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AN INVESTIGATION INTO THE IMPACT OF DECISION SUPPORT SYSTEMS ON STRATEGIC MARKETING PLANNING PRACTICE

Volume 1 of 2

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ABSTRACT

Relatively few companies gain the benefits from marketing planning claimed by prescriptive literature. This results from cognitive, procedural, resource, organisational, cultural and data availability barriers to effective planning. Research in other domains suggests that decision support systems (DSS) could assist in reducing some of these barriers.

The research aim was therefore to examine whether and how DSS could be used to improve strategic marketing planning practice. The research method incorporated: iterative development of a DSS named EXMAR; a formative evaluation of the prototype system using a survey and a multiple-case study; and a further multiple-case study of users of other, related systems to explore the extent to which the results from the EXMAR evaluation could be generalised.

The study confirms that software can play a valuable role in reducing some of the barriers to effective planning. Systems can assist with the effective application of analytical marketing tools through automated calculations, graphical display and on-line guidance, thus reducing the technical marketing knowledge required. Support for fast iteration allows these tools to be used to facilitate group strategy debates. Endeavours to move planning out of the hands of specialists and into cross-functional teams can be further aided by cross-functional analyses and by automated assistance with managing the complexity of multiple-level plans. The electronic format can support moves towards continuous planning based on a live marketing model of the business, helping the organisation to respond to internal or external changes without the constraints of the annual planning cycle. Other barriers such as cultural problems must, however, be reduced by other means.

Various factors contributing to success in system implementation are identified, including top management support, sufficiently wide planning team definition, appropriate definition of planning units, sufficiently flexible planning procedures, ease of use, and a system that is seen as empowering rather than controlling.

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Part 1: Introduction and Literature Review

1. Introduction

1.1 Aims of the research

We begin with a statement of the aims of the thesis, covering the ground of the literature review and the subsequent statement of research objectives in brief. The following sections of this introduction outline the research method (section 1.2) and describe the thesis structure (section 1.3). Full references are given in chapters 2 and 3 for the literature review, and in chapters 4 and 5 for the research objectives and method.

Few companies use a comprehensive marketing planning process, despite the substantial prescriptive literature on the importance, procedures and techniques of marketing planning. Of these few companies, some gain substantial benefits, but others do not. In an attempt to explain these inconsistencies, a number of researchers have identified barriers to successful marketing planning that can be categorised as cognitive, procedural, resource, organisational, cultural, informational and environmental problems.

The notion that support from decision support systems (DSS) could reduce some of these barriers is plausible by analogy with other fields of managerial practice, although other barriers could not be expected to be reduced through the use of software. There is, though, little previous research exploring this notion.

There is a similar paucity of commercial systems that attempt to address marketing planning, although this situation is beginning to change. Systems in use can be broadly categorised into five types: planning systems for multiple product-markets, aiming to assist with the definition and documentation of marketing strategy for a business unit with several product-markets; planning systems for one product or business unit; causal modelling systems; data consolidation and display systems; and systems supporting individual marketing techniques. The particular focus of this thesis is on the first of these types, although some tentative findings relate to other types of system.

It is to be expected from other domains that a system's impact on marketing planning would depend on its design and its implementation within the organisation. Therefore:

The research proposition is that an appropriately designed and implemented decision support system can improve strategic marketing planning practice.

This leads to two objectives:

The first research objective is to explore what benefits, if any, are gained by users of DSS for marketing planning. This includes which barriers to marketing planning are reduced by systems, if any, and whether system use results in any other benefits or dysfunctional effects.

The second research objective is to explore what aspects of the design and implementation of the systems have led to these benefits, and how they might be improved, in the areas of:

- *Nature of the system: How the marketing planning process and relevant marketing techniques are formalised to provide a marketing planning model as a basis for software support; what nature of support is provided by the system.*
- *System implementation: How the system is introduced into the organisation and applied.*

The research is exploratory not only due to the little previous research, but also because the systems and their use by organisations are at an early stage of development. Nevertheless, the choice of research methods includes theory testing as well as theory generating aspects, and hence some of the propositions generated have also been tested.

1.2 Overview of research method

This section summarises the research method, which is described and justified in detail in part 2 of the thesis. The research is in three major parts, whose results are reported in parts three to five of the thesis: the development of a DSS named EXMAR; its formative evaluation; and a further multiple-case study exploring the generality of the findings with users of a wider range of systems.

Development of EXMAR

Firstly, a decision support system named EXMAR was developed over several iterations, in order to investigate how software might best endeavour to assist with marketing planning. The DSS is an example of the first type of system in the list we described above, planning systems for multiple product-markets.

Formative evaluation of EXMAR

Secondly, a formative evaluation of one version of the system, termed the EXMAR prototype, was carried out with users who were mainly by chance in South Africa. The evaluation was formative in that its aim was as much to improve the evaluand - the system and its implementation - as to judge its merit (Shadish et al 1991). It consisted mainly of a triangulation of two parallel research methods: a small-scale survey with 61 respondents, and a multiple-case study.

The survey's main contribution was to the second research objective, through an examination of factors contributing to system success, based on a theoretical framework derived from previous research. System success, as the dependent variable, was measured perceptually through measures of user satisfaction. The relationship between the dependent variable and the various independent variables representing possible success factors was examined using correlation, analysis of variance and multiple regression.

The multiple-case study aimed to address both research objectives. It also complemented the survey through the use of a goal-free (Scriven 1972) approach, in which the impact of the system was examined inductively. In order to achieve this, the analytic induction method (Robinson 1951; Miles and Huberman 1994) was used, to allow a combination of theory generation and theory testing. 48 interviews were carried out in ten organisations: of these, 33 interviews in six organisations were selected for transcription and detailed analysis, complemented by participant observation in one case.

A third stage of the formative EXMAR evaluation, a system design evaluation with six UK companies, aimed to improve the design of the system itself. Its results only briefly reported in the body of the thesis, within our description of the EXMAR system in chapter 6: further details are given in Wilson and McDonald (1994b) in Appendix D.

Exploration of generality of findings

The formative EXMAR evaluation was limited by being restricted in its subject to one particular system at an early stage of development. The third part of the research aimed to explore the extent to which its findings could be generalised to a wider range of systems, through a further multiple-case study with eight organisations using a range of systems of relevance to marketing planning. 21 in-depth interviews formed the main means of data collection, again complemented by participant observation in one case. Of the eight organisations, four were using systems of the same type as EXMAR, planning systems for multiple product-markets, while four were examples of other system types.

1.3 Thesis structure

Part 1: Introduction and Literature Review

Chapter 1: Introduction

Chapter 2: Marketing Planning in Theory and in Practice

This chapter and the next provide a literature review with the purpose of defining the research gap which the thesis aims to contribute towards closing, later chapters referring to other aspects of the literature on marketing, IT and research methodology as appropriate. In this chapter we describe the gap between the prescriptive literature on marketing planning and the practice as observed in empirical studies. We review a number of barriers to effective marketing planning that have been identified. Weaknesses in the prescriptive literature are also acknowledged, but addressing these is excluded from the scope of this thesis.

Chapter 3: Decision Support Systems in Marketing Planning
After a review of schools of decision support, we examine research in domains other than marketing planning, concluding that the notion that decision support systems might reduce some of the marketing planning barriers we have identified is plausible. We then place marketing planning software within the context of a review of software in marketing, before presenting a simple typology of marketing planning systems. We discuss the little previous empirical research into DSS for marketing planning specifically, and finally derive a theoretical framework for research in DSS for marketing planning, that will later be used in the definition of the survey.

Part 2: Research Objectives and Method
Chapter 4: Research Objectives and Strategy
The chapter begins with the research objectives and an overview of the research strategy, including the stages into which the research has been divided, and information on the research context. The bulk of the chapter justifies the approach adopted to system evaluation, through a review of the suitability of various possible methods, complemented by a review of different system success measures, which are then used as a basis for the subsequent rationale for the choices made.

Chapter 5: Details of Research Methods
Whereas the previous chapter deals with broad methodological choices, this chapter describes in detail the method used for each stage of the research, starting with system development, briefly describing the system design evaluation and the design for an experiment which was dropped from the study following piloting, and proceeding to the main evaluation stages consisting of the survey, EXMAR multiple-case study and exploration of generality of findings.

Part 3: The EXMAR system
Chapter 6: The EXMAR system
We first describe a model of the strategic marketing planning process that was developed as a basis for the development of software. We then describe the various versions of the EXMAR system, in terms of their scope and the nature of the support they endeavour to provide. The results of the system design evaluation are used to motivate changes made to the design in moving from the prototype version to the subsequent versions termed the MacroScope system and the Visual Basic system (named after the programming languages used in their development).

Part 4: Formative system evaluation
Chapter 7: Survey of EXMAR users
In the first of two chapters on the formative evaluation of the EXMAR prototype, this chapter presents the results from the survey of users, first analysing the factors affecting system success, and then exploring the descriptive statistics relating to perceived benefits.

Chapter 8: Multiple-case study of EXMAR users
Each case is discussed, a case description being followed by description of any new or modified propositions arising from the case, and by an assessment of the case's strength

of support for each proposition. The chapter concludes with sections integrating the findings relating firstly to system benefits, and secondly to success factors.

Part 5: Exploration of generality of findings

Chapter 9: Case studies: planning systems for multiple product-markets

This chapter explores the extent to which the propositions generated in the previous chapter apply to a wider range of systems through four case studies, each dealing with a different system of the type we have identified as 'planning systems for multiple product-markets'. The structure is similar to that of the previous chapter.

Chapter 10: Case studies: other system types

This chapter complements the previous one by examining other types of system of relevance to marketing planning, one case relating to a data consolidation/display system, two cases examining use of a causal modelling system, and the fourth examining a planning system for a single product/business unit. After a comparison of the different benefits and success factors that emerge for different system types, the various approaches to modelling of markets embodied by the different system types are compared.

Part 6: Conclusions and implications

Chapter 11: Conclusions and implications

We first integrate the findings relating to planning systems for multiple product-markets, comparing and contrasting the findings of the EXMAR survey, the EXMAR multiple-case study and the case studies of a wider range of planning systems. We then summarise the tentative findings relating to other types of system. The chapter ends with a summary of the study's contribution to the literature, a summary of the study's limitations and some suggestions for future research.

Bibliography

Appendices

A. Model of marketing planning process: extract from Analysis Report

Appendices A and B complement the description of the EXMAR system in the body of the thesis. This appendix describes the first version of the marketing planning model developed as a basis for the EXMAR software. It is an extract from the Analysis Report which formed the first specification document for the earliest, 'demonstrator' version of the system.

B. Sample EXMAR screen snapshots

This appendix contains sample pictures of several versions of the EXMAR system, to illustrate the discussion of the system contained in chapter 6.

C. Questionnaire

The text of the questionnaire used in the survey of EXMAR users.

D. Papers

This appendix contains double blind refereed academic papers on the research as follows:

1. McDonald, M.H.B. and Wilson, H.N. (1990) State-of-the-art Developments in Expert Systems and Strategic Marketing Planning. *British Journal of Management*, 1, 159-170.

Describes the EXMAR demonstrator version within the context of a discussion of the applicability of expert systems to marketing planning and of the senses in which the expert systems term can, and cannot, be applied to EXMAR. Also reflects on the development process leading to the demonstrator system.

2. Wilson, H.N. and McDonald, M.H.B. (1994a) Decision Support Systems as Learning Aids: The Case of Marketing Planning. Refereed paper, *Proceedings of the Marketing Education Group Annual Conference*, University of Ulster, 1028-1037..

Presents an early analysis of data from the EXMAR multiple-case study relating to the system's hypothesised learning impact. This follows a literature review of the role of decision support systems as learning aids and an exploration of the analogy of decision support systems as process consultants.

3. Wilson, H.N. and McDonald, M.H.B. (1994b) Critical Problems in Marketing Planning: The Potential of Decision Support Systems. *Journal of Strategic Marketing*, 2, 249-269.

Reviews the rationale for applying DSS to marketing planning, and then presents findings from the EXMAR system design evaluation.

4. Wilson, H.N. and McDonald, M.H.B. (1996) Computer aided marketing planning: the experience of early adopters. Accepted for *Journal of Marketing Management*, scheduled for publication in Vol 12(5).

Presents results from the 'exploration of generality of findings' relating to planning systems for multiple product-markets.

2. Marketing Planning in Theory and in Practice

2.1 Definitions

There is a wide body of broadly consistent prescriptive literature on how and why marketing plans should be developed (Abell and Hammond 1979; Greenley 1986; Kotler 1988; Kotler and Armstrong 1989; McDonald 1995; Mercer 1995) covering the information to be collected and the process to be followed as well as appropriate analytical techniques (Hussey 1978; Wind and Saaty 1980; Wind 1981; Tull and Hawkins 1984; Aaker 1988; Brooksbank 1990; Proctor and Kitchen 1990; McDonald 1991; McDonald and Dunbar 1995).

There are, nevertheless, some differences in the definitions of marketing planning, and of strategic marketing planning in particular. Before examining the extent to which prescriptive literature is followed in practice, we discuss the definitions used in this thesis.

Marketing

The American Marketing Association's definition of marketing starts with the concept of exchange between two parties:

> "Marketing (management) is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organisational objectives." (Kotler 1988 p11)

This definition implicitly includes the 4 P's framework, which as Grönroos (1994) argues in an extensive review of the marketing mix, is subject to a number of difficulties in its four-part division of marketing, as well as in what is excluded, points also discussed by Christopher et al (1991). To avoid such difficulties, other definitions concentrate more exclusively on the relationship between the organisation and the customer, McDonald (1995) for example defining marketing as:

> "a matching between the company's capabilities and the wants of customers in order to achieve the objectives of both parties" (McDonald 1995)

The term 'product' can be viewed as an abstraction for the means by which the wants are to be supplied:

> "Marketing is a social and managerial process by which individuals and groups obtain what they need and want through creating and exchanging products and value with others." (Kotler 1988 p3)

Similarly, the term 'market' is often used as an abstraction for the wants of a more or less homogeneous group of customers. Hence marketing can be seen as addressing the product/market dimension of a business (Kotler 1988).

In moving towards marketing as a management process, the Chartered Institute of Marketing's definition includes the commonly mentioned importance (Kohli and Jaworski 1990) of anticipating future requirements as well as satisfying existing ones:

> "Marketing is the management process responsible for identifying, anticipating and satisfying customers' requirements profitably."

A further typical extension concerns the relevance of competitors and other aspects of the organisation's environment (Kohli and Jaworski 1990; Christopher et al 1991) in any endeavour to achieve this matching process between customer and supplier. In this vein, Piercy (1989) describes the marketing function as having:

> "a key boundary-spanning role, standing between the core of the organisation and the market environment".

For our purposes, we accept these various points, defining marketing as *the process of matching the organisation's objectives and capabilities to the current and anticipated wants of customers within the organisation's competitive and wider environment.*

Strategic marketing planning

The division of this marketing process into planning (which may include or be preceded by 'analysis' or 'audit'), implementation and control is well ingrained, for example forming the basis of the title of Kotler's (1988) standard textbook. This division implicitly suggests the periodic production of a written plan as the appropriate means of documenting how the matching process is to be achieved, although as we will review later, neither is this a statement of universal practice, nor is there clear evidence of its desirability. Nevertheless, the term 'planning' forms a convenient and common label for the formulation of how the matching is to be achieved, although terms such as 'strategy development' and 'strategy formulation' which are perhaps less laden with assumptions about documentation and sequencing are gaining in popularity (Bailey and Johnson 1994; Christopher et al 1991). In a different domain, that of public sector human services, McClintock et al (1979) sidestep this difficulty by defining planning as:

> "any activity directed to the preparation of information and decision alternatives for policy development, resource allocation, and program operation for specified human services to a defined population over some span of time."

In defining marketing planning as "the role, functioning, and contribution of the marketing area in planning in the organisation", John and Martin (1984) similarly avoid mentioning written plans, hence providing a definition which holds irrespective of the organisation's approach to documentation.

John and Martin (1984) were also seeking in this definition to avoid difficulties pertaining to how plan documentation is divided between organisational levels and functions. Prescriptive literature, as managerial practice (Hopkins 1981), varies on this point. Kotler (1988) advocates longer-term strategic planning at the corporate and business unit levels, complemented by marketing planning for individual product-markets, although he argues that the strategic planning should be "market-oriented" - his definition of strategic planning being strongly reminiscent of the earlier definitions of marketing:

> "Strategic planning is the managerial process of developing and maintaining a viable fit between the organisation's objectives and resources, and its changing market opportunities" (Kotler 1988 p33)

Piercy and Giles (1989) emphasise both the variations in practice and the sense in which a marketing plan is more than one of a number of equal functional plans:

> "In the practical setting there is frequently difficulty in distinguishing marketing planning from corporate or strategic planning...Our view is that...marketing planning can be positioned as the front-end of both corporate and strategic planning, which elevates it from the popular view of its use as an operational tool to its rightful place as a genuine strategic weapon."

Abell and Hammond (1979) are more explicit than Kotler in the role of marketing in the strategic plan, suggesting the use of the term "strategic market planning" in place of "business planning". Greenley's (1986) definitions, which draw on a review of the literature on the definition of marketing planning, are similar to Kotler's in distinguishing strategic planning from operational planning per function. He argues that as the term 'marketing planning' is often used exclusively to refer to the latter, clarity can only be achieved by talking of "planning of marketing at either strategic or operational levels". His characterisation of operational planning as including the manufacture and marketing of current products suggests agreement with Kotler that portfolio management issues form part only of strategic, and not of operational planning.

McDonald (1995) advocates producing strategic marketing plans with a longer-term outlook, complemented by one-year marketing plans. Unlike Kotler, he does not assume that one-year plans should be restricted to a single product-market, rather suggesting that they have a similar scope to strategic marketing plans but a greater degree of detail, particularly regarding implementation and control issues.

We wish to use definitions which do not make excessive assumptions about the way in which planning is organised in particular organisations, but it is clear that the variation in terminology renders any definition inconsistent with some of those discussed above. With some subjective choices, then, we will give some working definitions.

Marketing planning is the formulation of the intended means by which the matching between organisational capabilities and customer wants is to be achieved for the whole or part of the organisation for some time period. Strategic marketing planning is marketing planning for a time period of greater than one year.

A marketing plan is an agreed and recorded snapshot of this formulation. A strategic marketing plan is a marketing plan with a planning period of greater than one year.

The term 'snapshot' refers to the perhaps continually changing formulation, as ideas or circumstances change: a plan records the nature of the formulation at a particular point in time. We make no assumptions in this definition as to the medium in which this record is made, nor do we assume that marketing planning activities necessarily result in a marketing plan - as opposed, say, to informal, undocumented agreement. Marketing plans may refer to one product-market or many, and may be present at more than one organisational level.

2.2 Marketing planning in practice

Compared with the prescriptive literature, there is relatively little empirical research into marketing planning. Twelve significant studies have been examined (Ames 1968; Stasch and Lanktree 1980; Hopkins 1981; McDonald 1982; Greenley 1982 and 1983a; Cosse and Swan 1983; Hooley et al 1984; John and Martin 1984; Leppard 1987; Lysonski and Pecotich 1992; Greenley and Bayus 1993; Piercy and Morgan 1994). Five of these studies were US-based and five UK-based, with one comparing UK and US planning (Greenley and Bayus 1993) and one sampling New Zealand organisations (Lysonski and Pecotich 1992). Those by Ames (1968), Stasch and Lanktree (1980) and McDonald (1982) were qualitative studies based on interviews. The remainder used surveys, except for Leppard (1987) who employed both survey and case study methods.

Of these empirical studies, the evidence on marketing planning benefits derives from Stasch and Lanktree (1980), McDonald (1982), Lysonski and Pecotich (1992) and Piercy and Morgan (1994). Stasch and Lanktree's (1980) multiple-case study of six US consumer package goods companies found some evidence of a connection between the thoroughness of marketing planning and its effectiveness, which they assessed using profit/market share substitutes such as a recent history of launching new products successfully. Although a causal connection could not be shown, there was an association of thoroughness with effectiveness, to which the authors added their impression that the connection was indeed causal. Their concept of "thoroughness" was not based, as might be expected, on the degree to which formal steps or analyses were completed: rather, as summarised by Piercy and Morgan (1994), thoroughness involved "utilizing internal knowledge and experience from a number of levels; employing internal and external sources of ideas for the plan; budgeting an appropriate timescale and schedule for the task of planning; and, utilizing a number of organizational and motivational factors to encourage "good" planning." This relates closely to some of the barriers to effective marketing planning that we discuss below.

Piercy and Morgan (1994) found a relationship between the formalisation and sophistication of marketing planning and its effectiveness as measured by plan credibility, though they also identified a number of behavioural issues that were also significant predictors of plan credibility.

We summarise McDonald's (1984) reported benefits from appropriately applied marketing planning under three headings taken from Greenley (1987):

1. Procedural benefits: planning leads to realistic and accepted objectives, it requires a high level of actionable market information, and it results in control over the business
2. Process benefits: planning leads to higher levels of managerial motivation, greater inter-functional co-operation, and a greater awareness and acceptance of change
3. Efficiency benefits: planning relates to general improved business success, reduces waste and duplicated activities, results in a clearer understanding of priorities to be pursued, and gives less 'surprises' which lead to sporadic decision making.

McDonald's results were based on managerial perceptions. By contrast, Lysonski and Pecotich (1992) attempted a measurement of benefits in terms of organisational performance. They reported "a significant association between objective criteria of performance (i.e., revenue and profit) and [marketing planning] formalization and comprehensiveness. The positive relationships, although not strong, appear to hold in both stable and unstable environments." However, examination of their regression results shows that the only significant associations were with performance when measured in terms of revenue (after adjustment for company size in terms of employees), no significant relationship being found with profit. The small effect found (only 4% of the variance in revenue being explained by the regression), in combination with the dubiousness of revenue as a measure of performance and the number of other possible variables that could affect both revenue and planning formalisation/comprehensiveness, lead us to doubt the weight that can be attached to this finding.

There has, then, been limited assessment of the assumption that marketing planning is beneficial, though the available evidence is positive for some organisations - others falling foul of pitfalls that we discuss below. Although a considerably higher degree of attention has focused on the relationship between strategic planning in general and company performance, it has been inconclusive in its results. Greenley (1993) concluded from a review of twenty-nine studies that "the evidence from these studies is far from conclusive, and does not allow for the identification of a causal relationship between strategic planning and performance". He also warned that comparison of studies was difficult due to methodological differences. A study by McKiernan and Morris (1994) of UK SMEs failed to find an association between planning formality and performance, as well as providing another literature review reaching a similar conclusion to Greenley's. Papadakis (1995) argued for research looking less ambitiously at the link between formal planning and characteristics of strategic decision-making processes. His own study found that formal planning systems were positively associated with more rational and comprehensive decision-making, and with more financial reporting during investment decision-making. He also found that formal planning fostered hierarchical decentralization and lateral communication.

Consistent with these inconclusive studies of the efficacy of strategic planning, the marketing planning studies show that most companies do not follow the textbooks, and do not achieve the potential benefits we have discussed. Although 70% of companies produce marketing plans, only 10-14% are adequate when judged even in the most lenient terms by inclusion of standard steps advocated by prescriptive literature (Greenley 1982 and 1983a; McDonald 1982). This can be well illustrated by the inclusion in marketing plans of key data items:

1. Only 59% of organisations forecast market sizes three years ahead (Cosse and Swan 1983).
2. At the most generous estimate, only 68% split sales objectives into sales by market and 71% into sales by product (Hopkins 1981; Greenley 1982, 1983a). Future sales were most frequently arrived at by simple projection of trends, sales force opinions and 'gut feeling'.

3. 63% included market share in Greenley's (1982 and 1983a) surveys, 44% at segment level in Cosse and Swan (1983). Cosse and Swan found 49% deriving relative market share at product level. In Greenley's study, just one company specified market share as the most important objective.

Greenley found service companies to be even weaker than manufacturing companies on many criteria, having less detail on factors such as sales by product/service, sales by market and market share.

A similar picture emerges from consideration of the usage of analytical tools such as portfolio analysis, product life cycle analysis and perceptual maps. After a review of studies of the usage of such tools and a report on fresh survey results, Greenley and Bayus (1993) concluded that "Although few companies consider that their decision making is effective, there seems to be a reluctance to use decision making methods that are advocated in the literature." Even where serious attempts are made to apply the process and techniques advocated in the literature, they are far from universally successful in achieving the claimed benefits of marketing planning (McDonald 1982).

2.3 Barriers to marketing planning

Why is there such a wide gap between theory and practice? A number of the studies have shed light on this, identifying problems or barriers that frequently prevent the effective adoption of marketing planning. These findings are summarised in Table 2-1. A star indicates that the study has derived the barrier or problem from empirical data, with a clearly described and plausible research method, although in several cases the research is described by the researchers as exploratory. Inevitably, variables are grouped or defined differently in the various studies, so the table should be taken as an approximate guide only. The list of headings under which the barriers have been grouped ('Roles people play' etc) is adapted from Leppard (1987). Building upon an earlier version of this table drawn up by the author and published in Wilson and McDonald (1994b), McDonald (1996) found that this barrier list was also consistent with five further early studies published between 1966 and 1979. We discuss the barriers individually below.

B1 Lack of chief executive/senior management involvement. The importance of direction and regular guidance from senior management is emphasised by Stasch and Lanktree (1980) amongst others. Piercy and Morgan (1994) include a "marketing planning thoroughness" factor based on several variables mirroring Stasch and Lanktree's concept of thoroughness, including "We use experience and knowledge from all levels and all parts of the organisation". The factor was positively associated with plan credibility.

B2 Lack of cross-functional involvement. Ames (1968) claimed the involvement of functions other than marketing to be vital in industrial markets; a number of other studies have since followed suit. This is consistent with John and Martin's (1984) survey result that high centralisation of authority affected both plan credibility and plan utilization negatively.

Table 2-1: Marketing planning barriers

Research studies	1	2	3	4	5	6	7
Barriers							
Roles people play							
B1 Lack of chief executive/senior management involvement	*	*	*	*			*
B2 Lack of cross-functional involvement	*	*	*	*			*
B3 Lack of top management support	*	*					*
Cognitive							
B4 Knowledge and skills	*					*	*
B5 Lack of innovation/non-recognition of alternatives		*	*				*
Systems and procedures							
B6 Lack of care in marketing planning introduction	*				*		*
B7 Forecasts without documentation of intervention	*		*				*
B8 Inflexible application of textbook process	*		*			*	*
B9 Lack of follow-through to implementation	*		*				*
B10 Too much detail	*		*				*
Resources							
B11 Lack of time (elapsed and/or effort)	*	*		*			*
B12 Lack of money (for market research etc)	*						
Organisational environment/culture							
B13 Organisational structure inappropriate	*		*			*	
B14 Stage of organisational development					*		
B15 Corporate politics		*	*				*
B16 Short-term oriented reward systems	*			*			*
B17 Culture stifling idea generation/openness			*	*	*		*
Data							
B18 Lack of information	*	*	*	*		*	*
Environmental							
B19 Difficulty of forecasting in times of turbulence and inflation		*					

Key to studies
1. McDonald (1982)
2. Hopkins (1981)
3. Ames (1968)
4. Stasch & Lanktree (1980)
5. Leppard (1987)
6. Hooley et al (1984)
7. Piercy & Morgan (1994)

B3 Lack of top management support. This can be distinguished from top management involvement (Ames 1968). Piper and Smith (1990) present an interesting case study of the introduction of marketing planning into a difficult corporate culture, with a pervasive fear of change, a short term focus and interfunctional animosity. With strong sponsorship from a General Manager, commitment from the consultants, and continual review and modification to enable early successes, the project was perceived as a success, though introduction of planning was slower than at first envisaged.

B4 Lack of knowledge and skills. This barrier is confirmed by the already-mentioned research into the use of marketing planning tools and techniques (Greenley and Bayus 1993), for example an Australian study (McColl-Kennedy et al 1989) which found that "The awareness and usage level of planning tools is low". Reid and Hinkley (1989), looking at techniques such as the BCG matrix, Directional Policy Matrix, Ansoff Matrix, PIMS and the Experience Curve, reported:

> "Respondents were asked which techniques they were familiar with. The results were skewed towards ignorance of all the major techniques to which they were exposed. The majority were not at all familiar with any by name. The level of awareness of the techniques was not significantly different between Hong Kong and the UK."

Practising marketers agree. Cowell (1987) asked UK marketers in what areas they needed further training in order to succeed in their present jobs or to achieve their planned career path. Marketing planning was the single most common area quoted, both overall and across each industry sector, with 60% of respondents expressing the need for further training.

Concerning marketing tools and techniques, knowledge is necessary not just about the tools themselves, but also about their weaknesses, and dangers in their use, a point we will return to in the following section. For example, limitations of portfolio matrices are listed by Hussey (1978), Wind (1981), Aaker (1988), Kotler (1988) and Ohmae (1983). For the GE/McKinsey matrix, Kotler lists the following: the matrix may lead to overemphasis on highly attractive markets to the neglect of the current business; the results are sensitive to the ratings and weights; since an averaging process is occurring, two businesses may be in the same position but differ greatly in the underlying ratings and weights; many businesses will end up in the middle of the matrix due to compromises in ratings; and the model fails to accommodate synergies between two or more businesses.

Leppard (1987) argues that simple models are rarely adequate for all circumstances, and that a synthesis of existing theory is the necessary approach, further exacerbating the learning problem (McDonald 1990a).

B5 Lack of innovation/non-recognition of alternatives. Hopkins (1981) reported that:

> "A common worry is that managers may follow planning instructions to the letter, and yet fail to show evidence of the special kind of thinking, both analytical and innovative, that the instructions are supposed to engender".

The lack even of recognition that alternative strategies were possible was reported by Ames (1968):

> "we were surprised to see how many planners had tunnel vision in thinking about how the business should be run. In fact, so many plans were based on nothing more than straight-line extrapolation of the past".

In similar vein, problems contributing to a "politics and myopia" factor in Piercy and Morgan's (1994) study included resisting innovative ideas, projecting current trends rather than analysing the future for opportunities, and relying excessively on "rational" techniques when more intuitive thinking was called for. The factor was negatively associated with plan credibility.

B6 Lack of care in marketing planning introduction. McDonald (1982) reported the need to communicate the need for a marketing planning system, the need to test the system out on a limited basis and the need for training programmes. Drawing on change literature, Leppard (1987) also cited the importance of culture carriers.

B7 Forecasts without documentation of intervention. The confusion between a forecast of future sales on current trends and objectives which require documentation of the means by which they will be achieved is highlighted by McDonald (1982) and Ames (1968). Relevant questions in Piercy and Morgan's (1994) study included "Project current trends rather than analyze the future for opportunities", which loaded strongly onto the already-mentioned "politics and myopia" factor.

B8 Inflexible application of textbook process. The dangers of blindly following a standardised process which may need adaptation to specific circumstances were identified by several studies.

B9 Lack of follow-through to implementation. Ames (1968) described successful companies as exhibiting superior programming, in which all programs or projects were linked to product/market strategy. McDonald (1982) identified a failure to prioritise objectives as a key cause of managers becoming "sidetracked by trivia" when implementing plans. Piercy and Morgan (1994) examine a number of relevant behavioural problems including "avoid responsibility for reaching forecasted goals" which was found to be part of a "planning avoidance" factor, and aspects of a "planning recalcitrance" factor such as "File away the plan until next year and do not look at it" and "See marketing planning as a once-a-year ritual". Although the association between these individual variables and plan credibility was not reported, the factors to which they contributed were negatively associated with plan credibility. A quality management perspective led Ballantyne et al (1992) to suggest attention to process ownership, job definition, training and performance monitoring to help implement marketing plans effectively.

B10 Too much detail. One cause of the excessively detailed, inflexible plans found by Ames (1968) is a confusion between the planning process and the output, also explicitly mentioned by McDonald (1982). The output plan should summarise the information collected during the planning process, not replicate it. Piercy and Morgan (1994) examined a political reason for too much detail: the variable ""Pad" their plan to avoid close measurement", which contributed to their "politics and myopia" factor.

B11 Lack of time. Shortage of time for planning may relate to a compressed elapsed time or to excessive demands on other activities. In their survey of US grocery product managers, Cosse and Swan (1983) collected views on the value of various information items commonly regarded as relevant to marketing plans. They asked for a score on a five-point scale for the usefulness of each, and a separate score for the effort involved in the analysis. All analyses received a mean usefulness score greater than 3; however, the effort scores were often also high, particularly for data at market segment level. To a significant degree, the analyses actually used were those where the usefulness rating exceeded the effort rating. This result is of considerable interest, as it suggests that if means can be found of lowering the effort involved in analyses, the depth of analysis will be increased.

B12 Lack of money. Money may be needed for purposes such as market research (McDonald 1982).

B13 Organisational structure inappropriate. SBU definition can be critical for planning as for implementation (Ohmae 1983): this is also quoted as important by Ames (1968). A particular issue receiving much recent attention is the role of product managers and brand managers in FMCG firms (Economist 1994), which, it could be argued, have traditionally represented an organisation around products more than one around markets. This debate on marketing organisation has extended far beyond FMCG organisations, largely perhaps due to pressures to downsize (McDonald et al 1994). McDonald (1982) argues that the company should organise around customers, and if possible have a single executive responsible for marketing and sales. Piercy and Cravens (1995) draw less definitive conclusions from a review of more recent pressures for organisational change impacting on marketing, and of the diverse range of forms of network organisation that can result, but they do emphasise the importance for marketing of organisational structure:

> "The exploitation of the network paradigm should be an explicit choice for the implementation of strategy, made in preference to identified alternatives, not an inevitable drift in imitation of the supposed success with network organizations of other companies. We believe that such developments should include an explicit strategy for developing the marketing process and its supporting structures, even accepting that this may be dramatically different from the conventional marketing department."

B14 Stage of organisational development. In his study of 34 British companies, Leppard (1987) found a relationship between how marketing planning is tackled and the stage of development of the company. Stage of development was measured by operationalising a developmental life-line moving through the stages of creative evolution, directed evolution, delegated evolution, coordinated evolution and collaborative evolution, with crises marking the boundaries from one stage to the next. For example, no marketing planners were found in the initial, creative evolution stage. He was open-minded as to whether the process should be matched to the culture, or whether the culture should be changed, but he concluded that, at the least, the 'patient' should be considered before prescribing the 'cure'.

B15 Corporate politics. We have already mentioned some of the variables examined by Piercy and Morgan (1994) under the factor "Politics and myopia". Other variables contributing to this factor include intentionally failing to share information on matters of mutual concern and avoiding agreeing to goals that are difficult to reach. The relationship between information control, power and politics was further explored by Piercy (1989), who amongst other results found a positive relationship between the restriction of marketing information flow by marketing departments and corporate politicization. He also found that marketing information flow was restricted less when the marketing department had a higher 'positional power', or formal status in the organisation, suggesting "a possible substitution effect between formal power and the politics of information restriction by marketing departments".

B16 Short-term oriented reward systems. The studies suggest that remuneration and other reward mechanisms that are tuned mainly or exclusively to short-term performance can act as a barrier to long-term thinking.

B17 Culture stifling idea generation/openness. Ames' (1968) warning that top executives must "take pains to avoid any atmosphere of an inquisition and, instead, must stimulate open exchange of ideas and opinions" has been echoed by later studies.

B18 Lack of information. The need for a collation of internally available information, including 'soft' information derived from the experience of those close to the market from all business functions (McDonald 1982), complemented by external information such as market research (Hooley et al 1984), has been explored in many of the studies.

B19 Difficulty of forecasting in times of turbulence and inflation. Hopkins (1981) reported that forecasting became "even harder...in times of economic turbulence and inflation. Added complications arise in some industries, for example, from environmental changes and government regulation." Lysonski and Pecotich (1992), though, found little difference between stable and unstable environments in their limited evidence for a relationship between planning and performance. Turbulence has also been studied with respect to market orientation: Kohli and Jaworski (1990) suggested that greater market turbulence strengthened the relationship between market orientation and business performance, but Greenley (1995b) found on the contrary that market orientation may not be advantageous in highly turbulent markets.

2.4 Weaknesses in theory

As we have seen, much empirical research pins the blame for inadequacies in marketing planning practice firmly on the organisations that are applying the theory. But to what extent is the theory itself inadequate? Greenley (1987) regards this as an unanswered paradox. In support of the contention that at least some of the blame should be put at the door of the theory, we consider briefly two examples: the interface between marketing planning and accounting, and a recent debate concerning the efficacy of the BCG matrix.

The marketing/accounting interface

Inclusion of profit as a marketing objective is not universally advocated (Greenley 1987), but most companies nevertheless include profit or contribution in marketing plans (Greenley 1982, Shipley 1985). To achieve this at any level other than the whole business or major business units, however, it is necessary to address both theoretical and practical problems of terminology and cost allocation (Srikanthan et al 1987). One approach to this minefield is the 'attributable costs' system, in which costs allocated to a product or service are those which would be avoided if the product were discontinued without changing the supporting organisational structure.

But these issues are discussed little in marketing planning texts, which offer little practical advice as to how, for example, one quantifies the current and future profitability of product-markets and how this is affected by proposed strategies. In any case, most companies' accounting systems do not deliver information in the right form for such analysis, having been designed primarily to meet financial reporting requirements. Cost allocation by product is often incomplete or arbitrary, and allocation by market or customer generally absent. 'Accounting for marketing information systems' have been proposed to address this information need (Meldrum et al 1987).

Such difficulties extend to investment analysis. Ward et al (1991) advocate the use of investment analysis techniques that are appropriate to the decision: for example, use of discounted cash flow (Winer 1966) rather than return on investment for long-term decisions. Use of these, too, runs into accounting problems such as use of the 'prudency' concept for marketing expenses, versus the 'matching' concept for decisions on plant and so on.

Srikanthan et al (1989) also argue that accounting for brands by use of net present values can aid strategic marketing. Piercy (1986) argues more broadly for a recognition of the need "to turn attention away from the concept of marketing as a cost centre, or even a profit centre, and towards the creation of marketing assets." As well as brands, these assets can include market share and market position more generally, company reputation, and aspects of the organisation's marketing expertise such as logistical expertise, sales force skills and so on. He states that "The problem we face is how to account for such intangible assets", on the grounds that "in the absence of explicit recognition and measurement marketing assets may be squandered".

But as Cosse and Swan (1983) found, even simple marketing-related financial analyses are little performed in practice due to the high effort involved. It seems likely that this is also partly due to the immaturity of the literature, in particular that relating the accounting concepts to marketing theory.

We conclude that in the case of the marketing planning/accounting interface at least, the barriers to effective planning may include weaknesses in the models contained in marketing literature.

Validation of analytical tools: the BCG matrix

In Armstrong and Brodie's (1994a, 1994b) challenging experiment on the BCG matrix, subjects were asked to make a hypothetical investment decision, which had been defined in such a way that investing in the BCG 'star' would be less profitable than investing in the 'dog'. Subjects exposed to the BCG matrix were found to be more likely to choose the less profitable investment.

Whether or not one regards the experiment as an "elaborate tautology" (Wensley 1994), given the way in which the hypothetical situation was defined to expose the weaknesses of the BCG matrix (Wind 1981), it highlights a number of points on the nature of marketing theory and its dissemination - most obviously that marketing theory needs evaluation and validation, that this validation has not occurred even for commonly taught analytical tools, and that marketing educators have a responsibility to convey adequately the potential weaknesses of structures, frameworks, individual tools and methodologies.

But, reflecting on what Armstrong and Brodie's experiment did *not* examine, several important aspects of the relationship between marketing theory and practice seem to be highlighted:

1. Complexity of analysis. Much planning occurs within the context of considerable uncertainty, in which the power of precise financial techniques is not available. In this situation, individual marketing tools may be tried as a simplifying heuristic. But to counter individual tool weaknesses, the use of several complementary tools may be necessary (McDonald 1990a), as well as the use of more complex versions such as the multiple-factor elaborations of the BCG matrix. Even when exact data are available, similar issues of managing complexity arise in applying the financial analyses, which are also poorly understood (Armstrong and Brodie 1994a).
2. Group planning. As 'right' answers are in short supply, decision-making is frequently the result of a group process in which tools act as communication devices as much as decision-making aids (Bowman 1991).
3. The live marketing model. Planning may be ad-hoc or continuous rather than occurring in formal annual processes (Bailey and Johnson 1994). The potential of marketing tools may be as much to facilitate a commonly-held and evolving cognitive map (Langfield-Smith 1992; Eden 1989) as to aid in particular decisions.

These issues add extra complexity to the question of how best to support managers in translating theory into practice. Our examination in this thesis of one particular line of attack - the potential of decision support systems for marketing planning - accordingly includes discussion of whether systems can help to manage the complexity of marketing tools, whether group planning is thereby modified or facilitated, and whether software can aid the maintenance of a continuously-updated marketing model of the business.

Nevertheless, this discussion, and the preceding one about the marketing/accounting interface, illustrate that conventional marketing planning theory can be questioned for its validity and completeness. Other examples are:

- The literature on the importance of customer retention (Reichheld and Sasser 1990) and the limitations this poses on frameworks that treat each sale as a separate event. Drawing on this and other influences on marketing from quality management and customer service perspectives, Christopher et al (1991) go as far as to identify an "emerging redefinition" of marketing as "being concerned with the establishment of enduring and mutually profitable relationships between the firm and its customers".
- The related problem of market segmentations which are based on cross-sectional data and which ignore switching behaviour, and other question-marks about market segmentation (Wensley 1995; Saunders 1995), such as the importance of looking at

individual customers as well as at averaged and aggregated 'markets'. The quality management perspective, for example, can add a valuable emphasis on variability in the offering provided to individuals, although requiring a complementary marketing perspective to counter the danger that TQM planning structures are "often only tenuously linked to customer expectations" (Ballantyne et al 1992).

- The raising of the profile of plan implementation (Ohmae 1983), including discussions of internal marketing (Christopher et al 1991), defined by Ballantyne et al (1992) as "*any* form of marketing within an organisation which focusses staff attention on the internal activities that need to be changed in order that marketing plans might be implemented." Piercy and Morgan (1991) argue that plan implementation cannot be regarded simply as a matter of tactics and internal selling of a plan that has already been developed. Instead, internal constraints may need to be taken into account when developing external strategy, representing genuine internal marketing - the term 'marketing' implying a focus on the needs of the internal buyer, as well as providing a ready source of concepts and language for planning implementation strategies.
- The related work of researchers who have observed different styles of strategy development in organisations, of which periodic plan production based on rational decision-making followed by its implementation forms only one option (Anderson 1983; Pinfield 1986; Bailey and Johnson 1994). Piercy and Morgan (1991) tie this to the issue of internal marketing through an exposition of how such marketing frameworks as the 4 P's can be applied whether one views decision-making from a rational perspective or from those of politics and power.

While accepting the considerable importance of these debates on the status of existing theory, we assume in this thesis that the prescriptive marketing planning theory as traditionally defined has some validity and utility, and with some limited exceptions, concern ourselves with the potential role of software in applying well-documented aspects of that theory in the field, leaving other researchers to consider the primarily software-independent issues raised by these debates, such as how they might modify the process and tools presented in prescriptive marketing planning literature, or indeed might fundamentally modify the conceptions of 'marketing' and 'planning' and hence of their combination.

2.5 Summary

Despite the benefits claimed for marketing planning, planning in practice has a poor match to prescriptive theory. This results from cognitive, information, cultural and organisational barriers to effective planning. Although there are also weaknesses in the prescriptive theory, we assume that there is some value the conventional prescriptions, and concentrate on how it can best be applied.

We now turn to decision support systems in marketing, to answer the question: are there grounds for hoping that decision support systems can help to address the kinds of barriers that we have identified?

3. Decision Support Systems in Marketing Planning

3.1 Introduction

After a review of schools of decision support (section 3.2), we examine DSS research in domains other than marketing planning (section 3.3), concluding that the notion that decision support systems might reduce some of the marketing planning barriers we have identified is plausible. We then place marketing planning software within the context of a review of software in marketing (section 3.4), before presenting a simple typology of marketing planning systems (section 3.5) that we will later use to categorise the systems used in our case studies. We then discuss the little previous empirical research into DSS for marketing planning specifically (section 3.6), and finally show a theoretical framework for research in DSS for marketing planning (section 3.7), that will later be used in the derivation of the survey.

3.2 Decision support systems in context

The term 'decision support system' (DSS) does not have a clear definition, despite its use since at least the early 1970s as:

> "representing a concept of the role of computers within the decision making process" (Gorry and Scott Morton 1971).

Stabell (1986) regards its key characteristic not as a technical one, but as being the context in which the systems are to be used: he therefore defines DSS as:

> "systems developed to support managers' decision making processes in complex and ill-structured decision situations".

The reference to the degree to which decisions are structured refers back to Gorry and Scott Morton (1971), who defined DSS as supporting semi-structured and unstructured decisions, structured decisions being the preserve of "structured decision systems" that were often included under the label "management information systems". The term DSS is often taken to include expert systems, which in their attempt to mimic human experts are in general aiming to support human decision making.

A common distinction is between data-oriented and model-oriented programs (Hirst 1991a). This distinction is often applied specifically to decision support systems, Keen (1980) suggesting that those researchers who regard DSS as a subfield of management information systems (MIS) equate decision support with providing managers with access to data, while those who regard DSS as an extension of Management Science techniques equate DSS with providing access to analytic models. Some regard this distinction as a continuum rather than a dichotomy (Alter 1987). Alter uses this continuum as a basis for a taxonomy of DSSs, based on a study of live systems, which illustrates the diversity of types of system that may be described as DSSs:

A. File drawer systems, which allow immediate access to items.
B. Data analysis systems, allowing the manipulation of data.
C. Analysis information systems, providing “a series of databases and small models”. Relational databases (Codd 1970; Date 1986) are included here.
D. Accounting models, calculating the consequences of planned actions based on accounting definitions.
E. Representational models, estimating the consequences of actions based on models where values are not related by definition, for example models of price sensitivity. The key problem in these cases, Alter found, was the tradeoff between richness and comprehensibility.
F. Optimisation models, for example time scheduling.
G. Suggestion models, where the output was a specific recommendation. In the cases in this category that Alter looked at, the specification of the system was considered a major breakthrough.

Given the looseness of the definition of DSS apparent from the diversity of this list, it is not surprising that there are a number of approaches to their development. Five schools can be broadly identified, which we will discuss before returning to the issue of definitions: decision calculus; decision analysis; decision research; implementation process; and expert systems.

John Little's paper (1970) which started the **decision calculus** 'school' starts with the observation that "The big problem with management science models is that managers practically never use them". He goes on to argue for model-based systems which are simple (easy to understand); easy to control (it should be possible to change the input to get desired output); easy to communicate with (implying the importance of the user interface); robust (it should be difficult to get meaningless answers); as complete as possible (if necessary through incorporation of judgemental estimates), and adaptive (the model can be adjusted as new information is acquired). The 1970 paper described BRANDAID, a system modelling advertising effectiveness. An example of an inventory control system within this school is described by Floyd et al (1989). Lodish (1981) described other applications of Little’s approach in marketing, including CALLPLAN, which helped salespeople to allocate their time among accounts and prospects. He too emphasised the importance of ease of control, in remarks which will prove pertinent to this study:

> "Before the salesmen got their first results at the computer terminal, their initial reaction was one of caution and skepticism. However, experience with the interactive program transformed this attitude into varying levels of enthusiasm as the salesman realized that he was controlling the program, rather than it controlling him. Once the salesman realizes that all the computer and model are doing is a lot of arithmetic and evaluations that the salesman would like to do but could not do because of limitations to his computing power, his attitude towards the model changes very dramatically."

Decision analysis, as commonly used within DSS literature, addresses the problem of choosing between options under uncertainty with multiple goals (Stabell 1986; Wind and Saaty 1980). A decision is summarised as a decision tree (Phillips 1989). The Analytic Hierarchy Process is frequently (Wind and Saaty 1980), but not invariably (Phillips 1989), used to formalise this numerically with a tree structure of scores and weights. The

Analytic Hierarchy Process contrasts with Little's approach in that it is, in the author's view, hard for the user to understand the linear algebra-based mathematics performed by the computer without a mathematics degree. Wind and Saaty's argument is that the test of a method is its reliability and validity in reaching an answer. Little's argument is that if users can't understand it, they won't use it, and that in any case use of a system is as much to do with an "updating of his intuition" as reaching an immediate decision.

The **Decision research** and **implementation process** schools primarily address the means by which a DSS is built rather than the end result (Stabell 1986). Decision research advocates that the decision maker's current behaviour must be understood before it can be modified through a diagnosis of opportunities for improvement. Implementation process, also known as adaptive design (Keen 1980) or evolutionary development, advocates use of prototyping to get started quickly, with gradual improvements and extensions to the system (Iivari and Karjalainen 1989). A major criterion for success for the implementation process school is that the system that is developed should be used, whereas decision research, having understood the decision-maker's behaviour, wishes to modify it with the help of a computer system towards some more ideal state. Keen (1980) went as far as asserting that:

> "the label "support system" is meaningful only in situations where the "final" system must emerge through an adaptive process of design and usage".

He justified this through the observations that semi-structured tasks are characterised by a difficulty in laying out procedures and requirements in functional specifications; that users do not know what they want and so an initial system must be built to provide users with something to react to; and that:

> "the actual uses of DSS are almost invariably different from the intended ones; indeed, many of the most valued and innovative uses could not have been predicted when the system was designed".

The origins of **Expert systems** in research into artificial intelligence (AI) gives rise to its particular flavour: the attempt to capture the expertise of a domain expert in a computer system. This is a hyperbole-laden area in which prescription far outweighs practice (Wright and Rowe 1992). The vast literature on expert systems, including 500 dissertations in a 1991 search of *Dissertation Abstracts*, compared with 200 on DSS and 29 on marketing planning, contrasts with the author's experience in a 50-strong artificial intelligence company, which in six years delivered no successful commercial expert systems (though delivering a number of other systems using expert systems' enabling technologies). Most of the employees concluded, with John Seely Brown (1984), then director of the influential Xerox Palo Alto Research Center:

> "The real payoff of Artificial Intelligence during the next few years may not be in expert systems, but rather in commercially exploiting the artificial intelligence mentality (a mentality for coping with ill-defined, constantly-changing problems), and the intelligent programming environments that have emerged to enable AI researchers to cope with immensely complex problems."

This anecdotal observation is confirmed by statistics gathered by Mingers and Adlam (1989) that of 1,000 articles on expert systems published in 20 journals from 1984 to 1988, only ten were in regular use.

What constitutes an expert system (or the related term 'knowledge-based system') is a contentious issue (Doukidis 1989). It can be argued that any computer system incorporates expertise in a sense - even, say, a payroll system, which incorporates the rules for calculation of pay and deductions, traditionally within a procedural programming language. Brown (1984) usefully distinguishes between the "low road" of embedding the expertise in data structures and procedures (as in this payroll example), the "high road" of an explicit, "deep" representation, and the "middle road" of an explicit but heuristic representation based on rules of thumb. Much of the literature (Luconi et al 1986; Chadha et al 1991; McDonald 1989b, Rangaswamy et al 1989), though not all (Bobrow et al 1986a; Aitken and Bintley 1989; Duan and Burrell 1995; Dubelaar et al 1991), assumes a technical definition of expert systems based on the "rule-based" middle road, generalising considerably from some early successes such as MYCIN (Buchan and Shortliffe 1984) which tackled a problem in medical diagnosis, and XCON, a system for configuring computer systems (Barker and O'Connor 1989), and providing a large literature of prescriptions about such issues as how the system should be structured and how it should be developed. While this approach has proved promising for such applications as international negotiations (Rangaswamy et al 1989), the disadvantage of such technical definitions is that they exclude systems that in some sense mimic human experts, but that are built with a different technical approach (Bobrow et al 1986a; Duan and Burrell 1995).

A similar problem with definition occurs with **group decision support systems (GDSS),** a subset of decision support systems often discussed in the literature (Pinsonneault and Kraemer 1989). These aim to support a group of decision-makers rather than an individual. This distinction cuts across the schools discussed above. While normally thought of technologically through the use of 'multi-user' hardware and software, for example through decision conferencing rooms equipped with special equipment (Nunamaker et al 1988), it is possible to regard some single-workstation systems as supporting group work, if for example they make it easy to share information via diskettes or networks (Trigg et al 1986), or simply if the outputs are used as part of group decision-making (Keen 1980). Hence, definitions may concentrate on the use of the system by a group, for example Kraemer and King (1988), who defined a GDSS as any computer and communication based support of group work including, but not limited to, decision making.

This definition also raises the debate, which we have already touched on, as to whether DSS necessarily support decision-making as opposed to other activities or tasks. Alter (1977) simply distinguishes DSS which "facilitate management, planning or staff activities" from electronic data processing systems which "emphasize intrinsically clerical activities". Looking specifically at group systems, Pinsonneault and Kraemer (1989) distinguish group communication support systems, which "primarily support the communication process between group members", and GDSS, which "attempt to structure the group decision process in some way". Vogel and Nunamaker (1990) review the emerging use of terms such as 'group *deliberation* support system', 'group *process* support system' and the simpler 'group support system', in order to capture the notion that systems known as DSS have roles including communication and information processing as well as support for decision-making. We have already quoted Keen (1980) as using the term "support system", which is understandable given his observation (based on a review of live systems) that:

> "While the orthodox (academic) faith views DSS as tools for individual decision makers, users regard the concept as more relevant to systems that support organizational process. They also feel they do not really use DSS for decision making."

In Keen's view, benefits instead relate to improved communications, insight and learning.

Turning, then, to a working definition of DSS for this study, we would not wish to rule out the possibility that systems that aim to assist with marketing planning might have impacts in such areas as "improved communications, insight and learning", these forming aims of marketing planning as much as does the taking of decisions on, for example, resource allocation. Although we will use the term "decision support system" because of its common usage, we do not, therefore, wish to assume that its only purpose is to support decision-making. We also find Alter's (1977) distinction between "management, planning or staff activities" and other activities problematic. We therefore follow many previous definitions (Stabell 1986, Benbasat and Nault 1990, Eom and Lee 1990) in making use of Gorry and Scott Morton's (1971) concept of decision or task structure, defining a DSS as:

A system which aims to support unstructured or semi-structured tasks performed by individuals or groups, including but not limited to decision-making.

3.3 Why apply decision support systems to marketing planning?

Having discussed definitions and types of DSS, we will now look at each group of marketing planning barriers in **Table 2-1**, to explore whether similar problems have been reduced by DSS use in other areas of managerial activity.

Roles people play

Intuitively, this is not the most promising area for computers to offer assistance. It seems unlikely, for example, that the use of a DSS would of itself increase senior management's support for marketing planning. Relationships such as this have been more frequently hypothesised the other way round, for example in a number of studies that have found top management's support for a DSS project to be a factor contributing to project success (Sanders and Courtney 1985; Guimaraes et al 1992). It is nevertheless possible that a system could indirectly increase top management support for marketing planning due to the learning effect of system use, discussed later.

Greater involvement in marketing planning from top management or from staff outside marketing could also result from a group decision support system's facilitation for group working. Experiments on groups (Pinsonneault and Kraemer 1989; Nunamaker et al 1988) show that computer support for group decision-making can result in greater participation among members. In the laboratory, though, members are present to participate; if within the organisation they are not consulted at all, or do not make themselves available, the computer system cannot reduce this barrier to effective planning.

Any impact of decision support on these barriers, then, is likely to be limited.

Cognitive

An early objective of decision support systems was to make management science models, little understood and little used by practising managers, more available and usable (Little 1970). DSSs have been found to result in a greater depth of analysis (Pinsonneault and Kraemer 1989), suggesting perhaps a measure of success with this objective in cases where systems have been applied.

A number of marketing tools and techniques, such as portfolio matrices and product life cycles, involve graphical display of information as well as analysis. Appropriate graphical display has been shown to impact decision-making positively (Benbasat and Dexter 1986; Jarvenpaa 1989), suggesting that if a DSS reduces the effort involved in generating the display, it will render the marketing tools more usable. But it is not just the effort involved that holds practitioners back from using graphical tools: some of the cognitive difficulties found by practitioners relate to technical aspects of the graphics, such as logarithmic scales on a portfolio matrix (McDonald 1990b). It is plausible that computer support could overcome these difficulties. As many decision support systems have a substantial graphical component, this is a factor, unexplored in many studies, that may contribute widely to the impact of the technology.

A related goal of decision support systems has been to encourage the consideration of more alternative solutions to a problem (Lodish 1981). Some studies have found that system users consider more alternatives (Sainfort et al 1990), in some cases through explicit support for brainstorming (Nunamaker et al 1988). The role of the system in challenging previous perceptions is evidenced by Dickmeyer (1983), who found DSS users more likely to change their minds due to a planning exercise. Other studies, though, have not found a significant difference in alternatives considered (Sharda et al 1988).

As well as compensating for a lack of knowledge and skills, using a decision support system may actually teach the user some of the skills he or she lacks. If a DSS helps a user to perform a task, the user may learn by example how to perform similar tasks (Little 1970). Van Horn (1990), for instance, found this effect with a telecommunications planning DSS.

Systems and procedures

The extensive work on group decision support at the University of Arizona (Nunamaker et al 1987, 1988) concentrates on support for a planning process. The researchers report that this works well whether the process is prescribed by the system designers or defined by the participants. As we discuss in the next section, this contrasts with most software currently available for marketing strategy, which concentrates on assisting with specific tools and techniques, resulting in calls for more support for a planning process that combines the techniques together (Waalewijn and Boulan 1990; McCann 1991).

The Arizona researchers recognise the importance of text to complement numerical data in planning, and claim to have achieved good results with the incorporation of suitable facilities in their DSS. This might be hoped to assist with the common problem of planning forecasts being made without documentation of how they are to be achieved.

A formalised marketing planning process has for some companies proved a mixed blessing. There is perhaps a trade-off between formalisation and flexibility. The Arizona research found that the larger the group, the more the participants appreciated the structure provided by the system. We have mentioned the recognition by Little (1970) and Lodish (1981) of the importance of leaving the user in control of the decision-making process. This contrasts with the language used by Wind and Saaty (1980) who discuss how a system based on the Analytic Hierarchy Process:

> "forces them [managers] to explicate the environmental scenarios most likely to affect their business decisions...the discipline forced by the need to structure the problem hierarchically may help achieve consensus over the dimensions of the problem."

Not surprisingly, perhaps, the authors admit difficulties with persuading managers to participate in the process they advocate.

Expert systems have a similar flavour in that the system often (but not always) has control of the decision-making process. Luconi et al (1986) distinguish expert systems, decision support systems and "expert support systems", the distinguishing characteristic being where the control lies for "flexible strategies" - procedures to explore and analyse the problem and possible solutions. According to their definitions, in expert systems, the control lies with the computer, while in decision support systems the user is in charge. With expert support systems, however, responsibility is shared between computer and user.

In marketing planning, many authors have called for some formalisation of the planning process, but as we have seen, over-rigid processes can cause difficulty. The lesson from other research would appear to be that there needs to be some flexibility in the process supported by a computer system, with a shared responsibility for the planning process between the system and the user.

Resources

Although many case studies claim that the systems they describe save time (Bayer and Harper 1991; Alpar 1991), experimental results are inconsistent on this point (Pinsonneault and Kraemer 1989). There are a number of possible explanations:

1. Most studies have been carried out with novice users, who are likely to be slower than experienced users at performing any given task on the computer. This explanation is cited by Sharda et al (1988), who found in their experiments that DSS users took longer to begin with than those using pen and paper, but caught up after three weeks or so.
2. If systems encourage more analyses to be made, this may compensate for any time savings on each individual analysis.
3. The computer system may encourage users to apply techniques unthinkingly that are not appropriate, resulting in excessively detailed analysis (Rangaswamy et al 1991).

Whether decision support would save time in marketing planning, then, is an open question.

Organisational environment/culture

Analogous research is only known for one barrier in this group: that of a corporate culture which stifles idea generation and open expression of views. Nunamaker et al (1988) found that system use made participants in planning sessions less likely to be unduly influenced by organisational roles and responsibilities, and less likely to be intimidated by their colleagues' status. This resulted in a greater openness.

Data

Lack of information was mentioned by most of the empirical marketing planning studies we discussed earlier. A computer system that is internal to the company cannot, of course, generate external information that has not been collected, but it may provide a convenient central point for the data and provide for more efficient dissemination within the organisation. This is rarely the focus for decision support research, as these benefits are shared with management information systems, which have been well researched (Larcker and Lessig 1980; Davis 1989; Montazemi 1988; Baroudi and Orlikowski 1988; Franz and Robey 1986). Some relevant studies (reviewed by Money et al 1988) have, however, reported or hypothesized benefits in data utilization from DSS, including improved timeliness and greater accuracy, access and availability of data.

Environmental

No studies are known relating the use of a decision support system to particular environmental problems such as turbulence. While Ansoff's ANSPLAN system (reviewed in Waalewijn and Boulan 1990) includes Ansoff's portfolio matrix extensions to handle uncertainty, no empirical evaluations are known of the efficacy of this system.

Summary

With some of the barriers to successful marketing planning, there is little reason to believe that computer systems could help, and it is likely that these barriers must be reduced by other means. With other barriers, though, there are parallels from other domains where decision support systems have been of assistance. This suggests that it is worth investigating whether the same holds true in marketing planning.

3.4 A review of software systems in marketing

3.4.1 Introduction

To place in context the use of decision support systems in marketing planning, we first review some of the principal uses to which software is put within the marketing function, before looking specifically at marketing planning systems in the following section.

Figure 3-1 shows some of the most common data held by marketing systems, and some of the most common functions the systems perform. Actual systems support a subset of the data and a subset of the functions. For example, many marketing database products and bespoke systems (Moriarty and Swartz 1989; Shaw 1991) support more than one of the sales management, direct mailing, telemarketing and campaign management functions that we have listed as being typical uses of operational data. Arrows are used to indicate data flow. The diagram draws on models by Gorski (1993), Meyer (1994) and Hewson and Hewson (1994), as well as on other literature discussed below. The discussion also draws on surveys of IT in marketing (Higgins and Opdebeek 1984; Morris et al 1989; Andersen Consulting 1989; Shaw 1991, 1994; Hewson and Hewson 1994; Buttery and Tamaschke 1995) and more informal reviews of available software and its application (Arnold and Penn 1987; Eisenhart 1990; Waalewijn and Boulan 1990; Hirst 1991, 1991b).

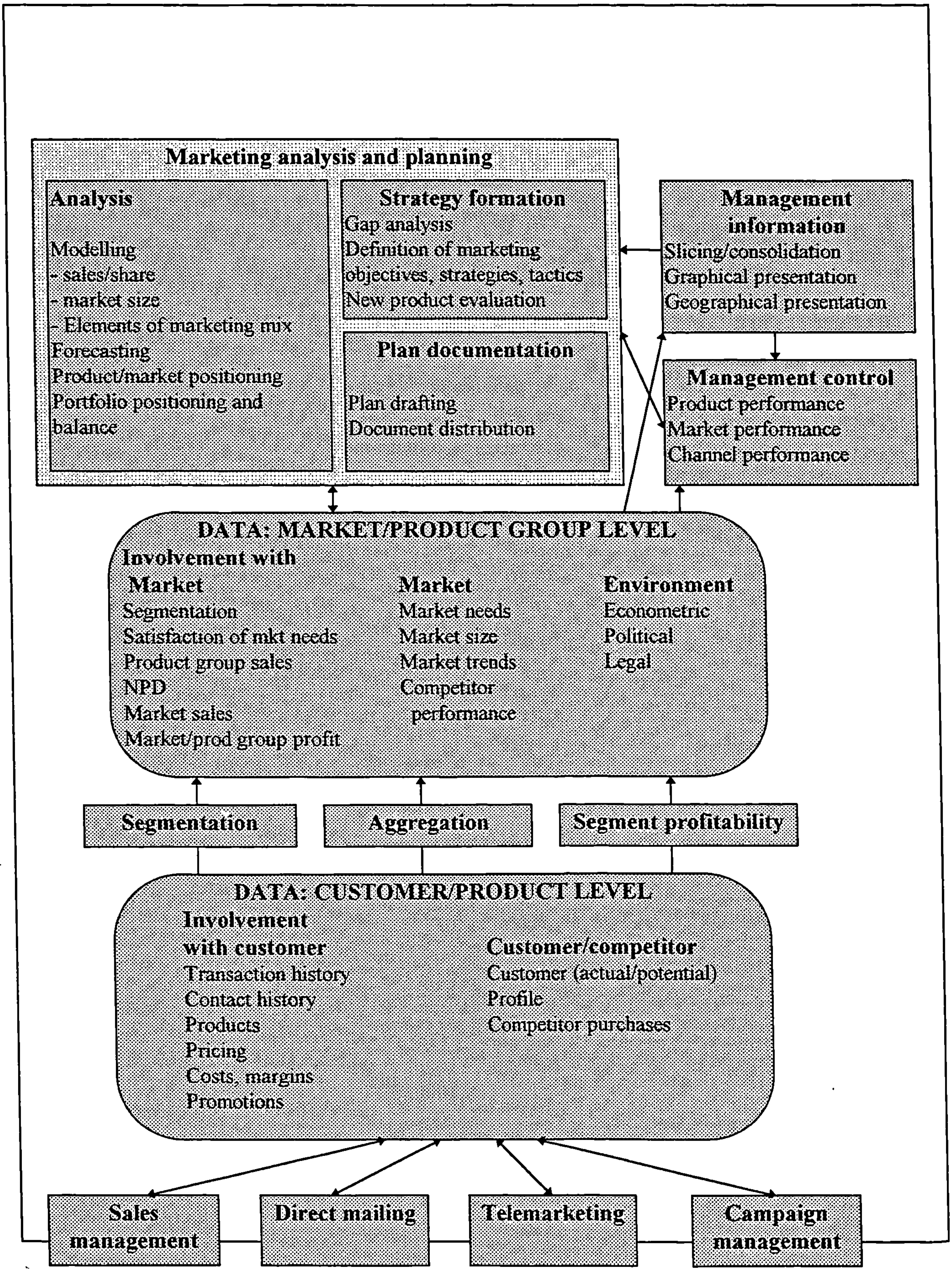
Given our limited purpose of placing marketing planning systems within a wider context, this model does not aim to be comprehensive - a more complex model being provided, for example, by Meyer (1994). McDonald, Hewson and Wilson (1993) also review a wide range of applications of IT to marketing, though without attempting their integration into a model. We concentrate on areas typically supported by marketing databases, and on major areas of decision support for marketing analysis and planning. Particular areas not represented or under-represented include the external interfaces by which information is obtained, such as scanner data (Piercy 1984) and systems that directly analyse it (Bayer and Harter 1991; Rangaswamy et al 1991), and separate sources of market research data and its analysis, such as computerised interviewing (Arnold and Penn 1987) and on-line information retrieval (Oppenheim 1993); tools to support the design of advertising and promotional materials (Meyer 1994); interfaces to computer-integrated manufacturing systems, including product design (Meyer 1994); systems for the optimisation of distribution and site location (Arnold and Penn 1987; Goodchild 1991); and educational systems such as computer-based training and simulations or business games (comprehensively reviewed by Hirst 1991a and 1991b). We also ignore the use of IT as an integral part of the product offering to the customer.

Marketing data can be broadly divided into two: operational data that deals with individual products, customers and transactions; and aggregated data where the unit of analysis is the market segment, market or product group.

3.4.2 Customer/Product Level Data

At the customer/product level, a variety of data may be held on actual and potential customers. Holding a degree of customer information is often taken as the minimal requirement of a marketing database (Hewson and Hewson 1994). The information can range from basic reference data such as name, address and postcode to profiling data such as age, sex, income, demographics and psychographics (Moriarty and Swartz 1989). In industrial markets, information on the customer's organisation may be extensive, covering organisational structure, key contacts and their roles, the customer's value chain (Christopher et al 1991) and so on. As well as details of the customer's purchases from the organisation (discussed below), information may be held on their purchases from competitors. Information may relate to both direct and indirect customers, and a similar range of information may be held for distributors and other relevant bodies or individuals such as influencers and sources of referrals (Christopher et al 1991).

Figure 3-1: Software for marketing - principal data and functions



Information is also typically held in marketing databases on the customer's involvement with the organisation. Transaction data can include items such as what products have been purchased at what price, the buying channel used, purchasing frequency and account balance. The transaction data typically references product data, which includes product codes, pricing and in some cases information on costs and margins and promotions. Contact history information, such as sales contacts, mailings, complaints or service calls, and proposals may also be held.

This information may be held in a separate marketing database, or it may be integrated into the organisation's operational systems. Stand-alone marketing databases may have links to operational systems such as sales order processing, stock control and sales ledger, though a surprisingly high proportion do not (Hewson and Hewson 1994).

3.4.3 Customer/Product level Functions

Drawing on this operational data, most "marketing database" products and many bespoke systems provide one or more of the following functions:

- **Sales management**: this can include salesperson productivity tools such as contact management, diary management, lead management, order entry, checking inventory and order status, and reporting of expenses. It can also include management functions such as automated reports on staff performance, sales activity, forecasts vs actuals and so on.
- **Direct mailing**: systems supporting direct mailing provide functions such as selecting a subset of a mailing list, customising letters and address labels, selecting appropriate literature, and tracking and forwarding leads (Moriarty and Swartz 1989). Management of lists can include facilities such as de-duplication and data quality reporting.
- **Telemarketing**: this typically includes management of call lists, scripting of the dialogue with the prospect, and tracking and forwarding leads or order entry. Again, data management of lists can form a major part of the system. A typical system is described in detail by Phillips (1993).
- **Campaign management:** systems may support all steps of a campaign, from definition of objectives to recording and analysing campaign results.

3.4.4 Data: Market/Product Group Level

The transaction-level data can be aggregated into data at the level of markets or market segments, and product groups or product-market combinations. This provides information at a sufficiently summarised level for marketing management analysis, planning and control. The data can broadly be regarded as falling into the categories of market information, information about the company's involvement in the market, and the wider economic, political or legal environment.

Some data at this level may be imported from outside the organisation, such as from market research (e.g. customer needs, customer product perceptions, relative market shares) and from external databases (e.g. market sizes, other market information).

The process of aggregation is not necessarily straightforward. As we have touched on, the definition of markets or market segments as a basis for aggregation can be a complex and creative process (Wensley 1995), involving in some cases analysis of operational data for possible segment definitions. Some systems aim to aid with the definition of segments as well as with the subsequent aggregation, such as Cranfield's Market Segment Master (McDonald and Dunbar 1995). Segments may also arise from cluster analysis on survey data, and other market research sources (Tull and Hawkins 1984), although they are often defined judgementally. Aggregation of cost data to provide measures of profitability by product group or market is similarly problematic, involving the already-mentioned decisions on the most appropriate form of cost allocation, and for some companies specialist software (Meldrum et al 1987).

3.4.5 Management information and control

In considering the uses to which this aggregated data is put, we consider first the provision of management information, which is the primary function of many of those systems termed Executive Information Systems, or EIS (O'Brien 1991), as well as forming the data consolidation and display function of many of the systems labelled Marketing Information Systems. Systems focusing on the provision of management information provide facilities for selecting the information required and displaying it in a variety of formats, such as tables and business graphics. The provision of geographic interfaces using maps, and analysis facilities appropriate to geographic data, form a 'Geographic Information Systems' extension found in some cases (Goodchild 1991).

Closely related to management information is management control. Performance against plan for product, market, channel and so on can be tracked through simple graphical display, or through facilities such as exception reporting, where the system highlights areas where the divergence from plan is significant (Shaw 1991).

3.4.6 Marketing analysis and planning

As well as providing management information and tracking performance, aggregated marketing data can be used more pro-actively in the formation of marketing strategy and its documentation in marketing plans. On the whole, software supporting these tasks is more sparse than for the other functions we have discussed, both in terms of the availability of commercial products and in the proportion of organisations using systems (Morris et al 1989; Buttery and Tamaschke 1995).

The functions with which systems can assist can be broadly divided into analysis, strategy formation and plan documentation. Some systems address just one of these areas, for example forecasting software. Others address more than one area: some of the few marketing planning systems in use, for example, have elements of all three.

Analysis

Software may be used to aid with the analysis of marketing information, as a precursor to the formation of marketing strategy. Particular functions include:

Modelling

One way to understand a marketing variable of importance, such as market size or product sales, is to develop a model of the factors affecting the variable. This typically involves defining a mathematical relationship between a number of independent variables and the dependent variable whose variation is to be modelled. For example, a product sales model might include as independent variables consumer spending, product price, competitor's price, and advertising and promotion data.

The model can be causal or judgemental. A causal model is built by statistical analysis of past data, most commonly through linear regression, although more recently models have also been based on neural nets (Hoptroff 1992; Proctor 1992). Several software routes are available for the construction of causal models. As well as general-purpose statistical packages such as SPSS (Norusis 1993), some specialist packages are available that specifically target the business modelling market, such as 4Thought from Right Information Systems (described in McDonald, Wilson and Hewson 1996). Core management information systems may also be extended to include such analyses without the need to transfer the data to a separate system.

Judgemental models are based on managerial judgement rather than past data, supplemented by any hard data available (Lodish 1981). A expert consensus can be sought, for example, for predicting future uses of new technology (Tull and Hawkins 1984 p558). Another common use is to model a company's strength in a particular market through judgemental assessment of the company's performance on the market's critical success factors, as one input to a portfolio analysis. In this case, the judgement is made by executives who are close to the customers in the relevant market.

Causal models have the advantage that the model is validated against past data. Judgemental models can be less expensive to produce, and can be used where data is not available. These trade-offs are discussed further in the analysis of cases in chapter 10.

A third method of building a model of market behaviour is through customer surveys or other forms of market research. This has the advantage that variables can be measured for which past data is not available, such as consumer brand perceptions. The disadvantages can include cost and sampling errors (Tull and Hawkins 1984). Software for market research analysis includes questionnaire design, computer aided telephone interviewing and results analysis (Shaw 1991).

The variable being studied does not necessarily vary with time. Cross-sectional analyses may be performed, for example, comparing the effectiveness of distributors or stores, or the attractiveness of possible plan, warehouse or outlet locations (Goodchild 1991; Hoptroff 1992). Those based on a time series, however, form a natural basis for forecasting, which we will now turn to.

Forecasting

Causal models can be used as a basis for forecasting. Again, regression analysis forms the dominant method: through predicting the value of the independent variables such as price, a forecast of sales or market size can be obtained. Other methods include the use of leading indicators, surveys of buyer intentions, the input/output model, and econometric models which involve the solution of multiple linear equations (Tull and Hawkins 1984). Neural networks are again a recent inventory to the armoury of techniques. The software products supporting causal modelling typically can be used for forecasting once the model is developed.

Judgemental methods can also be used, ranging from the simple aggregation of forecasts from sales representatives to the Delphi technique (Jolson and Rossow 1971). Again, these can be cheap, and may form the only option where hard data is not available. Many bespoke operational systems allow the entry of judgemental forecasts as a basis for annual budgeting.

A third group of methods is time series analysis and projection. In this group, the forecast is based on the past values of the variable (Chambers et al 1971). The X-11 method, for example, analyses the time series into the underlying trend, seasonal and cyclical effects, and random perturbations. The Box-Jenkins method includes an element of judgement, in that the forecaster hypothesises a relationship, which is checked by the system. These methods assume that the future will be an extrapolation of the past, so are not suitable when significant changes to prices, competitive products, the legal environment and so on are expected. As with causal forecasting, a variety of software products is available (Wiley 1989).

Product/market positioning

As well as examining the hard data of sales and market share, systems can assist with assessment of soft data such as a product's positioning in the marketplace. Techniques such as perceptual mapping and Porter's cost/differentiation matrix can be supported by computer to illuminate a strategy debate. A marketing planning system developed by ICL for its own use, for example, included efficiency frontier diagrams to assist with pricing, in which the relative price was plotted against a measure of the product's differentiation (Aitken and Bintley 1989).

Portfolio positioning and balance

Portfolio models such as the BCG matrix and the directional policy matrix have been advocated for over 20 years as a means of assisting with product-market strategy and resource allocation decisions between product-markets. Based on the rationale that their use without specific computer support can be both time-consuming and error-prone, some systems are appearing that help with the mechanics of portfolio analysis, and in some cases generate advice based on textbook marketing theory (reviewed by Waalewijn and Boulan 1990, and McDonald, Wilson and Hewson 1996). In addition to commercial products, research prototypes based on portfolio matrices have been described by Rita (1991) and Curry and Moutinho (1991).

Strategy formation

Systems providing analysis support may also allow the on-line modelling of the impact of proposed strategies, to provide more active support for strategy formation. Perhaps the simplest form is 'gap analysis' of the gap between the forecast performance and the desired performance. Systems may also provide facilities for exploring possible strategies through 'what-if' amendments to a model. Conclusions reached about marketing objectives, strategies and tactics may be recorded. In theory, the reaction of competitors to the organisation's actions can be modelled using ideas such as gaming theory or role-playing, but in practice, such active simulation is mainly currently used for training purposes on sample data, using gaming software such as MARKSTRAT (Perry and Euler 1989).

Systematic schemes for the evaluation of new product proposals have been developed by authors such as Cooper (1981). These lend themselves to automation as a means of guiding managers through the evaluation process. Systems have been developed by Cooper (termed NewProd and, later, DanProd) and others (Arnold and Penn 1987), for example, Cranfield's New Product Manager. Systems such as Ideafisher can also been used for new product idea generation (Hirst 1991a).

Plan documentation

Having decided on marketing strategies, these may be documented in a marketing plan, or in a plan for one component of the marketing mix. A few systems aim to assist with this process, through automatic generation of a "template" plan which the user can then edit as necessary (Cook and Sterling 1989). Systems may also aid with plan distribution through electronic mail or through adding the numerical data to management information systems.

3.4.7 Conclusions

We have reviewed the diverse marketing functions which can be supported by computer systems. The model we have presented distinguishes marketing planning systems from operational systems that work with disaggregated data at the level of the individual customer. It also shows, however, that the role of software in marketing analysis, planning and control is itself complex and many-faceted. The functions supported vary considerably, while single systems may support several functions.

In the next section, we take a simplified view of systems for marketing planning that is useful as a basis for categorising and comparing systems commonly found in practice.

3.5 Marketing planning software: A simplified typology

As we have seen, single systems may support a number of different functions. Also, systems contributing to marketing may be specifically designed for marketing, or may be more generic in their aims. This section defines a simplified and non-exhaustive typology of categories of system that are commonly found in practice. It can be regarded as a clustering of systems according to the subsets of the data and functions in Figure 3-1 that they include.

Table 3-1 lists the five types, with some examples of each. Systems within each type are divided into software products and bespoke systems. The software products are further categorised according to whether the system is targeted primarily at marketing, at business/corporate planning, or at any problem-solving application ('generic'). The case letters refer to our case studies described in chapters 9 and 10.

Table 3-1: A simplified typology of systems contributing to marketing planning

Targeting / Type	Marketing	Corporate	Generic	Bespoke
Planning systems for multiple product-markets	EXMAR SMPS			Cases A, B, C
Planning systems for one product/business unit		Business Insight (case H) ANSPLAN		Assist (ICI)
Causal modelling			4Thought (cases F, G) SPSS	Case D (also see EXMAR)
Data consolidation and display	DataServer (case E)		Metaphor	
Individual marketing techniques	Portfolio Planner New Product Manager		HiView Equity COPE	Marketing Workbench (ICL)

3.5.1 Planning systems for multiple product-markets

These systems aim to assist with the definition and documentation of marketing strategy for a business unit with several product-markets. In addition to any analyses per product-market, they therefore may include comparison of the attractiveness or potential of the product-markets, and aggregation of individual product-market figures to produce data at the level of the business unit. In common with the next type, their typical approach to market modelling (as discussed in the previous section) can be characterised as judgemental rather than causal, although some inputs may in practice be derived from causal modelling or market research.

The EXMAR system arising from this research is an example of this system type, targeted at marketing. It guides the user through a marketing planning process, prompting for key data, using marketing techniques such as perceptual maps and portfolio matrices to aid understanding, and supporting the documentation of resulting strategies in a marketing plan. The system developed for the animal health company in case B includes SWOT analysis and portfolio analysis, as does SMPS from Partners in Marketing. Smartplan from Lysia (not thought to be marketed currently) includes competitive analysis, strategy setting and the generation of parts of a 3-year marketing plan. Marketing Director from Director Portfolio (Newing 1995) is a recently-developed commercial product in this category. Duan and Burrell (1995) describe a research prototype, influenced by the publications on this research, which integrates various tools including the DPM and Porter's 5-force model into a planning process. Another research prototype for strategic planning in small firms called STRATEX (Borch and Hartvigsen 1991) guided the user through a process of defining goals, evaluating and choosing segments, analysing the current and forecast competitive position and defining an action plan.

These systems may include several of the functions included under Analysis, Strategy Formation and Plan Documentation in Figure 3-1.

3.5.2 Planning systems for one product/business unit

These systems assist with planning for one product, product-market or business unit. While the systems can be used twice on different product-markets, they do not aim to assist with issues of resource allocation or synergy between product-markets. Typically aimed either at product managers or general managers, examples are Business Insight, an expert system incorporating a number of marketing and strategy theories (McNeilly and Gessner 1993); the ANSPLAN system discussed above, which includes a portfolio matrix analysis but for one product-market or business unit at a time; and ICI's Assist, an internally developed system demonstrated to the author which asks the user a series of questions about a product-market and then generates advice, drawing on specific knowledge of the chemical industry coded into the program. While the usage of Assist was initially significant, it tended to be used once only to generate ideas in a single session. It is believed to have fallen into disuse, due to a combination of factors including its applicability only to certain bulk chemical industries, the technology used and the disruption caused by the ICI/Zeneca split.

As with the multiple product-market systems, these systems may include several of the functions included under Analysis, Strategy Formation and Plan Documentation in Figure 3-1, but excluding issues of portfolio balance.

3.5.3 Causal modelling

These systems support regression or equivalent techniques for modelling such variables as market size and market share. The 4Thought system is discussed in cases F and G. Other packages incorporating linear regression include the main statistical packages such as SPSS, and extensions to standard spreadsheets such as Lotus Regression (Hirst 1991a). Case D incorporates a bespoke system built using such a standard spreadsheet and its programming facilities, whose outputs formed one input to EXMAR. These systems correspond to the Modelling and Forecasting functions in Figure 3-1, though specialist forecasting packages are also available.

3.5.4 Data consolidation and display

These systems correspond to the Management Information and Management Control functions in Figure 3-1. Two of the many examples are IRI's DataServer, studied in case E, which is targeted specifically at marketing; and Metaphor, an EIS targeted at a number of application areas. A large number of others are reviewed in McDonald, Wilson and Hewson (1996).

3.5.5 Individual marketing techniques

These systems support individual marketing tools and techniques, with little or no attempt to integrate the tools or to provide a planning framework. The key benefit offered is typically the graphical presentation of the data to aid understanding, in some cases supplemented by advice based on the underlying theory for the technique. Examples are portfolio matrix drawing tools such as Portfolio Planner from Marketing Improvements, MatMar from Automated Marketing Systems and Porfolio-Plus from Strategic Dynamics, and new product evaluation tools, discussed above. Software can be obtained for generic decision support techniques such as the Analytic Hierarchy Process, for example HiView (Peterson 1994), Equity (Phillips 1989) and COPE, which supports Eden's (1989) cognitive mapping based SODA methodology. The ICL system discussed earlier incorporated several marketing tools, but without integration round a planning process - in the words of its principal sponsor, without a "washing line to hang the pegs on".

3.5.6 Conclusions

We have presented a simple typology of types of system contributing to marketing planning. Each type falls within our broad definition of decision support system, although they vary widely on such criteria as Alter's (1977) data-based versus model-based dimension. While examples of each type have been discussed, surveys indicate (Higgins and Opdebeek 1984; Morris et al 1989; Shaw 1994; Hewson and Hewson 1994) that in the main, computerisation of the marketing function has concentrated on:

1. The 'big four' personal productivity tools for microcomputers: spreadsheets, graphics packages, word processing and databases. These are supplemented by statistical packages for analysis of market research data and so on, and are increasingly also supplemented by group communication support systems (Pinsonneault and Kraemer 1989) such as electronic mail and other 'groupware' (Holtham 1993).
2. Marketing and sales productivity systems, often based on a general-purpose database management system, which provide specific facilities such as lead tracking, order taking and mailshots.

The most mature of the marketing planning system types we have defined is data consolidation and display systems, with causal modelling systems also being moderately common, particularly in FMCG organisations. Of the remainder, support for individual marketing techniques is more common than their integrated support within a wider planning process. Considered as a whole, facilities provided in marketing software are biased towards either purely numerical or purely textual work. Most applications are routine and operational rather than strategic: forecasting is a relatively common exception. These observations precisely reflect Waalewijn and Boulan's (1990) conclusions from a review of strategic planning tools then available:

> "Most of these programmes contain a set of unrelated management techniques like portfolios and financial analysis models...This creates a danger...that the programme's value added is restricted to representing the entered data graphically or in a table...However, the value added of the use of computers is to carry out calculations and/or to outline a procedure to be followed. Therefore it is important to combine quantitative and qualitative techniques in order to come to a (partial) process."

3.6 Previous research in DSS for marketing planning

Having described the systems available for marketing planning, we now consider the previous research into their efficacy.

Just one major empirical study has been identified on decision support systems involving marketing planning: Bovich's PhD thesis (1987), on 'Marketing management decision-making and the role of decision support systems'. This described an experiment typical of those described by Pinsonneault and Kraemer in their review of group DSS studies (1989), though the DSS is not termed a group decision support system by Bovich. Students in two groups performed a task defined by a scenario from MARKSTRAT, one group being offered use of a system called FCS:EPS, a generic system which "allowed its users to perform a wide range of spreadsheet, graphic, and statistical analyses". The task included presentation of results in the form of a paper report as if to senior management, broadly covering the contents of a product marketing plan. Bovich examined the efficiency and effectiveness of the decision-making process, the decision quality, and the users' confidence in the decisions they reached.

The DSS group were told to use the DSS, but only to the extent that they thought it would be useful. Both groups were trained in relevant techniques, but the DSS group had an extra hands-on training session in how to use the software. The quality of solutions was measured by three means: by MARKSTRAT, by how close the predictions were to the MARKSTRAT model's predictions, and by the judgement of 'experts' (marketing academics).

Bovich concluded that the users of the system had greater confidence in the solutions they proposed, but did not have greater process efficiency, as measured by solution time, or greater breadth in alternative design and evaluation. Critically, DSS use had no significant effect on solution quality. There was, though, some support for the notion that training with the DSS led to a more synthetic and forward looking perspective.

Methodological weaknesses reported by Bovich included use of individuals rather than groups, the individuals' inexperience in system use, and the study's short timescale. The study had several other limitations: students were used rather than practising managers; the presence of a facilitator for DSS users, in the form of "an experienced DSS consultant", did not seem to be controlled for; and no evidence was presented on how close the MARKSTRAT scenario was to problems encountered by managers in the field.

This study, then, gave useful evidence of the training benefits of DSS use, which alone could justify the further investigation of DSS in the area of marketing planning. It left many questions unanswered, however. Firstly, the software used was not specifically aimed at marketing plan generation, so was not tackling issues such as the support for a planning process advocated by Waalewijn and Boulan (1990). Secondly, the laboratory experiment method only shed limited light on many factors of interest to marketing planners, such as the role of systems in group communications. Thirdly, the study only set out to address *whether* a specific system helped with marketing planning, providing little indication of *how* the system affected planning and how this assistance might be improved.

We speculate that the importance of evaluating systems more broadly than on whether they deliver the intended benefits might apply in decision support system domains other than marketing planning also. Fitzgerald and a number of other applied IT researchers (Fitzgerald et al 1985) regard the paucity of empirical research allowing for these subtleties as inappropriate at such an early stage in the development of computer systems:

> "we should currently be generating ideas, theories and hypotheses, rather than simply testing them, and...anything which restricts or constrains this process is inappropriate".

We will return to this point in our research method description in Part 2.

No further evaluation literature has been identified specifically concerning decision support systems for marketing planning, though informal feedback from users or potential users has been described for some research prototypes (Curry and Moutinho 1991; Rita 1991; Borch and Hartvigsen 1991; McNamee and McHugh 1991) as well as for systems in live use (Arinze 1990; Proctor 1995; Eisenhart 1990; Greco and Hogue 1990; Duan and Burrell 1995), mainly in the context of papers describing the system concerned. Reviewing software for marketing strategy development, Dandurand (1993) concluded that:

> "there is little empirical market evidence to indicate...that knowledge is being used in computer-based decision models in a way that produces 'quality' decisions that enhance market performance".

In summary, the research into the application of DSS to marketing planning shows some limited benefits but without shedding much light on what caused the benefits or how they should be extended. As a final part of this literature review, we will define a theoretical framework for research in this area which endeavours to provide the richness necessary to address these issues. This framework will be used in the derivation of the survey, and we will also, in the final chapter, consider respects in which the inductively derived case study findings modify it.

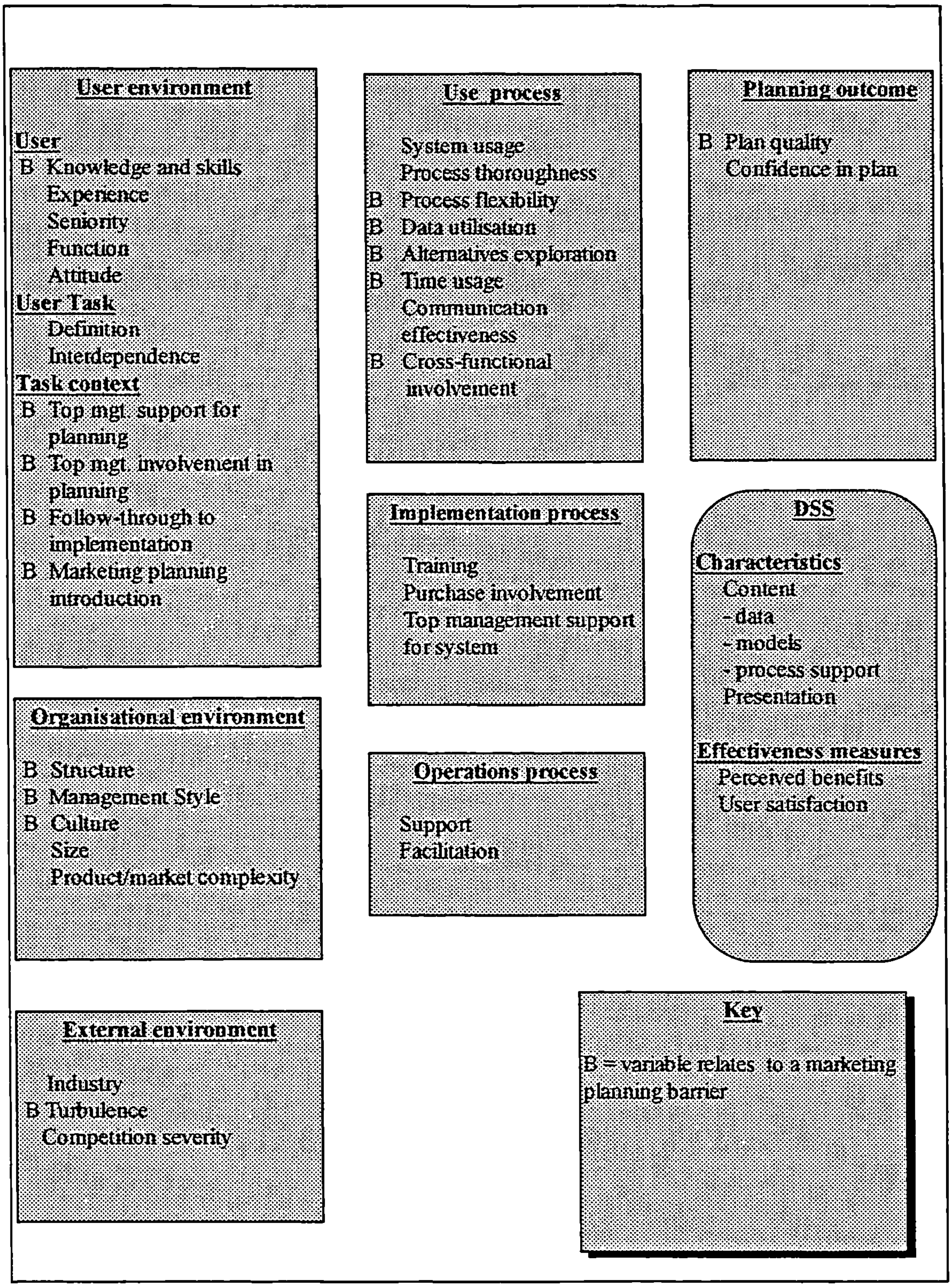
3.7 Theoretical framework

3.7.1 Derivation of framework

A framework for research in decision support systems for strategic marketing planning is presented in Figure 3-2. This was derived as follows:

1. The *box structure* of the framework is due to Ives et al (1980). An organisation with certain characteristics (Organisational Environment) exists within an External Environment. A DSS has users with certain characteristics and tasks to perform (User Environment), who go through a Use Process in using the system to aid with marketing planning. Similarly, the way in which the DSS is implemented is described in the Implementation Process. In the case of packaged software, the implementation occurs in two organisations, the software house and the "user organisation" purchasing the package. Only variables relating to the user organisation are included in the framework.

Figure 3-2: Theoretical framework for DSS in marketing planning



The Operations Process describes how the system is supported. Within traditional DP departments this refers to the Operations Department and their work in supporting the system. In the case of PC software, it includes support provided by the software vendor.

2. *Major variables* were included from previous research into decision support systems, particularly models by Guimaraes et al (1992), Sanders and Courtney (1985), Bovich (1987) and Pinsonneault and Kraemer (1989). In selecting from the large number of possible variables, an assessment of relevance to this domain was made based on the literature review of marketing planning.

3. The *barriers* to effective marketing planning discussed in chapter 2 were incorporated into the model, by assignment to existing variables or by adding new variables. A "B" against a variable name indicates that one or more of the barriers we identified in chapter 2 relate to the variable. For example, the barrier "Lack of innovation/non-recognition of alternatives" relates to the variable "Alternatives exploration" (the extent to which alternatives are considered in the decision-making process), an aspect of the decision-making process often considered in DSS research.

Two barriers only found in one study were omitted in the interests of simplicity:

- Lack of money. This is regarded as a contributor to other problems, such as lack of time and lack of information, which are listed separately.
- Stage of organisational development. This is regarded as a contributor to organisational structure, management style and culture, which are listed separately.

4. The model was checked for completeness against Money et al's (1988) comprehensive list of potential *DSS benefits*, to ensure that all the areas of benefit they describe could be represented in terms of the system's impact on one or more variables in the model.

3.7.2 Framework description

The variables are listed below, with notes where necessary on the meaning of the variable. Marketing planning barriers are listed against the relevant variables.

User environment

This class of variables is divided into three subclasses: User (characteristics of the individual user); User Task (characteristics of the user's marketing planning task); and Task Context (marketing planning within the organisation).

a) User

<u>Knowledge and skills</u> The user's knowledge of marketing planning and of relevant computer systems. *Barrier B4: Lack of knowledge and skills.* As well as forming a possible causal antecedent to planning outcomes, one outcome may be learning effects (Bovich 1987).

<u>Experience</u> The user's experience of marketing planning, of the decision support system in question and of other relevant computer systems (Guimaraes et al 1992). The user's education is also measured in some studies (Snitkin and King 1986).

Seniority The hierarchical level of the user within the organisation (Guimaraes et al 1992).
Function Which business function the user is part of.
Attitude The user's attitude, enthusiasm and motivation regarding marketing planning and decision support systems (Pinsonneault and Kraemer 1989; Bozionelos 1994).

b) User task
Definition The nature of the planning task (Guimaraes et al 1992), including its aims, the planning period, the envisaged plan content and the output format. Given the poor match between marketing planning theory and practice, it cannot be assumed that the task with which an actual user is engaged is necessarily to produce a classic marketing plan.
Interdependence To what extent the user collaborates with others to perform the task. Sanders and Courtney (1985) found that this affected DSS success.

c) Task context
Top management support for marketing planning The extent to which senior management supports and encourages marketing planning. As we have seen, this is distinct from the extent to which they are actively involved in the planning process, as their support alone may be insufficient (Ames 1968). *Barrier B3: Lack of top management support*
Top management involvement in planning process *Barrier B1: Lack of chief executive/senior management involvement*
Level of follow-through to implementation The extent to which the company exhibits "superior programming" (Ames 1968) in translating plans into action and monitoring them. *Barrier B9: Lack of follow-through to implementation*
Marketing planning introduction How marketing planning is introduced into the organisation, for example the briefing of managers before the arrival on their desk of complex proformas (McDonald 1982). *Barrier B6: Lack of care in marketing planning introduction*

Use process
System usage Whether a system is used, and to what extent, is hypothesised as being a relevant aspect of the planning process in determining the outcome on the marketing plan (Pinsonneault and Kraemer 1989). Also sometimes cited as a measure of system success (O'Keefe 1989).
Process thoroughness How completely the planning follows the steps contained in prescriptive theory, and uses the related tools and techniques. This corresponds to Piercy and Morgan's (1994) planning formalisation and sophistication factors, and in particular to their "plan components" factor.
Process flexibility *Barrier B8: Inflexible application of textbook process*
Data utilisation The availability, access, accuracy and timeliness of data (Money et al 1988). *Barrier B18: Lack of information*
Alternatives exploration The depth and scope of the "decision search" by which alternatives are investigated (Sainfort et al 1990; Dickmeyer 1983). *Barrier B5: Lack of innovation/non-recognition of alternatives*
Time usage The time available and used for planning (Sharda et al 1988; Pinsonneault and Kraemer 1989). *Barrier B11: Lack of time (elapsed and/or effort)*

Communication effectiveness How well the participants in planning communicate with each other. Group DSS studies suggest that relevant aspects include how equally they participate, whether they reach a consensus, whether they understand one another, how well they concentrate on the task and the extent to which a process for performing the task is agreed (Pinsonneault and Kraemer 1989).
Cross-functional involvement The extent to which appropriate staff from other functions are involved in the planning process. Like top management involvement, this relates to who is involved in the planning process, as opposed to the quality of the involvement (communication effectiveness). *Barrier B2: Lack of cross-functional involvement*

Planning outcome
Outcomes of the planning exercise may include not just the nature of the plan, but also the authors' confidence in it.
Plan quality *Barriers B10: Too much detail; B7: Forecasts without documentation of intervention*
Confidence in plan The confidence of decision-makers in their decisions has been measured by DSS researchers such as Bovich (1987) and Sharda et al (1988), both of which found that DSS users were more confident in the decisions reached.

Implementation process
Training The quality of the users' training in how to use the DSS (Guimaraes et al 1992; Sanders and Courtney 1985).
Involvement (purchase) For software not developed in-house, we suggest that the closest equivalent of the widely-used concept of user involvement in the system's development (Montazemi 1988, Ginzberg 1981) is the user's involvement in the purchase decision.
Top management support for DSS Found to be a significant factor by Guimaraes et al (1992). This is distinct from top management support for marketing planning itself.

Operations process
Support The availability of support in how to use the DSS (Ives et al 1980).
Facilitation The presence during planning of a DSS expert to aid the planners could impact on DSS success (Pinsonneault and Kraemer 1989).

Decision Support System
The system characteristics are based on Ives et al (1980).

a) Characteristics
Content - data What information is requested by the DSS.
Content - models What marketing models are supported by the system.
Content - process support Whether and how the system includes a planning process; the extent to which control of this process resides with the system.
Presentation How information is presented by the system, including the medium (e.g. on screen, printout), the format (e.g. graphical displays, tables) and other aspects of the user interface.

b) Effectiveness measures

System success measurement will be discussed in detail in the methodology chapters.

Perceived benefits Specific dimensions of the system's impact on the planning process, as perceived by users. Money et al (1988), for example, proposed a benefits-based success measure.

User satisfaction The users' satisfaction with the system. A generalisation of the commonly used user information satisfaction construct (Montazemi 1988; Baroudi and Orlikowski 1988).

Organisational environment

Some of the variables under this heading and under External Environment below, such as management style and culture, are clearly complex and multi-faceted (Lloyd 1991). They are left as single variables in this model for simplicity.

Structure How the organisation is structured, particularly with respect to the organisation of the sales and marketing functions. *Barrier B13: Organisational structure inappropriate*

Management style *Barrier B16: Short-term oriented reward systems*

Culture *Barriers B15: Corporate politics; B17 Culture stifling idea generation/openness*

Size Organisation size, measured in employees or turnover. Examined in some previous DSS literature, e.g. Franz and Robey (1986).

Product/market complexity It might be expected that such analytical tools as portfolio models are particularly applicable to diverse businesses with a complex set of product-markets. In evaluating any DSS tools for multiple product-markets, this may therefore be a relevant variable.

External environment

Industry The industry within which the organisation operates. May be relevant to such issues as customer power and ease of market entry (Greenley 1995b), which may in turn affect the efficacy of marketing planning and hence have an impact on its computer support.

Turbulence The degree of unpredictable change in the external environment. We have discussed market turbulence under *Barrier B19: Difficulty of forecasting in times of turbulence and inflation.* Technological change may also be relevant, Greenley (1995b) confirming Kohli and Jaworski's (1990) finding that the higher the technological change, the weaker the relationship between market orientation and business performance.

Competition severity The level of competition within the organisation's markets. This may impact on the planning process and how it is viewed within the organisation. Kohli and Jaworski (1990), for example, suggested that stronger competition led to a stronger relationship between market orientation and business performance, though Greenley (1995b) rejected this hypothesis in a UK survey.

Part 2: Research Objectives and Method

4. Research Objectives and Strategy

4.1 Introduction

The chapter begins with a statement of the research objectives (section 4.2) and an overview of the research strategy (section 4.3), including the stages into which the research has been divided, and a description of the research context. These two sections expand upon the statement of aims and research method in the introductory chapter. The remainder of this chapter justifies the research strategy, and in particular the approach adopted to system evaluation, through a review of the suitability of various possible methods (section 4.4), complemented by a review of different ways of measuring the success or efficacy of computer systems (section 4.5), which are then used as a basis for the subsequent rationale for the choices made (section 4.6). The final section, 4.7, is a discussion of the epistemological assumptions made in the choice of methods. Details of the methods used within each stage are discussed in the following chapter, which completes Part 2 of the thesis.

4.2 Research proposition and objectives

The aim of the research is to explore the efficacy of the application of decision support systems to strategic marketing planning. As we have seen, it is to be expected that at best, a system will reduce only some of the problems preventing more effective marketing planning. It is also clear that the design of a system must be appropriate to the domain. A system must also be appropriately implemented, or applied to the organisation: implementation issues such as user training and support, facilitation in using the system, the phasing of system introduction and top management support for the system, have been widely found to impact the success of system introduction (Montazemi 1988; Ginzberg 1981). Therefore:

The research proposition is that an appropriately designed and implemented decision support system can improve strategic marketing planning practice.

The research proposition leads to two objectives, the first relating to the nature of the improvement to marketing planning practice, and the second exploring what constitutes an appropriately designed and implemented system.

O1. The first research objective is to explore what benefits, if any, are gained by users of DSS for marketing planning. This includes exploring which barriers to marketing planning are reduced by systems, if any, and whether system use results in any other benefits or dysfunctional effects. The research is exploratory in that the systems, their use by organisations, and some of the research instruments used are all at an early stage of development.

O2. The second research objective is to explore what aspects of the design and implementation of the systems have led to these benefits, and how they might be improved, in the areas of:

O2.1 Nature of the system: How the marketing planning process and relevant marketing techniques are formalised to provide a marketing planning model as a basis for software support; what nature of support is provided by the system.

O2.2 System implementation: How the system is introduced into the organisation and applied. For brevity, the term 'success factors' is used in this thesis to refer to the aspects of system implementation which affect the benefits gained.

4.3 Overview of research strategy

4.3.1 Rationale for system development and evaluation

A major part of this thesis concerns the development and formative evaluation of one specific system, named EXMAR. A system was developed because when the research began, no software was known that attempted specifically to assist with the process of strategic marketing planning. In other words, there were no known systems of the type we have identified as 'Planning systems for multiple product-markets', either in the form of products targeted at the marketing function, or by way of bespoke systems developed for particular companies. The few systems of this type we discussed in chapter 3 have been developed since the research began. There was therefore a need for exploratory conceptual research to investigate how software might best endeavour to assist with marketing planning.

It was not, however, felt to be adequate to develop and describe the system without a degree of evaluation, although for a prototype system this would most appropriately be formative - with the aim of improving the evaluand, that is, the system and its implementation - more than summative - that is, designed to judge the merit of the evaluand (Shadish et al 1991). A significant proportion of IT research is conceptual (Eom and Lee 1990), with various theses that describe a prototype system with at most an informal evaluation exercise (Van Horn 1990; Rita 1991). In a review of IT evaluation principles and practice, O'Keefe (1989) concluded that:

> "Few decision-aiding systems, such as Expert or Decision Support Systems, are formally evaluated...Researchers have focused on evaluating implementation efficiency, i.e., factors such as the user interface. ..There have been little or no attempts to evaluate an ES in the context of the decision making environment in which it is used...Traditionally, within MS/OR a model has been judged as successful if it has been installed and operated with real world data...All developed decision-aiding systems are evaluated, if only when management or system developers subjectively declare the resulting system a 'success' or a 'failure'. Formal evaluation of systems, however, is rare."

O'Keefe was perhaps being excessively bleak, given the empirical studies we have reviewed earlier on DSS in various domains. Even within expert systems, a particular target for his criticism, there have been some examples of serious attempts at evaluation of system utility (Liebowitz 1986). Although we do not dispute the value of descriptions of innovative prototype systems in little-explored areas, these are subject to the danger that the publication of a system description suggests, even if implicitly, that the system represents a promising approach to delivering the intended benefits. We conclude that evaluation is highly desirable to enable a proper assessment of the contribution of the system to an understanding of whether, and how, software can assist with marketing planning.

As the EXMAR system was developed through several versions, the evaluation continued to concentrate on this system, despite the emergence of some other systems of this type. This was for several reasons: EXMAR had the largest known user base for a marketing planning system for multiple product-markets; the users were accessible for research purposes; the marketing theory and design decisions underlying the system were known; and changes requested by users could be built into future versions to provide an improved testbed for research. Keeping the system constant also introduced one fewer variable into comparisons across cases or subjects. In order to explore the extent to which the findings could be generalised, though, a further evaluation was then carried out examining some of the other systems we have identified.

4.3.2 Summary of research stages

In summary, the research stages are:

System development

Demonstrator development: conceptual research to develop a formal marketing planning model as a basis for computerisation, followed by development of a demonstrator system using the Lisp programming language in order to provide, in a short time-scale, a vehicle for discussion with potential users of the scope, content and style of the system.

Prototype development: development of a sufficiently robust prototype system to allow evaluation in the field, using the Smalltalk programming language.

Full system specification and development of MacroScope and Visual Basic systems: a third specification iteration involving further modelling and system design to incorporate feedback from the system design evaluation, resulting in what we will term the 'full specification', its scope being somewhat wider than the previous versions. As we will see, the first implementation of this specification in the MacroScope development environment did not result in a usable system, but it did serve to illustrate part of the specification in software. The subsequent implementation of much of the specification in the Visual Basic language has recently been completed.

Formative prototype evaluation

System design evaluation: a qualitative evaluation using 13 semi-structured interviews and user-completed reports with six UK companies from different market sectors, who used the prototype system on a trial basis. The aim of the evaluation was to improve the design of the system itself. This evaluation is described within our description of the EXMAR system in chapter 6.

Survey: a small-scale survey with 61 respondents in South Africa, where by chance a community had built up making live use of the prototype system. This examined factors contributing to DSS success based on the theoretical framework derived from previous research. It also provided initial indications of system success through descriptive statistics on user perceptions of benefits.

Multiple-case study: a qualitative evaluation of the impact of the prototype system in South African organisations, carried out in parallel with the survey. The evaluation aimed to address both research objectives. In contrast to the survey, this research stage was goal-free (Scriven 1972), in that it was not assumed that the benefits, if any, would correspond to the goals of the evaluand (in this case, the reduction in certain marketing planning barriers): rather, the impact of the system was examined using the analytic induction method (Robinson 1951; Miles and Huberman 1994), and *subsequently* compared against the original goals derived from the literature review. 48 interviews were carried out in ten organisations: of these, 33 interviews in six organisations were selected for transcription and detailed analysis, complemented by participant observation in one of the six cases.

In addition, a *pilot* was carried out for an *experiment* using MBA students to test the efficacy of the prototype. After completion of the pilot, it was decided to switch for the remaining field-work to an evaluation involving the user base of prototype users that had built up in South Africa. The reasons for this are explained later in this chapter. The exercise did, however, provide an initial pilot for some of the questions in the survey, and also provided further qualitative data in the form of reports from the subjects.

Exploration of generalisability of findings

To explore the extent to which the findings could be generalised to other systems, a further multiple-case study evaluation through 21 interviews, complemented in one case by participant observation, was carried out with two groups:

Case studies: planning systems for multiple product-markets: an evaluation of four organisations using different systems, falling into the category of marketing planning systems for multiple product-markets.

Case studies: other types of system: an evaluation of four organisations using other types of system of relevance to marketing planning.

4.3.3 Research context

The research context is relevant to the explanation of the rationale for the choice of methods that follows. The initial modelling, demonstrator development and prototype development were carried out from 1988 to 1990 while the author was employed by a software company, AI Ltd, and were sponsored by a research club of companies with additional funding from the DTI. Codenamed EXMAR, the club's purpose was to investigate expert systems in marketing planning - though this brief was interpreted by the author as being to explore the most appropriate software support for marketing planning, irrespective of whether the resulting system would best be termed an expert system. This followed some earlier difficulties in the club due in part, in the author's judgement, to the narrow definition of expert systems adopted, which led to the replacement of the previous software house by AI Ltd. This early history is described in McDonald and Wilson (1990) in Appendix D.

Shortly after the prototype was completed AI Ltd ceased to trade, at which point the author obtained a grant from the SERC (now the Engineering and Physical Sciences Research Council) for a PhD. NCR UK Ltd, one of the original club members, agreed to provide further sponsorship, and to provide programming assistance as needed, in exchange for an agreement concerning marketing rights on any software arising from the research. The sponsorship took the form of the author becoming an employee of NCR under the SERC's Industrial Studentship scheme, under which the SERC grant was topped up by NCR in recognition of the commercial value that NCR hoped to gain from the author's research. During the NCR-sponsored period from 1991 to the end of 1992, the system design evaluation and full system specification were carried out. NCR provided programmers to implement part of the specification, through a software house contracted by them. However, this development in the MacroScope programming language ran considerably over budget, and resulted in a system with significant performance and reliability problems, at which point NCR ceased the development and their sponsorship of the research, making the author redundant.

Meanwhile, a user base of users of the prototype system had built up in South Africa, due to a distribution agreement AI Ltd had made before ceasing to trade. The South African evaluation work was carried out with these users with assistance from the remaining SERC grant in 1993 and early 1994.

Finally, the exploration of the generalisability of the findings was carried out in 1994/95 with sponsorship from Cranfield. Simultaneously, another sponsor, SMS Ltd, was found for software development, providing Visual Basic programming resources to implement much of the full specification, again in exchange for an agreement concerning marketing rights.

This research context has had the strengths of providing ready research access to companies, and software development resources to translate the author's specifications into software. As far as the software development was concerned, it has had the difficulties associated with action research settings (Elliot 1991; Wood-Harper 1985), in which approaches had to be negotiated that enabled the requirements of both parties to be met. In particular, the negotiations with NCR ensured that the specification of the software they developed was provided by the author, but the sponsor maintained control over decisions on the development tools used, which proved to be unfortunate, in the author's judgement. Fortunately, the user base that had meanwhile built up in South Africa for the previous prototype software meant that evaluation with live users was still possible, while the first version of the Visual Basic system has recently been completed.

4.3.4 Assistance provided to the author

All evaluation stages were conducted by the author personally, including conducting and analysing interviews, and designing, distributing and analysing the questionnaire.

To clarify the assistance received in the various iterations of software development: in each case, the author acted as systems analyst in modelling the domain of marketing planning (or knowledge engineer, to use the expert systems jargon), and designer in specifying what the system was to do through documentation of the required functionality (functional specification or equivalent), illustrated by a draft user interface design (including specification of screen layouts). The author's user interface design was modified somewhat by the programmers of the MacroScope system and, particularly, the Visual Basic system, the earlier versions following the author's design exactly. The author wrote approximately half the code for the demonstrator system, delegating half to a colleague. All of the programming was delegated for the following versions. Program design - how the system would implement the specification - was a shared responsibility between the author and the programmer(s), with the exception of the most recent, Visual Basic development, where it was conducted by the programmers. The author was project manager throughout, except for the Visual Basic development, in which the author assisted the programmers with interpretation of the author's specification, checked the software for consistency with the specification and provided a draft for marketing help text. See Table 4-1 for a list of the main software development deliverables: these are further discussed in the next chapter.

Given this assistance with programming to the author's specification, this thesis concentrates on describing what the system does, its relationship to marketing theory and its impact on planning practice, in the main ignoring issues of how the specification was implemented, such as choice of development environment.

Table 4-1: Main software development deliverables

Demonstrator	Prototype	Full system specification/ MacroScope and Visual Basic systems
* Analysis Report	* Requirements Specification	* Requirements Specification
* Demonstrator Script	* Functional Specification (inc. user interface design)	* Annotated screen sketches
(*) Code	(*) Outline Design Specification	(*) MacroScope Design Document
* Appraisal	(*) Detailed Design Specification	MacroScope code
	Code	(*) MacroScope user manual
	* Test plan	* MacroScope online help
	* User manual	Visual Basic code
	* Online help	(*) Visual Basic user manual
		(*) Visual Basic online help

Key *: written by author (*): partially written by author

4.4 System evaluation: the available methods

The remainder of this chapter explains the rationale for the choice of methods for system evaluation. Details of the procedures adopted in both system development and system evaluation are presented in the next chapter. This section, which reviews the suitability of the various research methods available, is complemented by the next (section 4.5) which discusses the various ways in which benefits of computer systems can be assessed. These sections form the basis of section 4.6, which explains the rationale for the actual choices made.

4.4.1 Methods of evaluation: basis of comparison

We first turn to the various methods available for system evaluation, discussing the suitability of each for this research project through reference to literature on research methods in general and IT research methods in particular.

Table 4-2 summarises the discussion that follows. Our use of the terms 'validity' and 'reliability' is as follows:
- *Internal validity*: The validity of a measure reflects the degree to which the measure actually measures what it purports to (Nunnally 1967). More generally, the validity of a method - whether it has found what it purports to have found - may be divided into internal validity and external validity (Kerlinger 1973). Internal validity refers to whether or not what is identified as the 'cause' actually produces what have been interpreted as the 'effects'.
- *External validity* is the extent to which research findings can be generalised beyond the research sample and setting. We also use where appropriate the further distinction (Gill and Johnson 1991) between *population validity*, the validity of generalisations from the sample, and *ecological validity*, the extent to which results in the research setting (e.g. the experimental laboratory) can be generalised to other settings (e.g. the workplace).
- *Reliability*: When repeated measures of the same thing give identical or very similar results, the measurement instrument is said to be reliable (Vogt 1993). More generally, reliability of a research method or study refers to the consistency of the results obtained and the ease of replicating them.

4.4.2 Experiments

A central hypothesised benefit of systems is the improvement of the quality of the resulting marketing plan. An experiment could test this hypothesis, through system usage as the independent variable and plan quality as the dependent variable. Ideally, one would use practising managers, working in teams drawn from the same company; but in order to persuade subjects to participate, such experiments tend to use MBA students (Benbasat and Nault 1990), working on a single problem defined by a written case study as frequently used in teaching. The experimental group would use the system as an aid, while the control group would use pen and paper or their electronic equivalents. Assessment of plan quality might best be carried out by a panel of independent experts (Bovich 1987). This is similar in concept to various experiments carried out in DSS research (Sainfort et al 1990; Sharda et al 1988; Van Horn 1990) except that decision quality is generalised to plan quality. Bovich (1987) provides the closest model to the requirements of this study.

Table 4-2: Suitability of research methods

Criterion	Experiment	Quasi-experiment	Survey	Qualitative
Validity & reliability: Internal validity	Strong on controlling for most extraneous variables. Experimental artifacts provide threat to validity	Difficult to rule out all relevant extraneous variables	Depends on instrument validity, eg of user perception of system success; weak for benefits as no control	Exploring causality and identifying all variables are strengths. Rigour of analytic induction difficult to sustain without necessity for judgement
External validity	Students not necessarily typical; experimental task probably differs considerably from live planning	Good ecological validity. Population validity could be addressed with care in sampling	Limited sample restricts population validity, but to measurable extent. Good ecological validity	Good ecological validity, but reflexivity on researcher impact needed. As population small, pop. validity not major issue
Reliability	Good provided same software and similar subjects	No problem replicating procedures, but finding subjects non-trivial	Good (though dependent on questionnaire design)	A weakness. Documentation of procedures helps
Hypothesis generation vs testing	Testing	Testing	Testing	Generation strong; can also have role in testing, subject to validity difficulties discussed above
Contribution: Benefits vs success factors	Benefits; some potential S.F.s, eg user attitudes/ experience	Benefits; success factors	Success factors, particularly in implementation; early indications of benefits	Benefits and success factors. Both can be goal-free, ie, allowing for the unexpected
Feasibility	Practical though only with use of students	Inadequate sample available	Marginal sample size restricts statistical power	Time-consuming, and distance not ideal, but feasible

The experiment has many strengths in *internal validity*, due to the ability to manipulate the independent variable of system use, to control for a variety of extraneous variables through random assignment of subjects, and to measure the dependent variable of plan quality through comparison of a number of plans written to the same brief. Some variables are difficult to control for, such as the effect of DSS training, not controlled for in the case of Bovich (1987) as we discussed earlier. This can, however, be tackled by providing training for all, even though only the experimental group go on to use the system. Another variable not controlled for by Bovich was the effect of the DSS facilitator who was on hand in case of difficulties - a tricky problem to avoid when users are inexperienced in the software.

More subtle threats to validity arise from experimental artifacts such as those identified in the Hawthorne studies (Roethlisberger and Dickson 1939). According to the "reactive measurement effect" (Patton 1990), the subjects' knowledge that they are in a study might distort the findings. For example, a finding from the Hawthorne studies of relevance to evaluation research is that "any organisational change leads to a performance improvement but that it may not be long maintained in the absence of further change" (Parker 1995). For this study, this is, of course, a danger for all the research methods, but it is perhaps exacerbated by the short time-scale of the experiment, and the subjects' acute awareness of their situation within it.

External validity is decidedly mixed. Population validity can be a problem if sample sizes are low, often the case in experiments involving students. In this domain, it is important that students work together in groups on the production of a marketing plan, as some of the hypothesised benefits relate to the facilitation of group interaction. This further reduces the sample of marketing plans as a basis for statistical analysis. Use of students introduces an additional difficulty, as they may not be comparable with practising managers. Although Cranfield MBA students typically have a number of years' management experience and an average age of over 30, making them presumably more comparable to the average manager than, for example, undergraduates, they may differ on variables such as attitude to computers and (depending perhaps on the timing of the experiment during the course) marketing knowledge and skills. For example, Snitkin and King (1986) found that those educated in business were more likely to use personal decision support systems, and Bozionelos (1994) found an association between age and attitude towards using computers.

Ecological validity presents further problems. The match between the experimental task and planning performed in 'natural' contexts is very difficult to assess, in terms of the definition of the task, the data available, the group dynamics involved in marketing plan production, timescales for producing the plan, and so on. These problems were illuminated by the pilot experiment (described in the next chapter), in which the subjects produced a plan based on adapted teaching case study, which in turn had been derived from consultancy by its author. Its scope was slimmed down in order to match the time available for the experiment, and the case was worded in such as way as to contain all the data that might be required for the plan. Even this simplified case proved too complex given the time available to the subjects. It was feared that in defining an even simpler case study for a full experiment, the result would be even further away from marketing planning in reality.

Some examples of the potential mismatches between this kind of experiment and live marketing planning are:

1. *Data availability*. As we saw in Chapter 2, shortage of information was reported by several studies to be a frequently-found problem. The utility of the system in such

situations of uncertainty, and the system's role, if any, in identifying key data items, could not be readily assessed by an experiment.

2. *Differences in group structure*. While an experiment could endeavour to measure through questionnaires the system's impact on some relevant variables such as group consensus (Pinsonneault and Kraemer 1989), these variables may be critically dependent on the organisational setting, such as inter-functional relationships between the planning participants. By contrast, a group of students may be relatively homogeneous in the information available to each, their objectives in the planning exercise, and their roles in the team.
3. *Assessment of plan quality*. A real marketing plan may form a negotiated product arising from the participants' differing roles, relationships, perspectives and experience (Daniels et al 1994). Combined with uncertain information, this means that 'right' answers are hard to come by, as we have discussed in chapter 2. Assessment of plan quality by independent 'experts', such as marketing professors, is not therefore necessarily a good measure of the plan's likely business effectiveness.

Reliability is likely to be good, provided the same software and sampling methods are used. Since the term 'decision support system' can, as we have seen, refer to such a wide variety of systems, a different study may well have very different results if the software used is not the same - a factor ignored by much of the literature comparing studies (Pinsonneault and Kraemer 1989; Money et al 1988; Benbasat and Nault 1990).

4.4.3 Quasi-experiments

A quasi-experiment involves identification of subjects in the field who have naturally experienced the different values of the independent variables, in an attempt to reduce the problems of ecological validity in true experiments (Yin 1984; Gill and Johnson 1991). In this domain, this would involve identification of a sample of companies who have not used the system, matched with an experimental group who have used it. Again, one could attempt to measure plan quality, controlling for various possible extraneous variables such as prior knowledge and skills of the managers and the supportiveness of the organisational environment. In order to match the samples on the various possible extraneous variables, however, a considerable sample size would be needed (Kraemer and Thiemann 1987). With the small numbers of users as yet using the EXMAR system or other systems, this method seems to be impractical at present, despite its theoretical advantages in terms of external validity.

Ruling out extraneous variables would, in any case, both be tortuous and involve considerable confidence in which variables were of relevance - something that is difficult to achieve at this early stage of research in this domain. By contrast, the randomised assignment of treatments to subjects possible in the laboratory controls for variations in subjects that could be of relevance, without necessarily specifying what they are (Campbell 1984).

4.4.4 Surveys

Much used in information systems research, the survey shares the experiment's advantage of reliability due the presence of formal, well-documented statistical procedures for analysis, aiding replication of studies. The reliability of scales to measure attitudinal variables can be tested using measures such as Cronbach's Alpha, based on the split-half method (Moser and Kalton 1971), to check that a replication would be likely to produce similar results.

A survey is mainly of relevance in assessing aspects of the secondary research objective, notably factors affecting successful system implementation, as associations can be examined between the hypothesised success factors and the user's perception of system success as measured on an attitude scale. Many surveys of IT systems are of this type, such as Doll and Torkzadeh's survey (1988) of the impact of system content, accuracy, format, ease of use and timeliness on end-user satisfaction, and Franz and Robey's (1986) study of the relationship between MIS department characteristics such as its size and age and perceived system usefulness.

In the absence of a control group, however, the survey can offer comparatively little towards an assessment of system utility. It can be argued that system benefits can be measured through user perceptions, as the rigorous paper by Money et al (1988) illustrates. Although their approach is atypical, it being generally accepted that a single-group design cannot offer the same internal validity as the experiment (Cohen and Holliday 1982), it shows the role that benefits-based measures can play in providing early indications of system success as part of a formative evaluation. This is illustrated within marketing decision support systems by Rangaswamy et al (1989), who use descriptive statistics on perceived benefits as initial indications of system success and as indications of where the benefits are felt to lie, and within marketing expert systems by Stone and Good (1995) who adopt a similar approach.

One important difference between the survey and the experiment is in the measurement of system success, the dependent variable. Whereas in an experiment we have suggested that this be determined by assessment of plan quality by a panel of independent experts, in the survey this variable must be determined through scales based on user perception. This is not entirely a negative characteristic, a scale allowing various possible aspects of the system's impact to be considered, such as its impact on knowledge and skills, albeit perceptually. This is therefore one respect in which a move out of the laboratory trades off external validity against internal validity. The measurement of success is discussed further in section 4.5.

The prior identification of relevant variables for a survey is easier in some domains than in others. Evans and Riha (1989), describing a case study in which questionnaires were filled in on a computer, argue for quantitative evaluation of all DSS systems. However, their DSS domain, the disposal of hazardous waste, is perhaps one in which identifying and operationalising the relevant variables relating to the efficiency benefits gained is easier than in the case of marketing planning. In this domain, the variables in the theoretical framework presented in chapter 3 form a basis for questionnaire design, but with some risk that unidentified variables might also in fact be relevant.

4.4.5 Qualitative research

Qualitative research covers a wide range of types of study with very diverse aims and techniques. It also suffers, by comparison with the quantitative methods we have discussed, from a lack of established, commonly-accepted procedures, as Miles and Huberman report (1994 p262):

> "A decade ago, we noted that qualitative researchers shared no canons, decision rules, algorithms, or even any agreed-upon heuristics to indicate whether findings were valid and procedures robust. That situation is changing, but slowly."

We therefore discuss in some depth the methodology of qualitative research in order to illuminate its potential applicability, strengths and weaknesses for this study.

Qualitative research in theory building

Qualitative research has a widely-accepted role in the generation of plausible theory. Theory arising from qualitative studies can be 'grounded' in data (Glaser and Strauss 1967), giving it, according to some (Eisenhardt 1989), a higher chance of being valid than theory hypothesised without reference to data:

> "Thus one canon for judging the usefulness of a theory is how it was generated - and we suggest that it is likely to be a better theory to the degree that it has been inductively developed from social research." (Glaser and Strauss 1967 p5)

Glaser and Strauss compare, for example, the grounded "middle-range" theory arising from their qualitative work with the ambitious but hypothetical "grand theories" that had in their view been influential in sociology throughout the century.

According to Eisenhardt (1989), one impact of this grounding of the theory in data is that if quantitative research is chosen to test the theory thus generated, the constructs arising from the research are likely to be more easily measured because of their match with subjects' concepts and vocabulary. In similar vein, Mintzberg (1979) complains of the cross-sectional survey analysis of organisations "rich in flows and processes" through measurement of imposed variables such as 'amount of control' and 'complexity of environment':

> "As soon as the researcher insists on forcing the organisation into abstract categories - using his terms instead of its own - he is reduced to using perceptual measures, which often distort the reality."

Turner (1981) points out that the intelligibility of the theory to the subjects also enables the researcher to gain qualitative comment and correction from them - a point exploited to the full by Bloor's qualitative study of ear, nose and throat specialists' decision rules (Bloor 1978), and by Chetty and Hamilton (1993), who used respondent validation in a study of export performance of small firms.

The extent to which categories are understood by survey respondents is, however, dependent on the prior state of the theory. For example, Stouffer (1930) found, in a study of students' attitudes towards alcohol, that questionnaires on a Thurstone scale gave similar results to a much more complex and time-consuming qualitative approach. In this case, he concluded, qualitative research had not been necessary. The common conclusion is that qualitative research is appropriate in little-understood areas (Benbasat et al 1987). Mintzberg (1979) typically goes further:

> "No matter what the state of the field, whether it is new or mature, all of its interesting research explores. Indeed, it seems that the more deeply we probe into this field of organisations, the more complex we find it to be, and the more we need to fall back on so-called exploratory, as opposed to "rigorous", research methodologies."

Another argument made by qualitative researchers is that qualitative approaches allow the exploration of causality. Miles and Huberman (1994 p146) cite Hume's classical rules of causality:

> "Temporal precedence: A precedes B
> Constant conjunction: When A, always B
> Contiguity of influence: A plausible mechanism links A and B."

They argue that in-depth case studies enable exploration of Hume's "contiguity of influence" criterion, pointing out that neither the experiment nor the survey explores *how* the independent variable affects the dependent variable, although in both cases some rival hypotheses may be ruled out. They also point out that educational and social programs, for example, do not form an invariant "A" that will inevitably lead to result B: rather, "we are faced with a locally unique complex of interacting factors", which suggests in-depth case research. The same argument could be made in our case of the introduction of a DSS, in which one case might vary from another on many factors such as the manner and extent of use, the nature of the planning team, and so on. While the survey attempts to measure each such factor, an alternative strategy is in-depth, qualitative research of each case. We return to the issue of causality in our discussion of qualitative theory testing below.

Eisenhardt (1989) warns, however, that theory generated from case studies may be idiosyncratic, applying at a modest level of generality, and lacking the broad sweep of 'grand' theory. To avoid excessively narrow results, Glaser and Strauss (1967) suggest that once theory has been developed, the researcher should explore the extent to which the theory can be generalised more widely through further cases. For example, they cite the extension of a study of emergency wards to other emergency services such as fire and police. They suggest that in their experience, this can both generalise the theory and illuminate the original, more limited theory.

Qualitative research in theory testing

Although Glaser and Strauss (1967) do not dispute that qualitative research can test theory as well as develop it, the claims they make for the "grounded theory" approach they describe are limited to the generation of plausible theory - though their contention that grounded theory researchers often do not bother to do a testing study, preferring to move on to the next area of theory generation, suggests that their belief in the method's efficacy may be greater than they are prepared to claim explicitly. An illustration of the application of grounded theory to DSS evaluation is provided by Toraskar (1991). Other qualitative researchers, however, go beyond the minimal view of qualitative research as appropriate merely for theory building (Yin 1984; Miles and Huberman 1994; Patton 1990).

In order to examine the role of qualitative research in theory testing, we consider how qualitative and quantitative research strategies contrast in addressing the key issues in the scientific method, which Campbell (1984) summarises as follows:

> "the core of the scientific method is not experimentation per se, but rather the strategy connoted by the phrase "plausible rival hypotheses". This strategy may start its puzzle-solving with "evidence" or it may start with "hypothesis"."

Whichever comes first, Campbell continues, data is considered against a hypothesis, for:
a) The fit of the hypothesis to data
b) The fit of the hypothesis to other available data
c) The plausibility of rival explanations.

Remembering Hume's criteria cited above, and our earlier discussion of qualitative exploration of causality, we add to Campbell's list:
d) The presence of a plausible explanation of the mechanism by which the "cause" produces the "effects".

A stream of writings on the logic by which qualitative research can address these points has used the heading 'analytic induction', a term attributed to Znaniecki (1934). His book contains no short definition of the term. Manning (1982) attempts to fill the gap with the following definition:

> "a non-experimental qualitative sociological method that employs an exhaustive examination of cases in order to prove universal, causal generalisations."

Arguing that all empirical research was essentially inductive, as it started with observations of instances rather than axioms, Znaniecki termed the commonly-used statistical approach of generalising on the basis of a representative sample 'enumerative induction'. He was concerned that as applied in sociology at the time, the dominance of statistical methods led to relatively weak conclusions, expressed as probabilities, and based on category definitions (as, for example, of "criminal") that were taken for granted:

> "Thus, the worst mistake of mediaeval scholasticism is here repeated: juggling with concepts instead of investigating reality has to be again accepted as the essence of science."

He argued for a more ambitious sociology that looked for universal statements, of the form "All S are P" or "If p then q", rather than probabilistic statements such as "Some P are Q". His rationale was that as in the physical and biological sciences, exceptions were fertile ground for posing new problems and advancing theory. To take due account of individual cases, he argued for use of 'analytic induction' that subjected a few cases to careful scrutiny.

Amongst the researchers within this school was Cressey (1950, 1953). In his influential study of 'embezzlement', he redefined this legal term as the criminal violation of financial trust after initially taking on a job in good faith. He found that such acts had several pre-conditions: awareness of an unshareable problem; awareness that the problem could be solved by embezzlement; and the presence of a rationalisation that permitted both the criminal act and the maintenance of a self-conception as a law-abiding citizen.

Cressey spelt out his method of theory development clearly. It can be simply stated as follows:
1. Formulate a rough definition of the phenomenon to be explained.
2. Formulate a hypothetical explanation of the phenomenon.
3. Study one case to see if the hypothesis fits the facts of the case.

4. If not, either re-formulate the hypothesis or re-define the phenomenon more precisely so as to exclude the case. An example of this was Cressey's exclusion of those who had planned the embezzlement when they took on the job from his re-definition of 'embezzlement'.
5. Practical certainty may be attained after a small number of cases, but a single negative case requires a re-formulation.
6. The procedure continues until a universal relationship is established.
7. "For purposes of proof", cases outside the area circumscribed by the definition are examined to determine whether or not the final hypothesis applies to them:

> "This step is in keeping with the observation that scientific generalizations consist of conditions which are always present when the phenomenon is present but which are never present when the phenomenon is absent" (Cressey 1953 p16)

Such a well-defined process, stepping through the cases one by one in a manner analogous to (though quite distinct from) mathematical induction, has the advantage of being explicit in addressing Campbell's point **a), the fit of the hypothesis to the data.** This helps to address the common criticism of qualitative research as "proof by anecdote", though it does not avoid the difficult problem of *communicating* the results in a style that illustrates without appearing anecdotal - a problem discussed by Glaser and Strauss (1967 p5), who in a much-quoted phrase, advocate that the theory should be "illustrated with characteristic examples of the data". Glaser and Strauss suggest a similar process of taking each case and confirming or modifying the developing theory, although they are somewhat less explicit about how this should be done. In accordance with their stated aim of developing theory rather than testing it, however, they suggest that some examples only of the fit of the data to the theory should be noted, in the interests of reducing the work required.

A later book by Strauss and Corbin (1990) is considerably more explicit in the process of 'grounded theory' or the 'constant comparative method', offering particularly a set of terminology for theory representation that is richer than Cressey's 'phenomena' and 'conditions'. This includes categories and subcategories, their properties and associated dimensions, and relationships between categories. They advocate combining important categories using a 'paradigm model' that links Causal Conditions (e.g. a broken leg) to a Phenomenon (e.g. pain). Given a particular Context (e.g. where pain is intense, continuous and in the lower leg), Action/Interaction Strategies (e.g. splinting the leg) that depend on various Intervening Conditions (e.g. a long way to go for help) lead to certain Consequences (e.g. reduced pain, improved prospects for recovery). Similar "stories" can be defined for a wide range of topics, in their view.

This work suggests how Cressey's process might be adapted to those studies where the theory requires a different representation to that of the several analytic induction studies which have dealt with the conditions that characterised particular groups of subjects or cases (Cressey 1950; Bloor 1978; Manning 1982). Their looser exposition of how the theory is actually developed, though, illustrates the difficulties of maintaining a rigorous process as the theory becomes more complex. Turner (1981), Johnson (1981) and Eisenhardt (1989) have attempted to add their insights on the process of theory development through tentative road-maps of the process which might be followed. George (1979) provides a similar attempt at mapping the process of theory development for the benefit of researchers in diplomacy; in doing so, he draws parallels between analytic induction and the historian's method of "causal imputation".

Turning now to point **b)** in Campbell's (1984) list, **the fit of the hypothesis to other available data**, Cressey's point 7 (introduced in his 1953 paper) would seem to imply that in order to ensure that these conditions were specific to embezzlement, cases should be examined where embezzlement did not occur. However, Cressey does not appear to have sought such a control group, as Robinson (1951) pointed out in a review article on analytic induction. Cressey did, however, attempt to examine the presence of the conditions in his subjects before they took on the job in which the embezzlement occurred, thus providing a measure of control at least analogous to a single-group, before-and-after design (Herman et al 1987) - arguably better than a single-group, post-test design, at least.

Bloor (1978) addressed Robinson's criticism directly. In an inductive study of how specialists decided on a 'disposal' in ear, nose and throat out-patient clinics, disposal categories were compared for which features they shared - those features which were necessary for the achievement of a particular disposal - and which features were unique to the category - those which were sufficient for the generation of the category. Bloor argued that whereas Cressey and similar studies lacked a control group in which necessary but not sufficient causes could be located, he was able to use other disposal categories as a control group for those cases in the disposal category that he was analysing.

With regard to criterion **c)** on the **plausibility of rival explanations**, Campbell (1984) points out that the classic laboratory experiment developed by the physical sciences controls for relatively few but explicitly specified rival hypotheses, while the "randomised assignment to treatments" model of, for example, medical research and psychology endeavours to control an infinite number of possible rival hypotheses without specifying what any of them are. Typical IT evaluation experiments such as the one discussed under the Experiments subsection above include aspects of both of these classic models, including a random assignment of subjects to experimental and control groups, and explicit control for variables such as the effect of system training. How, then, does analytic induction, or qualitative research more generally, address the issue of rival explanations?

Bloor (1978) recognises the:

> "..hoary old problem of drawing the correct inference from all the competing inferences that could be drawn from one's data...Inductive analysis can reduce, but not eliminate, the difficulty: some, but usually not all, competing inferences can be eliminated by comparison with other cases".

Yin (1984) discusses a "pattern matching" logic whereby the data is assessed against various rival hypotheses for "closeness of fit". He quotes an example from his own research, looking at the conditions under which R&D projects had proved useful (Yin 1984 p112). The nine cases were considered against three possible models: the research, development and diffusion model; the problem-solving model; and the social interaction model. He found that they fitted best a combination of the second and third models.

Pattern matching has proved a popular tactic in other theory-testing studies, though the rival hypotheses in some cases simply consist of a null hypothesis. Campbell's (1969) study of the impact of a speed restriction law used a pattern matching logic in assessing whether the time series data on road deaths before and after the law was introduced were closer to a "no effects", random fluctuation pattern or to an "effects" pattern. Markus (1989) attempted in a single-case study to disconfirm at least one of three theories about how users decide whether to use electronic mail systems. Chetty and Hamilton (1993) examined the export performance of smaller firms, using a simple scoring system to summarise qualitative data as a basis for pattern-matching against a theoretical model derived from previous research. Parker (1995) identified from the literature internal changes to organisations that were thought to be necessary if privatisation was to deliver the intended benefits, testing these against the history of ten organisations, and again using a tabular display to summarise the primarily qualitative data as a basis for a pattern-matching assessment of whether it supported the literature.

The studies by Parker and by Chetty and Hamilton again illustrate the difficulties of maintaining the same degree of clarity of method as the theory becomes more complex. In Parker's study, for example, the absence of most of the hypothesised success factors was associated with the lack of performance improvement, while their presence was associated with improved commercial results. While this was persuasive in general terms, the performance differences as summarised in his table could arguably still be accounted for by (say) omitting the 'organisational structure changes' factor and retaining the other five factors concerning objectives, communications, management, nature and location, and labour. In this case, the author's argument therefore relied not just on the pattern-matching, but also on the plausibility of the underlying causal mechanism derived from the in-depth research (our point d), discussed below), a summary of which formed an important part of his paper.

Yin (1984) acknowledges that pattern-matching has weaknesses in terms of rigour. As he concedes, one difficulty with pattern-matching is that it leaves the issue of which hypothesis best matches the data somewhat subjective. He advocates comparing sufficiently clearly-differentiated hypotheses to allow an 'eyeball test' to determine which best matches the data - as was the case in Campbell's (1969) study, where statistical analysis was judged both impractical and unnecessary. Miles and Huberman (1994) acknowledge that summary displays as a basis for pattern-matching are still in essence summaries of qualitative data, whose interpretation is of necessity judgemental rather than mathematical.

An alternative to pattern-matching for addressing the plausibility of rival hypotheses is to control for them, in the manner of extraneous variables in the experimental model. Such a strategy approaches the quasi-experimental design, although the variables may be assessed more qualitatively (Yin 1984). Markus (1989), for example, as well as testing against three rival hypotheses, controlled for the possibility that variations in electronic mail usage might be due to biases in the IT industry towards IT usage, or to differences between managerial and clerical communication patterns, through use only of managers as subjects, and through exclusion of the IT industry from consideration.

In many cases, though, such explicit control for extraneous variables is not so easy, providing a theoretical weakness in internal validity compared with the experiment. Working in the other direction, though, in an experiment or a survey, potential extraneous variables must be identified in advance. To this extent, inductive qualitative research is:

> "perhaps the likeliest of all strategies to identify and include all the relevant variables in any subsequent theoretical analysis" (Gill and Johnson 1991 p124).

Miles and Huberman (1994 p274) conclude that controlling for rival explanations in qualitative research is frequently an imperfect art rather than an exact science:

> "..in most social settings, we cannot easily construct the series of carefully controlled, elegantly scaffolded critical experiments that theoretically - but seldom practically - do away with equivocal findings from competing studies...Still, we think the search for rival explanations is often more thorough in qualitative research than in survey research or in most laboratory studies, and that it's relatively easy to do. The competent field researcher looks for the most plausible, empirically grounded explanation of local events from among the several competing for attention in the course of fieldwork."

We turn now to our fourth aspect of the scientific method, **d): the presence of a plausible causal mechanism.** Manning (1982) differs from most in concluding that "On balance, it does seem that to this point analytic induction does not permit the answer of causal questions". His rationale follows Robinson's (1951) already-mentioned argument that analytic induction did not look at the data where the phenomenon - such as embezzlement, in the case of Cressey (1953) - did not occur; and therefore, that the presumed conditions (such as awareness of an unshareable problem) might not prove to be causal. However, as we have discussed, Bloor's response (1978) does appear to refute this argument through his use of control cases. Manning's comments, though, can be taken as a warning of the potential weaknesses of studies which lack such control.

Even in single-case designs, or multiple-case designs without control cases, these weaknesses may sometimes be overcome, however. Scriven (1976) has advocated the 'modus operandi' approach for use in program evaluation. Consider two potential causes, X and Z, of an effect Y. If X and Z leave different 'signatures', or traces of themselves, when they have operated as the cause, then the traces may be examined in an individual case of Y to see which was the cause in this case. Mohr (1985) quotes the example of a post-mortem analysis to decide whether a death following a road accident was due to a heart attack before the crash, or injuries from it. If the signatures of each are known, reliable analysis may be carried out of the causes of death for each case.

This approach seems to generalise the notion of establishment of a causal mechanism (Campbell 1984), as the 'signature' may or may not correspond to what one regards as the 'actual' mechanism by which X causes Y. In diagnosing why a singer's voice has tired easily in a concert, for example, a singing teacher may, after listening to a tape, attribute the problem to an excessively raised larynx, without being aware in medical terms of how the 'signature' of the lightened sound quality arises from the 'cause' of the raised larynx, or of why a raised larynx should lead voices to tire.

A number of other writers have suggested that qualitative research is better placed than experimental or survey approaches to establish plausible mechanisms for causality. Strauss and Corbin (1990) provide graphic examples of the long chains of causality that might lead from 'cause' to 'effect', and how these can be regarded as forming concentric circles out from the cause to its most distant effects. They encourage the qualitative researcher to generate such a 'conditional matrix' to explore causality. Miles and Huberman (1994) add that qualitative research is well placed to explore the temporality already explicit in Hume's definition, checking the order in which events which are presumed to be causally linked actually occurred. In the evaluation research literature originating in social policy, the emergence of process evaluation, which explores what factors seem to be contributing to the outcomes of a program, as opposed to outcome evaluation, which assesses how the program's outcomes measure up to its goals, is "in response to the comment that many evaluations do not explain *why* a particular outcome occurs" (Smith 1985).

Applicability to this study

To summarise our discussion of qualitative research, and to relate it more closely to the requirements of this study, we consider the criteria used in Table 4-2.

Internal validity: Variables generated inductively tend to have good face validity, in that the variables or concepts forming part of the theory are readily understood by respondents. Their 'measurement' has the disadvantage of subjective assessment: multiple sources of evidence are often thought to help (Benbasat et al 1987), as is respondent validation. The formal logic of analytic induction often in practice copes less rigorously with complex theory, and with variables that are non-dichotomous (Manning 1982), though some proposals have been made to permit, for example, of exceptions and probabilistic reasoning in analytic induction (Robinson 1951; Miller 1982), and pattern-matching and controlling for extraneous variables have proved useful. A strength is the exploration of causality, and the related use of the 'modus operandi' approach. In sum, qualitative research is not necessarily the poor relation of quantitative methods in internal validity that it is often thought to be (Yin 1984), though much depends on the details of the problem and the research design.

For this study, although a number of relevant variables have been identified from previous research, the lack of research in marketing planning systems specifically suggests that qualitative research has the advantage of identifying any further relevant variables, reducing one threat to internal validity.

The likely complexity of the theory (illustrated by the theoretical framework in chapter 3) suggests that more judgemental strategies such as pattern-matching are likely to be needed within the overall framework of analytic induction, complemented by exploration of causality. To illustrate, we consider the study of the impact of success factors on system success. If all relevant variables were dichotomous, then all the success factors should be present in each case where the system is judged to have delivered benefits, while one or more should be absent in each case where it has not. As with many other qualitative studies, however, the logic is not this simple. The strongest contention that can be made is that the absence of a success factor reduces the system's benefits to some extent, as not all factors will necessarily prove critical. Consider, for example, a less than ideal user interface, which may reduce system utility through adding to the time taken to learn the system, but may not entirely prevent benefits from being gained. The analysis, then, would of necessity be judgemental, but following as closely as possible the logic of analytic induction. In particular, firstly, any absence of a success factor should be associated with evidence of reduced benefits in one or more areas of potential benefit; and secondly, a plausible causal mechanism, or at least the presence of 'signatures' of the impact of the success factor, should be detected for each hypothesised success factor.

External validity: Population validity is generally regarded as lesser than for the survey, as fewer cases are examined (Gill and Johnson 1991). On the other hand, each 'case' may correspond to more than one survey respondent (Mohr 1985), or indeed to a whole experiment (Yin 1984). Theoretical, or purposeful, sampling for cases likely best to advance the theory can also make efficient use of a limited number of cases (Patton 1990). For this research, the limited number of accessible cases for either survey or qualitative methods reduces the relative disadvantage of qualitative methods regarding population validity.

The ecological validity of qualitative research is generally regarded as a strength (Jenkins 1985). One threat that remains is that the presence of a researcher affects the environment: this must often be met by 'reflexivity' as to what the researcher's impact is, it being impossible and, indeed, sometimes undesirable to eliminate it (Elliot 1991). For this study, threats due to the researcher include the attempt to please the interviewer (Hoinville et al 1978) and an increase in usage of the system because the researcher is travelling from so far to visit it (Miles and Huberman 1994).

Reliability is a weakness of qualitative research, as removing researcher judgement is not possible (Jenkins 1985) - or, given the creative nature of theory generation, necessarily desirable (Watson 1994). Documentation of the procedures adopted helps to reduce this difficulty (Lofland and Lofland 1984), ranging from the overall research strategy through sampling, data collection and analysis methods.

Hypothesis generation vs testing: We have seen how qualitative research designs may involve generating theory (Glaser and Strauss 1967), testing theory (Markus 1989) or both (Bloor 1978). For this study, an approach allowing both generating and testing has the advantage of allowing for the possibility that the theory derived from analogous areas of application of DSS is not entirely sufficient in this particular domain.

Contribution: Qualitative research is well placed to examine both system benefits and success factors. One further observation is that compared with other methods of assessing system benefits, qualitative research can allow a goal-free evaluation (Shadish et al 1991), which allows the researcher to ignore the intended goals of the system, instead starting with a 'clean sheet' and observing what impact the system has had. To put this another way, any benefits or dysfunctional effects of the system can vary, both between cases and by comparison with prior theory. This can be mimicked by the survey in the former respect by benefits-based system success measures such as that of Money et al (1988), but not in the latter. Goal-free evaluation is advocated by Patton (1990) when a program aims at individualised outcomes: you can then describe each case "in depth, in detail, in context, and holistically". Although individualised outcomes are not an aim as such in this research, they cannot be ruled out a priori. This alone forms a powerful argument for including qualitative methods in the system evaluation.

Feasibility: A qualitative approach is well suited to the relatively low number of cases available. On the other hand, qualitative analysis is generally found to be much more time-consuming than quantitative strategies due to the large amount of rich data to be analysed (Grundy 1992; Manning 1982). As most users of the prototype system happen to be in South Africa, the distance forms a further difficulty, but not an insuperable one. Although inductive researchers recommend analysing between each data-gathering visit, this is not an essential feature of the method, which rather requires *analysis* of the cases one by one, a point also made by the 'grounded theorists' Strauss and Corbin (1990). Bloor's (1978) classic study, for example, involved data collection before analysis began for practical reasons. However, phasing of the data gathering has the advantage of allowing theoretical analysis to influence further case selection and data gathering through purposeful sampling (Patton 1990). The distance does have the advantage that the researcher's lack of prior contact with the subjects reduces a potential source of bias.

4.5 System evaluation: measurement of success

We have reviewed the applicability of various research methods to this study. Before relating this to the reasons for the approach actually used, we consider in more depth one important issue which cuts across all the research methods: how the success of the system is judged.

4.5.1 A basis for comparison of success variables

Various system success or system effectiveness measures used in IT research are summarised in Table 4-3 on p68. A cursory glance at our typology of success indicators, listed down the left of the table, shows that the concepts being measured vary considerably. We have used the term 'success variable' for this column, as system success is often regarded as a dependent variable, but clearly, many of the aspects of success listed, such as 'user satisfaction', are many-faceted and may correspond to a number of variables in, for example, a survey or experimental approach. We have avoided the term 'measure', as this would tend to imply that there was a single variable of 'system success' which the different 'measures' were attempting to operationalise - a view which, we will argue, is excessively simplistic.

Before discussing each success variable, some explanation may be necessary of the column headings 'Stakeholder perspective' and 'Dominant evaluation model'. 'DSS/MIS school' indicates which of the DSS schools discussed in section 3.2 tend to use the success variable.

Stakeholder perspective

This refers to whose view of success dominates in the assessment. For example, systems developers may concentrate on whether the system does what it is supposed to do (system validation) in a manner that is easy to use (usability). Gregory and Martin (1994) examine how evaluation research cannot be removed from "the political context within which it takes place and the multiplicity of stakeholders who have an interest in its findings". From this perspective, this column can also be taken as an indication of whose interests are served by the choice of this success variable as an indicator of system success. Smith (1985) argues for pluralistic evaluation embracing multiple perspectives, based on the observation that the "experimental, rationalist and objectivist" evaluation models, as exemplified for example by Rutman and Mowbray (1983), make a presumption of consensus, that all relevant actors in the project share common goals and therefore a common concept of what would constitute success. Along the lines advocated by Smith, Holden (1991) provides a case study in the evaluation of an expert system through three perspectives: technical, organisational, and individual. These correspond approximately to our use in this column of the shorthand Developer, Manager and User. It is worth noting that while Smith uses the term 'subjectivist' for the multi-perspective evaluation he advocates, the concept of stakeholder perspective goes beyond the subjective/objective divide. The use of a success concept such as system usage, for example, which may be taken to be 'objective', depends on the subjective decision that system usage is an important measure of system success (Patton 1990).

Dominant evaluation model

Our methodological discussion in this chapter has drawn on writings from an important reference discipline: the body of research methods literature known as 'evaluation research'. Originally derived from public sector and social policy evaluations, its long gestation and its evolved emphasis on the holistic evaluation of an intervention into a social setting provide a valuable perspective for the relatively new field of the evaluation of the implementation of computer systems; and yet few researchers evaluating computer systems seem to have drawn extensively on this literature, though we have cited some exceptions such as Holden (1991) and Evans and Riha (1989). In this column, we cross-reference the success measure to the 'evaluation models' to which it most commonly corresponds. These (overlapping) types of evaluation are as follows (Patton 1987):

Goal-based evaluation: As the traditional model for evaluation against project goals which are specified in advance, goal-based (or 'goal-directed' or 'outcome') evaluation is often assumed to be the only possible model. Evans and Riha (1989), for example, seem unaware of other approaches. The flaws in this approach when evaluating decision support systems are revealed by Keen's (1980) previously-reported conclusion, on the basis of an analysis of a number of DSS case studies, that many system benefits were different from those initially intended by the system designers.

Goal-free evaluation: In response to the limitations of goal-based evaluation in circumstances where the potential effects may not be known exhaustively in advance, Scriven (1972) coined the term "goal-free evaluation". Scriven advocated gathering information on the actual effects without specifying in advance what effects would be sought. As well as avoiding the risk of missing important unanticipated outcomes, this would remove the negative connotations attached to the discovery of unanticipated effects:

> "The whole language of 'side-effect' or 'secondary effect' or even 'unanticipated effect' tended to be a put-down of what might well be the crucial achievement' (Scriven 1982).

Scriven pointed out that goal-free evaluation was not necessarily an alternative to a goal-directed one: indeed, there could be advantages in conducting both in parallel.

Implementation evaluation: This term is used for evaluation work that concentrates on checking that the evaluand is being implemented correctly:

> "Unless one knows that a program is operating according to design, there may be little reason to expect it to produce the desired outcomes" (Patton 1987 p27).

Process evaluation: This concentrates on how the evaluand is achieving its effects. Often using participant observation, it aims to identify:

> "what seem to be the most important elements contributory to the outcomes of any given programme, and the way these elements relate to each other" (Smith 1985).

Table 4-3: Measures of system success

Success variable	Stakeholder perspective	DSS/MIS schools	Dominant evaluation model	Dominant research strategies	Dominant measurement methods
System usage	User/ Manager	Implement-ation process Decision calculus	Goal-based	Survey Observation Automated recording	User memory Researcher assessment System recording
Financial cost-benefit	Manager	Data processing	Goal-based	Tailored per organisation	Manager assignment of value to benefits/costs
User satisfaction	User	Imp. process Decision calculus	Goal-free or goal-based	Survey	Attitude scale
User benefit perception	User	Imp. process Decision calculus	Goal-free or goal-based	Qualitative and/or Survey	Researcher judgement Attitude scales
Validity of system outputs	Expert	Expert systems	Implementation	Laboratory testing	Comparison with expert specified 'correct' outcomes
Usability	Developer	Dec. calculus Imp.process Expert syst.	Implementation	Survey Observation Experiment	Attitude scales Researcher assessment
Impact on decision process	Researcher	Decision analysis MS/OR	Process	Experiment Survey	Attitude scales, researcher assessment, etc
Impact on decision results	Manager/ Researcher	All	Goal-based	Quasi-experiment Experiment	Measurement of predetermined variables for desired outcomes

4.5.2 System usage

We now discuss each success variable in turn, beginning with system usage. An advantage of system usage as a success indicator is that it is readily measurable. The rationale for measuring system usage is that the system will be used if and only if it is found to be useful. This argument was, for example, used by Snitkin and King (1986) in justifying their collection of usage in hours per week as a measure of system success. O'Keefe (1989) distinguished three respects in which this assumption may not hold:

i) There may be management pressure to use the system. System usage may, therefore, not reflect the users' assessment of its utility. Snitkin and King (1986) addressed this point in their study, arguing that within the category of system studied, namely spreadsheets, system use was voluntary. We conclude that the stakeholder perspective for this variable may be that of the users or their management within the organisation.
ii) The system may be intended only for rare use. This is a relevant observation for this study. According to the prescriptive literature, at least, planning is an occasional activity carried out at regular intervals, such as annually.
iii) "Initial use of the system may produce a worthwhile shift in management perceptions and decision-making, so that the system is effective but then falls into disuse". This might be relevant if, for example, the system is beneficial as a training aid, as claimed by Holden (1991).

We have seen that the implementation process school places particular emphasis on developing a system that is finished and used (Keen 1980): this is consistent with the use of system usage as a success variable, though it is also commonly used by workers in other traditions. However, we have mentioned comments by two decision analysis researchers (Wind and Saaty 1980) who described resistances from users to the usage of a system that the researchers, by contrast, regarded as useful. This appears to reflect the researchers' lack of faith in the argument that useful systems will necessarily be used.

4.5.3 Financial cost-benefit

Naturally, financial cost-benefit analysis is popular where it is feasible. Wright and Rowe (1992), for example, cite as "what we believe is best practice in expert system deployment" the measurement of the financial payback from a system evaluating sales leads at Texas Instruments. Bailey (1989) provides another example where the emphasis of the system on efficiency - rejecting inappropriate curricula vitae, and thus saving personnel time - allowed a cost-benefit analysis, in this case positive. The traditional emphasis of data processing systems on efficiency benefits perhaps makes financial cost-benefit analysis easier to achieve than for many decision support systems:

> "systems where the major return on investment is partially unquantifiable or intangible have proved difficult to evaluate, and the move towards decision-aiding systems had made this situation even worse" (O'Keefe 1989).

Arkush and Stanton (1988) asked users to put a financial value on soft benefits, then validating these through interviews with both users and their managers. Their approach, though, could be criticised as providing a spurious accuracy. Potential biases such as the users' political interest in producing a high estimate in order to obtain further system resources, for example, were not mentioned by the authors.

For these reasons, other means of assessing system success are often used. While Holden (1991) used a discounted cost-benefit analysis, which indicated that the system could not be justified at present, he also provided complementary evaluations on other criteria which were more positive, due to intangible benefits such as the system's training effect.

The problems of financial cost-benefit analysis in IT evaluation have parallels in wider program evaluation, Rothenberg (1975) for example reporting that:

> "Very serious inadequacy of relevant data exists in almost area for which cost-benefit analyses have been undertaken".

Gregory and Martin (1994), however, reported a trend in public sector evaluation in the UK towards evaluation of economy and efficiency, with a corresponding decrease in concern for effectiveness. The changing fortunes of financial cost-benefit analysis were reported on within the DSS field by Meador and Keen (1984), who showed in a survey that:

> "the ability of a DSS to effect more efficient decision-making is also important to creating and maintaining managerial support. This contrasts with case studies of early DSS which showed an emphasis on value rather than cost, and a general disregard of traditional cost-benefit analysis."

4.5.4 User satisfaction

We have seen that system usage, where used as a success variable, is justified as a proxy for the user's satisfaction with the system, but direct assessment of 'user satisfaction' through perceptual measures is often preferred (e.g. Guimaraes et al 1992). This approach shares with system usage the feature that it is not necessary for the researcher to know what the benefits actually are to the individual or the organisation: the user is simply asked to assess whether the system is indeed of benefit. For this reason, it could be regarded as goal-free - particularly as it takes into account the possibility that the system may be of benefit even if infrequently used. For example, Sanders (1984) developed a 13-point user satisfaction scale with items such as "DSS is extremely useful", subsequently applied by Sanders and Courtney (1985).

However, even such simple measures may make certain assumptions about the type of benefit to be gained. For example, Snitkin and King (1986) used a one-question Likert scale as to whether the system was 'Effective in solving business problems', as well as the system usage measurement we discussed above. This assumes that the role of the system is to solve business problems (as opposed to, say, identifying business opportunities, or communicating ideas). These assumptions are rarely explicit, and can result in a real threat to validity. In some cases, therefore, the measurement of user satisfaction can be regarded as goal-based.

The assumptions are particularly apparent in the case of the many scales measuring User Information Satisfaction (reviewed by Zmud and Boynton 1991). These tend to assume that the role of the computer system is to provide information, the measures including such aspects as the information's accuracy, the speed with which it can be obtained and its comprehensibility (Larcker & Lessig 1980). While this is doubtless appropriate to many systems, it is clearly goal-based - a description which makes explicit that assumptions are being made about the role and impact of the system.

One problem with user satisfaction measures is that there may be a link between the score and the user's expectations of the system, O'Keefe (1989) citing evidence that high expectations tend to lead to lower scores. Another issue is that the system may be of value to the organisation despite low satisfaction from the users: hence we list the stakeholder perspective for this success measure as 'user'.

4.5.5 User benefit perception

Where the evaluator wishes to know not just that the system has been useful, but in what ways, the equivalent of the user satisfaction scales is user benefit scales measuring specific benefits. In advocating evaluation via user benefit perception, the author and another marketing systems researcher (Hewson and Wilson 1994) provide a exploratory typology of benefits of particular relevance to sales and marketing systems. The hypothesised benefits may be specified in advance in a goal-directed way. For example, Guimaraes et al (1992) used Money et al's (1988) scale of benefits, which includes such items as improved planning and control and improved communication between managers. Similarly, Sethi and King (1991) derived from the literature a construct for the competitive advantage gained from an IT system. When evaluating a system designed to help with conflict resolution, Sainfort et al (1990) included a single Likert scale question on the participants' "perceived progress in resolving the problem", which is sufficiently specific, perhaps, to be regarded as measuring a benefit perception rather than generalised user satisfaction.

Alternatively, the scale may be developed through a process of interaction with the users, involving qualitative approaches before the scale is finalised. This was the approach which Money et al (1988) had actually used to derive their scale. In similar vein, Liebowitz (1986) used Saaty's Analytic Hierarchy Process (Wind and Saaty 1980) to provide a quantitative measure of user-specified benefits.

A third option is for assessment of benefits to be entirely qualitative, a particularly common approach in individual system case studies (Nunamaker et al 1987; Lodish 1981).

4.5.6 Validity of system outputs

A common concern of expert systems developers is the validity of the system (O'Keefe 1989): does it produce 'correct' results? In other spheres of information technology, this might simply be regarded as part of the testing process, prior to use and evaluation (Hares 1990). That the evaluation of expert systems is often equated with establishing their validity (Bailey 1989) is perhaps a function of the already-discussed immaturity of the field and the few operational systems that exist, despite the high proportion of IT researchers studying the subject (Galliers 1995). On the other hand, it should be acknowledged that validating (say) an advice-giving system may be both hard and important, whatever other evaluation is carried out. As examples of validity measurement, Chadha et al (1991) used Harvard business cases both to generate the knowledge base for a prototype system for selecting the appropriate class of marketing media, and to validate its advice; and Bailey (1989) validated his expert system to screen job applications by comparing its results with past recruitment decisions by personnel managers.

4.5.7 Usability

The assessment of the usability of systems is typically carried out either via a survey or by informal, observation-based approaches. Examples of the former are scales to measure 'user interface satisfaction' or 'usability' by Davis (1989), Doll and Torkzadeh (1988) and Chin et al (1988). Observation-based methods are reported by Bewley et al (1983) in their report on the design of the highly influential Xerox Star workstation. They also used simple experiments. More sophisticated experiments on usability are reported by Jarvenpaa (1989) and Benbasat and Dexter (1986).

4.5.8 Impact on decision process

Decision support systems are often hypothesised to impact decision-making through an effect on aspects of the decision-making process. Most commonly using experiments (Benbasat and Nault 1990), a number of studies have endeavoured to measure the system's impact on process variables instead of (or as well as) outcome variables. The model of the decision-making process is typically a variation on the "rational actor" (Pinfield 1986) theme summarised by Sainfort et al. (1990):

1. Problem structuring (recognition, exploration and definition)
2. Alternatives generation (exploration and search)
3. Evaluation of alternatives and choice of solution
4. Solution implementation.

Other variables are added in the case of group support systems, such as the efficiency of the communication between group members, and the extent to which the process is dominated by certain individuals (Pinsonneault and Kraemer 1989). We have included some such variables in the theoretical framework presented in chapter 3.

By way of examples of experiments, Sharda et al (1988) examined the number of alternatives considered, finding no difference between users and non-users. Sainfort et al (1990), though, found that system users generated more alternative solutions to the problem that they were trying to solve. In a survey, Adams et al (1990) found that the systems studied supported alternative development and selection rather than problem identification and diagnosis.

We note that with both survey and experimental approaches, the variables to be measured are determined in advance, based on theoretical considerations of the nature of decision-making. Sainfort et al (1990) admit this:

> "Although most models of problem solving are congruent with ours, there is no other empirical evidence that precludes other models. There is currently no general theory about problem solving and little promise of such a theory in a foreseeable future."

Taken with the findings reported earlier (Keen 1980) that users did "not really use DSS for decision making", there would seem to be a case for more goal-free research into the impact of systems on the 'decision process', or more broadly, on the task process, however that is defined (Pinsonneault and Kraemer 1989).

4.5.9 Impact on decision results

Finally, we consider measurement of the system's impact on the results of the decision for which the system has been used. We distinguish this from the closely related variable of user benefit perception through consideration of the 'stakeholder perception' column. Whereas measures of perceived benefits take the perspective of the user, sometimes in a goal-free way, the impact on decision results takes a managerial or organisational perspective based on the purpose for which the system was introduced. Approaches are accordingly typically experimental or, much more rarely, quasi-experimental.

An example of the latter is Fudge & Lodish (1977), who found improved average profits for salesmen with access to the CALLPLAN salesman's planning system. An example of the experimental approach is Evans and Riha (1989), who viewed results of a system for hazardous waste disposal in terms of the accuracy of records, the quality of an inspection program and the success of compliance schedules.

4.6 System evaluation: choice of methods

We have reviewed in depth the applicability of several research methods to the system evaluation, finding that each has advantages and disadvantages: the trade-offs are summarised in Table 4-2 on page 53. We have also reviewed the related issue of how system success is measured, summarising their different perspectives in Table 4-3 on page 68. In this section, we summarise the decisions that were accordingly taken on which methods to use, and why. A detailed description of how each method was applied is left until the next chapter.

Table 4-2 ignores the added complexity that not all options were available at the relevant decision points: for example, the user base in South Africa did not initially exist. We therefore interweave historical factors into the discussion as necessary.

4.6.1 Rationale for system design evaluation

It was decided that the first evaluation stage should have as its primary aim the improvement of the prototype system itself. This stage could therefore be regarded as part of the system development rather than its evaluation - hence our discussion of its results within our system description in chapter 6. Although potential users had been closely involved in its specification, and although the system's correctness against its specification had been tested, the specification had largely been based on conjecture as to how software might best assist with marketing planning. The availability of the prototype was the first opportunity for problems in the specification itself to be identified through use of software for its intended purpose.

Thus this stage followed the logic of an implementation evaluation (Patton 1987): that until the program was operating as intended, there might be little reason to expect it to produce the desired outcomes.

The secondary aim of this initial evaluation stage was to establish users' views on what the benefits of the system would be likely to be, assuming the changes requested by the users were made. This would have the benefit of helping to steer subsequent outcome evaluation. This was, however, a minor part of the evaluation's focus.

The method involved six companies who agreed to use the software on a trial basis and provide their feedback on the system specification. This route was chosen rather than the use of students in order to maximise ecological validity. Data triangulation (Denzin 1978a) was used through the use of user-completed reports, to a template provided by the researcher, in addition to interviews. Given the aim of improving the evaluand and generating potential benefits, a qualitative approach was felt to be appropriate.

The results of the evaluation influenced the full specification that followed. It was intended that this specification would be implemented in the next, MacroScope generation of the EXMAR system before further evaluation stages. However, as already related, this was not successful. Hence the further evaluation also used the same prototype software.

4.6.2 Rationale for pilot experiment

Having completed the system design evaluation at the end of 1991, NCR began to implement the full specification in the MacroScope language. There were then no regular users of the prototype system in the UK, and only a few in South Africa. A further evaluation stage was desired before the doctoral research was completed in order to provide some less hypothetical evidence of the benefits that the system might provide, and of success factors for applying the software within the organisation.

Of the research methods we have reviewed, the only option available was the experiment, as there was no guarantee that the MacroScope software would gain users within the timescale of the PhD. It was, therefore, decided to conduct a pilot experiment during 1992, in order to develop and test the procedures for an experiment. It was intended that the full experiment would be conducted during 1993, hopefully with revised software.

4.6.3 Rationale for survey

After completion of the pilot experiment at the end of 1992, the situation was as shown in Table 4-2. A user base had been built up during 1992 in South Africa; it had become apparent that the NCR-sponsored MacroScope system would not be completed; and the pilot experiment had shown that, while feasible, the experiment had significant problems in ecological validity. The South African user base had generated the new options of a survey, a quasi-experiment and qualitative research. However, initially funding was not available for the extensive periods in South Africa that would be required for qualitative research, ruling out this option.

A quasi-experiment was ruled out on the basis of feasibility, for the reasons we have discussed relating to the sample size and the difficulty in matching the samples and ruling out all relevant extraneous variables.

The trade-off between an experiment and a survey was, in summary, as follows. The experiment had the advantage of a reliable assessment of system benefits, and of a limited number of potential success factors. The survey had the advantage of ecological validity, while allowing assessment of a wider range of success factors.

As the first empirical study of the impact of a DSS specifically designed for marketing planning, it was decided firstly that formative evaluation concerns should predominate over summative issues. The analysis of success factors found in the field was therefore of more importance than attempting, at this stage, to measure the system's success through an experiment. The second consideration was one of ecological validity: given the limitations of the experiment highlighted by the pilot, it was felt to be perverse not to take advantage of the live experience of thirty companies in South Africa in order to use students in an experiment.

An added factor in this regard was that software implementing the full specification would not be available for the experiment. Many of the weaknesses of the prototype software identified in the system design evaluation related to the user interface, and in particular to the speed of learning: as the pilot experiment showed, this would be a significant problem given the limited period available for learning and using the system in an experimental situation.

It was therefore decided to adopt a survey approach. The survey aimed to assess the importance of a number of success factors derived from the conceptual model presented in chapter 3. It would also provide initial indications of system benefits.

The investigation of initial indications of system benefits concentrated on the measurement of system success by user benefit perception, in order to indicate where benefits were perceived to lie. For the purposes of assessing potential success factors, though, two comparatively homogeneous success measures were used: system usage and user satisfaction. The scale construction for these success measures is discussed in the next chapter. In addition, a scale measuring user interface satisfaction (usability) was used. Given the soft nature of the potential benefits, both financial cost-benefit analysis and quantitative measurement of the impact on decision results were ruled out. The impact on some aspects of the decision process was, however, included in the potential benefits assessed.

4.6.4 Rationale for multiple-case study

It had been intended that the survey would form the final fieldwork of the doctorate. However, an opportunity arose to visit South Africa at some length, due to an invitation from a company using the system (leading to one case study using participant observation), complemented by support from the SERC. This opened the option of conducting qualitative research in parallel with the survey. This option was taken up in order to complement the survey through a qualitative approach, which would both be stronger in an assessment of system benefits, and provide theory generation as well as theory testing.

Because of the timing of this offer, the qualitative research could not be conducted first, as the survey had already been distributed. This had the disadvantage that results from the qualitative research could not be used to influence the survey design, a classical combination of qualitative and quantitative research (Miles and Huberman 1994 p41; Kaplan and Duchon 1988) that might have been appropriate here. On the other hand, it had the advantage of providing a genuine triangulation of methods (Denzin 1978a) whereby a goal-free qualitative evaluation could proceed without any danger of bias from the goal-based survey. Scriven (1972) even advocated using separate researchers for goal-based and goal-free approaches:

> "The less the external evaluator hears about the goals of the project, the less tunnel-vision will develop, the more attention will be paid to looking for actual effects (rather than checking on alleged effects)." (Scriven 1972 p2)

Although this approach was not possible, Scriven's argument was borne in mind in the conduct of the qualitative evaluation, an open mind being kept about what effects, if any, the system was having.

In order both to generate and to test theory, the qualitative study used analytic induction based on ten case studies, of which six were analysed in detail. In all cases, in-depth interviews were used, complemented in one case by participant observation, in order to provide a degree of data triangulation. Success measurement was, naturally, qualitative and judgemental: but as outlined in the next chapter, the assessment took account of several factors:
- user benefit perception: the user's perception of whether a benefit occurred
- corroboration from observation of documentary evidence
- the plausibility of rival hypotheses.

4.6.5 Rationale for exploration of generality of findings

Much of this thesis relates to the development and evaluation of one particular system, EXMAR. As we have argued, however, the assumption in much of the empirical DSS literature that 'decision support systems' can be regarded as homogeneous, and therefore that a consistent set of benefits and success factors might be expected to emerge across all studies, is unwarranted. Evidently, EXMAR is one of an infinity of possible systems that might have been built to attempt to support marketing planning. Any benefits found for EXMAR, for example, while showing that the potential of decision support systems in marketing planning includes those benefits, would not imply that another system would necessarily have the same effects.

Given the emergence since the study began of some other marketing planning systems, a logical next step was therefore to compare EXMAR's impact with that of the other systems that had been identified. The availability of funding from Cranfield enabled a study to be carried out and included in this thesis, rather than being left to future research as previously envisaged.

Because generalising the theory might require its modification, a qualitative approach based on analytic induction was appropriate. The study aimed to both explore the extent to which the results for EXMAR applied to the wider range of systems studied, and to compare and contrast the systems in order to gain a perspective on what types of systems would produce what kinds of effects.

4.6.6 Summary

In this section, we have explained the rationale for the choice of methods in evaluation. The previous sections have explored in depth the advantages and disadvantages of each, and we do not wish to repeat these arguments here. We make, however, some general points about the strengths and weaknesses of the particular combination of methods adopted.

The approach taken has had the related strengths of ecological validity and of a theory-generating component as well as a theory-testing one. It has been particularly strong on system success factors, where a triangulation is available between survey and qualitative approaches.

The first main weakness has been the lack of a benefits assessment with the experiment's twin advantages of reliability and internal validity. However, we have argued that qualitative research can contribute more strongly in these respects than is sometimes assumed, although the experiment undoubtedly has advantages that would justify its use in future research in this domain, particularly as the benefits to be tested have been clarified through this research. The second, related weakness is that the emphasis in benefits assessment has been on user perception, both in the survey and the qualitative approaches. This is not entirely a disadvantage, as we have argued that more 'objective' measures make potentially dangerous assumptions about the benefits that are to be measured. However, although an attempt has been made to validate the user's assessment of benefits through consideration of rival hypotheses and other data sources, the criticism is worth bearing in mind, and again makes a case for future experimental work.

4.7 Epistemological assumptions

An epistemological position is implicit in the rationale for the research method presented above. This section endeavours to make this position more explicit. The aim, however, is not to persuade, but merely to make the author's assumptions clear.

Various aspects of the epistemology of logical positivism, which (at least as practiced) involves "quantitative and experimental methods to test hypothetical-deductive generalisations" (Patton 1990), have come under scrutiny from social scientists:

i) The emphasis on sense data as the sole allowable source of information.

ii) Wittgenstein's argument in the Tractatus Logico-Philosophicus that due to the use of certain terms in language as a name for the same thing, "intersubjective agreement provided sufficient justification for knowledge" (Hirschheim 1985). This was combined with a realist ontological position, that data emanated from the world, hence its observation by different people could be shared through language.
iii) The argument that the synthetic knowledge of science (as opposed to the analytic, and ultimately tautological, knowledge of mathematics and logic) must be showable to be false.

We can summarise three relevant lines of criticism against this position:

1. There are various difficulties in treating humans as objects analogous to physical objects. These include:

a) The 'verstehen' argument that humans understand meaning. When reading words, for example, the word is immediately interpreted according to a rich framework of meaning, which analytic psychologists have taken as far as our associations with integers (Jung 1964). At the very least, this adds an intervening variable when studying humans' reactions to stimuli (Gill and Johnson 1991). At the most, subjective meaning represents an important study in own right, such as Husserl's phenomenological search for essences behind human interpretations.
b) The argument that humans act & choose. We speculate that the effect of the breakdown of determinism in quantum mechanics may have been influential in reducing the popularity of strictly deterministic views of humans.
c) Complexities arising from humans as social beings. "Because individuals do not exist in isolation, they cannot be studied as isolated units; they need to be understood in the context of their connections to cultural and social life" (Dilthey, quoted Hirschheim 1985 p24). Hence the symbols used by humans may be further complicated by their derivation from our social interaction, as argued by the symbolic interactionists.

These difficulties in studying humans partly present a paradigm issue (Kuhn 1970) relating to how logical positivism is practiced - there being nothing inherently in logical positivism to contradict the view that one cannot, for example, assume that all humans are the same, or that they will not react differently in (say) an experimental situation to how they react in a natural setting. It does, however, suggest to many the necessity of phenomenological inquiry, "using qualitative and naturalistic approaches to inductively and holistically understand human experience in context-specific settings" (Patton 1990). Further, some would argue that in order to understand humans' complex set of meanings, it is necessary to be a participant observer. This provides a link to our epistemological points: notably, our point i) on the use of sense data would rule out introspection, while point iii) would disallow approaches that did not provide replicability in order to confirm or disconfirm findings.

We move on, though, to two further criticisms of positivism with more direct epistemological implications.

2. As Wittgenstein himself later argued, the context-sensitivity of language mitigates against the notion that we can share data through language. This problem has been summarised as the problem of the 'value-free observation language' (Gill and Johnson 1991). Again, the spirit of the age has perhaps been influential in the philosophical debate, the emergence of relativity clarifying how even observations in terms of time and place are theory-dependent (Bernstein 1973), and the concept of observation by an external observer coming under attack from Heisenberg's uncertainty principle (Koestler 1959). This criticism is potentially devastating to the idea of cumulative, shared knowledge.

3. The problem of induction leads to the observation that synthetic knowledge cannot be absolute anyway. If the justification for the exclusive use of sense data and the use of replicable designs is that otherwise knowledge cannot be reliably gained, it can be retorted that knowledge cannot be reliably gained in any case, reducing these 'rules' to 'rules of thumb' held by certain people for pragmatic reasons relating to the ease of sharing findings.

These criticisms have led many to a pragmatic position (Patton 1990 p38), whose assumptions are implicit in Campbell's (1984) arguments quoted earlier. Within this position, the aim of science is to fit data, ruling out as many rival hypotheses as possible, while the choice of methods uses heuristics, or rules of thumb, determined judgementally (and therefore culturally). Taken to its logical limit, this would reduce science to a set of activities performed by certain individuals (Burrell & Morgan 1979):

> "Scientific knowledge here is in essence socially constructed and socially sustained; its significance and meaning can only be understood within its immediate social context."

Even assuming a more realist position, the criteria we used to compare research methods can be regarded (as we in fact have done) as heuristics, or rules of thumb or 'happiness measures', to be traded off against each other as necessary (McClintock et al 1979):

- *Reliability* becomes a heuristic rather than a necessity to provide findings that are 'showable as false'. So, to take an extreme example, findings on dream interpretation would be exceedingly difficult to replicate but not of themselves invalid.
- The complexities of peoples' interactions and interpretations makes *validity* problematic: how, for example, can findings be generalised? How can interpretations be measured? These issues can often be viewed as a trade-off between on the one hand, external measurement and observation, which may not uncover more subjective 'variables' that are necessary to a complete understanding, and on the other, the qualitative exploration of interpretations and interactions, which is problematic in terms of reliability.
- The *exploration vs testing* dichotomy is also loosened, as testing is no longer regarded as absolute. Rather, there is a dialectic between the process of theory generation and the process of data gathering - which, it has been argued, is how science actually proceeds in any case (Koestler 1959). This leads to Windelband's alternative terms (carrying a rather different symbolism) of nomothetic methods, exploring physical causation, versus idiographic methods, attempting to identify meanings and specific characteristics (Hirschheim 1985).

- even *naturalism* - the ban on the use of 'purposive' arguments in explanation - and *causality* become heuristics. We allow purposive arguments within, for example, popular expositions of natural history - "the giraffe's long neck has the purpose of allowing upper branches to be reached" - because we are aware of a hypothesised mechanism by which this purposive argument can ultimately be reduced to a causal one, the mechanism being the theory of evolution. If, however, we imagine that the theory of evolution were found to be false, would the knowledge of numerous species that has been built up through the heuristic of naturalism be invalidated? Likewise, was the knowledge of natural history that was accumulated through purposive arguments before the theory of evolution was stated invalid because no mechanism was known by which purposes could be explained? Although causality has proved a useful heuristic at times, for example as a motivation for Kepler (Koestler 1959), some would argue that it can also obstruct theoretical progress, for example with Newton's assumption (overturned by Einstein) of the existence of an ether to convey his otherwise seemingly magical gravitational force, or in turn with Einstein's problems with developments in quantum mechanics based on their disregard for the assumption of causality (Bernstein 1973). Fortunately, however, no purposive arguments are necessary in this thesis, as they might understandably prove contentious within the culture to which this thesis aims to contribute, the memory of the absurdities of angels driving the wheels of the epicycles being too fresh in the collective memory.

Related to the pragmatic position is that of methodological pluralism. If method choices involve trade-offs, then the language of combining methods to offset the disadvantages of each makes sense (Denzin 1978a). Kuhn (1970), for example, writes:

> "The pull towards a single methodological perspective, with its clearly defined tools, needs to be resisted because this single perspective designed for research in 'normal science', overlooks the anomalous quality of human experience. The difficulty for human science arises not from the need to change from one paradigm to another but from the need to resist settling down to any single paradigm."

One particular argument of relevance for evaluations is that the trade-offs may include choices as to whose perspective is taken: we have made these explicit in our discussion of success measures. As Smith (1985) argues, evaluations must therefore:

> "identify the major constituent groups to the policy initiative with which it is concerned and...collect data on these groups' interpretations and perceptions of 'success' in service provision...In consequence, pluralistic evaluation must embody the principles of methodological triangulation...each data source is interest bound (as tied to the perspective of one group rather than another"

This study, then, accepts that the criticisms of logical positivism are sufficient to allow a pragmatic position which allows use of both qualitative and quantitative approaches on the grounds of trade-offs between the weaknesses of different methods. A strict logical positivist might accept pure analytic induction, but he or she might regard the wide definition of the domain of this research and the attendant compromises in reliability that we have discussed as too great to allow the thesis to claim anything other than theory generation. We would argue, however, that there has been a degree of data covering and of ruling out of rival hypotheses, and thus of theory testing: the extent to which this has been achieved is a question of judgement, and is considered again in weighing the findings in our conclusions. We would further argue that the trade-offs in reliability are justified in order to generate theory for the impact of systems as a whole, rather than taking a small subset of the potential impacts (as in an experiment) and testing them reliably but with significant question-marks over the relevance to marketing planning in practice.

A strict logical positivist might further emphasise that 'perceptions of success' only have been measured. As a literal statement we would not disagree (except where we have triangulated with other data sources). Our possible disagreement would be over the potential implications of the word 'only' - that some other approach might have measured success entirely 'objectively'. While advocating the use of other, in some cases more reliable, measures in further research, we have argued that all measures are culturally determined by the stakeholders' perspective that they represent. Given the theory-laden assumptions behind the many experiments looking at whether systems help with 'decision time', 'alternatives generation' and so on, we have argued that there are merits in the phenomenological view that it is important to understand how users think the system helps or hinders them in what they believe their task to be. However, if only because the researcher has more time and motivation than users to reflect on rival explanations, & thus to counteract the natural tendency of humans to jump to conclusions (Pennington & Hastie 1988), we regard the findings as having higher validity where we have been able to triangulate user perceptions with direct or indirect observations.

5. Details of Research Methods

5.1 Introduction

In the previous chapter, we described in broad terms the stages of the research, and justified the overall methodological choices made, within the context of a review of software evaluation methodology. This chapter provides details of the method adopted for each stage of the research. It is structured as follows:
- Section 5.2: Initial modelling and demonstrator development
- Section 5.3: Prototype development
- Section 5.4: Full system specification and MacroScope and Visual Basic systems
- Section 5.5: System design evaluation
- Section 5.6: Pilot experiment
- Section 5.7: Survey
- Section 5.8: EXMAR multiple-case study
- Section 5.9: Exploration of generality of findings.

5.2 Initial modelling and demonstrator development

Part of objective 02.1 is:
How the marketing planning process and relevant marketing techniques are formalised to provide a marketing planning model as a basis for software support.

There are two approaches to this: to use, and if necessary to evaluate, an already existing model; or to develop a new model, building on existing theory. Examination of existing formalised descriptions of a marketing planning process (e.g. Abell and Hammond 1979; Greenley 1986; McDonald 1982) showed that they were not in themselves adequate, as the degree of formalisation necessary for a paper-based planning system seemed to be less than that required for a computer system. For example, it was not always apparent how analyses on different paper forms related to each other, and the applicability of marketing tools and techniques at different parts of the planning process, and the relationship between the techniques, was only loosely defined (McDonald 1995 p432).

But such descriptions did provide invaluable material for this task, and suggested that an efficient way of developing a model might be to integrate and formalise them, using the techniques of system analysis (Hickman 1989, Hares 1990, Coad and Yourdon 1990, Meyer 1992, Shlaer and Mellor 1992) adapted to the domain. The resulting model was then validated by presenting it back to an 'expert', the term being defined in this case as a person with good knowledge of the marketing planning literature. Professor Malcolm McDonald performed this role in several interviews (four of which occurred prior to development of the demonstrator), later also becoming the author's PhD supervisor.

To this extent, the modelling followed the expert systems school (Bobrow et al 1986a). But as well as being 'expert driven', the modelling was also 'user driven', in that practitioners in club member organisations were interviewed to establish their perspective on problems with marketing planning in practice, and to hold early discussions on the potential role of computers (seven user interviews being held prior to demonstrator development). Another difference from classic expert systems developments (Hickman 1989) was that modelling was consciously undogmatic on choice of suitable systems analysis techniques - so no assumption was made, for example, that a rule-based approach (Buchan and Shortliffe 1984) would be most appropriate.

The resulting model was documented in an Analysis Report (see Appendix A), which also reached tentative conclusions on the most appropriate system scope and style:

> "An interactive system that supports a marketing planner by providing tools that help the user to represent the state of the markets and products under consideration; to interpret this information so as to gain an understanding of the workings of the markets and one's place within them; and to determine a course of action based on this understanding".

Using the model implicit in other computer systems was ruled out for several reasons. Of the marketing planning systems for multiple product-markets discussed in chapter 3, none was in existence when this study started. In any case, vendors typically guard carefully the theory underlying their systems, though this may in some cases be self-evident to the system's users. In the absence of published literature, the theoretical basis for such models cannot be readily tested; and further systems cannot be produced that improve on the model without the cooperation of the vendor.

The development of several generations of software has followed the Implementation Process school's advice (Stabell 1986; Keen 1980) to begin building quickly and to evaluate as you go along. The demonstrator is described in McDonald and Wilson (1990), and was more fully documented in a Demonstration Script and accompanying video. It was informally evaluated by demonstration to the domain expert and to representatives of the club member companies, who provided feedback resulting in an Appraisal document. The demonstrator was implemented in the Interlisp variant of the Lisp language using the Loops object-oriented programming system (Bobrow et al 1986b, Stefik et al 1983) to operate on Xerox AI workstations.

5.3 Prototype development

The demonstrator was not, however, sufficiently robust to allow evaluation in the field by marketing staff. It also ran on expensive AI workstations. A PC-based prototype was therefore developed, implementing a subset of the marketing planning model illustrated by the demonstrator.

The prototype's full name was a 'thin, core, customisable prototype': 'thin', in that most aspects of the marketing planning process were included, even if lightly; 'core', in that certain vital parts of the process and key techniques were included in depth; 'customisable', in that the software was designed to allow adaptation, as it was only a working assumption that the underlying model would apply across all vertical markets.

The marketing planning model showed the large amount of important information summarised by the directional policy matrix: this was therefore included as a key 'core' technique, as were related techniques and data items such as SWOT analysis, objective and strategy setting, and basic financial information on sales, market size and share for each product-market.

Although the end result was termed a prototype, standard software development stages were nevertheless used to ensure tight project control, a decision based on the author's previous experience and supported, for example, by Mumford (1988). These resulted in deliverables of Requirements, Functional, Outline Design and Detailed Design Specifications; well documented code; and user documentation, including extensive online help. Table 4-1 shows these deliverables and those for the other software versions. Specifications were presented to marketing managers from club member companies for feedback, particularly on user interface design.

After a multi-criteria evaluation of software development tools, the prototype was developed using the Smalltalk-80 object-oriented programming language (Goldberg and Robson 1983; Deutsch 1989) and the Analyst hypertext system from Xerox Special Information Systems (Piersol 1986; Wilson 1990).

5.4 Full system specification and MacroScope and Visual Basic systems

A third system was then specified. This was closely based on the feedback from the system design evaluation (discussed in the next section). Methodologically this was similar to the previous stages, involving conceptual modelling of the marketing planning process, to extend the previous model and to refine it in weak areas; functional specification and user interface design; and a staged approach to software development. Several sessions were held with the domain expert on conceptual modelling; it was also found useful to check the emerging user interface design with him as a sample user with limited experience of software. (Although by this stage the domain expert was also the author's PhD supervisor, these roles were kept distinct through separate meetings, even held in different rooms.) Specific modelling problems relating to the modelling of cost and profit were also addressed by sessions with appropriate academics. The updated model and requirements were documented in a Requirements Specification, while the required functionality and user interface design were further documented through annotated screen layouts.

The then sponsors, NCR, contracted a software house to implement a subset of the author's specification, intending to release the resulting system as the first version of a commercial product. The development tool used was a database front-end tool called MacroScope, against the strong advice of the author who argued for an object-oriented approach using a fully interactive development environment with a Microsoft Windows interface. The project overran its budget substantially, and ended in delivery of a system too slow and bug-ridden for commercial release, which NCR was not able to persuade the software house to improve. The resulting system nevertheless formed a further prototype embodying many of the ideas contained in the full system specification.

Subsequently, a further sponsor, Strategic Marketing Systems Ltd (SMS), was found to provide programming resources to implement much of the full specification, using the Visual Basic programming language. The first version arising from this sponsorship, termed the Visual Basic system, has recently been completed.

The system is described in detail in the next chapter. Here we provide a brief description.

> *The system guides the user through a marketing planning process, prompting for qualitative and quantitative data, validating and relating this data, checking the data for consistency, offering advice at key stages, presenting information in various ways so as to assist in the setting of objectives and strategies, and generating a marketing plan document.*

The Visual Basic system meets this description. The only part of this definition not implemented by the prototype is the automatic generation of a marketing plan document, though facilities are provided for printing out of specific screens, or for cutting and pasting a document together.

5.5 System design evaluation

We now turn from software development to software evaluation, beginning with the UK-based system design evaluation.

Informal feedback on the prototype had been obtained from the club member companies, and from numerous demonstrations to other marketers. This led to a large list of potential improvements. There was nevertheless a need to gain a more precise notion of their relative importance and to gain more feedback from experienced users of the system.

A more structured evaluation of the prototype was therefore carried out. Marketing and strategy managers in six companies were trained in how to use the software, which was installed on a PC within the company. They then developed a marketing plan using the system, and wrote a report on their conclusions. In exchange the companies had use of the system for three months and a chance to influence future software development. The companies were chosen to cover a variety of market sectors, and to incorporate capital, other industrial, consumer and service products. The vertical markets covered were aerospace, engineering, consumer goods, computing, banking and insurance.

The results of the previous informal feedback were used to define the categories under which information was to be collected. These were incorporated in a report structure that the companies were asked to follow in their reports. The report template included open-ended questions under each heading: the wording of these followed questionnaire design guidelines in avoiding bias and so on (Lofland and Lofland 1984; Macintyre

1978). In addition, thirteen semi-structured interviews, averaging three hours' duration, were carried out to gather background information on the companies and their planning, and to explore selected areas in more depth. Tape recordings were not made, but interviews were noted in detail and written up in full typed notes.

The reports received were rich and extensive. They did not all follow the report template closely, however, covering in general subsets of the report's questions. In analysing the responses it therefore proved useful to combine as well as contrast the information gained from interviews and from the written reports, resulting in at least four full responses to most categories. The data was summarised in an Evaluation Summary which followed the report template's headings; its results are summarised in chapter 6, and expanded on in Wilson and McDonald (1994b) which is appended.

5.6 Pilot experiment

A central hypothesised benefit of systems is the improvement of the quality of the resulting marketing plan. A pilot was carried out for an experiment designed to test this hypothesis, through system usage as the independent variable and plan quality as the dependent variable. First we will describe the planned experiment, before describing the pilot.

The subjects were to be MBA students, working on a single problem defined by a written teaching-style case study. The experimental group would use the system as an aid, while the control group would use pen and paper or their electronic equivalents. Assessment of plan quality would be carried out by a panel of independent experts. This is similar in concept to many experiments carried out in DSS research, except that decision quality is generalised to plan quality: this is further discussed below. The thesis we have discussed by Bovich (1987) provides the closest model.

The theoretical framework described in chapter 3 would be used as a basis for the experiment, omitting variables not measurable in the laboratory such as organisational characteristics. The sample size would be between 80 and 150. The subjects would be randomly assigned to the experimental and control groups. This is preferred to systematic controls as it provides a degree of protection against bias from extraneous variables not identified explicitly by the researchers. This is felt to be important due to the relative immaturity of this field of study. Nevertheless, the two groups would be checked for similarity on a number of potential extraneous variables. These include attitude towards marketing planning and towards IT, marketing planning experience, marketing knowledge and skills, and motivation, as well as generally-applied variables such as age. These variables would be tested through a questionnaire filled in before the experimental treatment, while a post-test questionnaire would test for modifications in these attitudes as a result of using the system, and would measure other outcome variables such as satisfaction with the decision-making process.

Three extraneous variables deserve special mention as being frequently uncontrolled for in DSS research: facilitation, training, and the potential benefits of a paper-based formal marketing planning system as compared with the DSS. Both groups would be trained in the use of the DSS, while only the experimental group would use the system for the experimental task. If found to be feasible in the pilot experiment, no facilitator would be used by either group, so no assistance would be provided if users had a problem in their usage of the system. If this was not found to be feasible, any facilitation would be strictly limited to assistance with the operation of the software, as might be gained from a software vendor's support service. To control for whether benefits were due to computerised support or due to the introduction of a marketing planning process (whether computerised or not), the control group would be offered the use of an equivalent paper form-based planning manual.

Measurement of the main dependent variable of plan quality would be by assessment by a panel of independent experts, following the example of Bovich (1987). A panel of independent marketing academics would be used, complemented by a second panel of practising marketing directors (this second panel is additional to Bovich's design). The results from each would be analysed separately. Plan quality would be measured on a number of dimensions, derived from the marketing planning literature. These include decision quality, plan structure, communication effectiveness, creativity, prioritisation of recommendations, identification of information needs and understanding.

A number of process variables would also be measured. These include process thoroughness and flexibility, data utilisation, alternatives exploration and time usage. Some would be measured by the expert panel, such as the depth of analysis performed, while others would be measured through observation, such as time usage.

A special case of a process variable, or set of variables, is group communication effectiveness. Subjects would be divided into teams of two or three subjects, each of which would work on a marketing plan together. This would more closely match the reality of marketing planning as a team activity, and allow assessment of the system's impact on communication effectiveness. This would be done through users' perceptions, measured in the post-test questionnaire.

To check for the impact of the system training itself, two pre-test questionnaires would in fact be used, one before and one after the system training.

The pilot experiment was intended to develop scales, and to pilot other aspects of the research design, such as the definition of the case study and the process of judging plan quality. It was based on an earlier version of the theoretical framework presented in chapter 3. Just four subjects were used: all used the system, and thus formed part of the experimental group. Other than the restriction that there was no control group, the whole experimental procedure was piloted, including subject training and briefing, expert assessment of reports, and questionnaire design and completion. The statistical questionnaire analysis was also omitted in the absence of control data.

The pilot showed that an experiment was viable, but as we discussed in more detail in the previous chapter, at the cost of low ecological validity, with the result that the strategy was switched to field evaluation for the main formative evaluation of the prototype.

Other than its influence on the subsequent research method, the pilot exercise nevertheless proved useful in several respects:

1. It provided the focus for the development of the first version of the theoretical framework.
2. It provided an initial pilot for many questions that were later incorporated in the survey.
3. It provided further qualitative feedback on the system's strengths and weaknesses, through reports on this topic from the MBA students following a similar format to that used in the system design evaluation. This influenced the development of the second version of the theoretical framework as a basis for the survey, and provided some appropriate statements with high face validity for inclusion within the questionnaire.

5.7 Survey

5.7.1 Aims

The aims of the survey were:

i. To develop and validate instruments for measurement of system success. This may be of value for future research. It was also an essential first step in analysing the questionnaire.
ii. To examine factors affecting system success, such as user training, and top management support for the system's introduction.
iii. To provide early indications of system success, using user satisfaction, user benefits perception, and system usage. As discussed in the previous chapter, only indications can be provided in the absence of a control group.

5.7.2 Hypotheses

The hypotheses were derived from the theoretical framework presented in chapter 3, which describes the variables and relevant previous literature.

i) Factors affecting system success.
The first set of potential success factors (hypotheses 1 to 10) are those where the literature on DSS or marketing planning gave grounds for hypothesising the direction of any relationship with success.

Hypotheses 1-10. The following variables are positively related to system success:
H1. Training
H2. Purchase involvement
H3. Top management support for the system
H4. Support
H5. User interface satisfaction
H6. Attitude towards marketing planning
H7. Task interdependence

H8. Top management support for marketing planning
H9. Level of follow-through to implementation
H10. Top management involvement in marketing planning

Below are listed factors where the relationship could be hypothesised as either positive or negative. Greater marketing planning experience, for example, could be thought to lead to a greater appreciation of the system; on the other hand, the system's hypothesised learning benefits might cause it to be more highly valued by less experienced users.

Hypotheses 11-20. The following variables are related to system success:
H11. Marketing planning experience
H12. Seniority
H13. Organisation size
H14. Process flexibility
H15. Data availability
H16. Alternatives exploration
H17. Time availability
H18. Industry sector
H19. Function
H20. Task definition

ii) Benefits
In defining hypothesised benefits, priority was given to variables relating to cognitive and technical barriers to marketing planning, for example the thoroughness of the planning process adopted. It was thought unlikely that system use would affect more cultural and organisational variables, such as marketing planning introduction and organisational structure: only some more plausible possibilities were included, in the interests of questionnaire brevity. This choice was guided by the literature review, the system design evaluation and the pilot experiment.

Hypotheses 21-33. The system has a perceived impact on the following variables:
H21. Knowledge & skills
H22. Plan quality
H23. Alternatives exploration
H24. Communication effectiveness
H25. Cross-functional involvement
H26. Data utilisation
H27. Process flexibility
H28. Process thoroughness
H29. Time usage
H30. Level of follow-through to implementation
H31. Top management involvement in planning process
H32. Top management support for marketing planning
H33. Attitude towards marketing planning

5.7.3 Sampling procedure

A list of the 27 organisations in South Africa who had then purchased copies of the system was obtained from the South African distributor, with the name of a main contact in each organisation. Each contact was written to enclosing eight copies of the questionnaire and reply-paid envelopes, and was asked to circulate them to all colleagues who had used the system or participated in planning sessions in which the system was used. To minimise response bias, the letter emphasised that "It is vital that all such users are represented, irrespective of their level of involvement or views about the system, in order to ensure that we receive a balanced view". Confidentiality was also assured.

A follow-up letter was sent after two months to those companies where no responses had been received, and followed up by telephone.

The survey had 61 respondents from 18 companies. A further two responses were not usable. The response rate is estimated as follows:

- In organisations where at least one questionnaire was returned, it is estimated (based on the case studies) that 50% of users responded to the questionnaire, giving a user base of 122.
- Adjustment for companies where no questionnaires were received: 27/18 x 122 = 183.
- The response rate is therefore estimated at approximately 33%. It should be noted that this is an approximate calculation.

The respondent profile is further discussed in the survey results chapter, chapter 7.

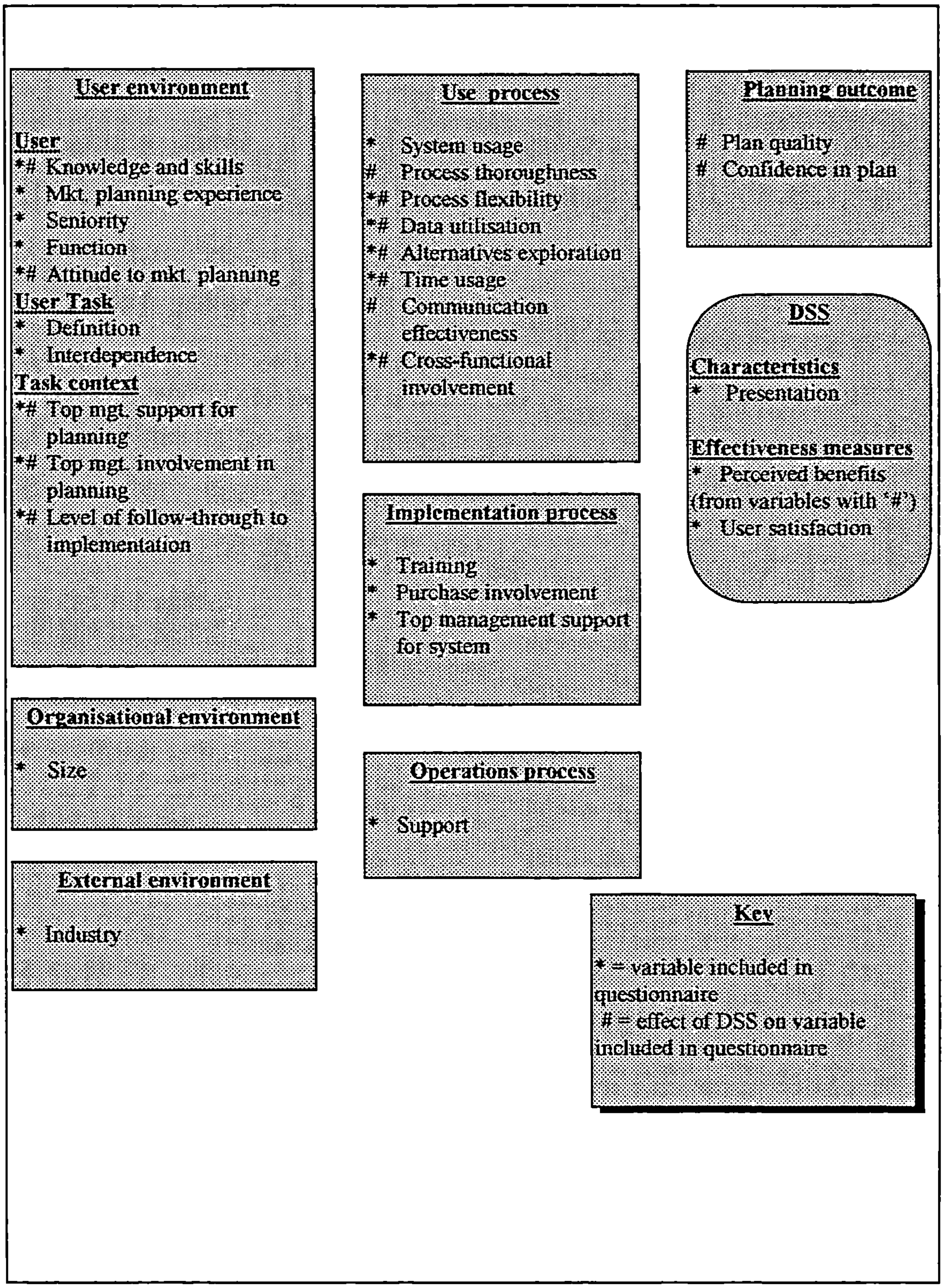
5.7.4 Measurement of variables

Introduction

For purposes of the exploration of system benefits, perceived benefits were measured by asking for the user's perception of the *system's impact on the variable,* in accordance with the 'user benefit perception' success variable discussed in the previous chapter. This was, in some cases, in addition to measurement of the user's perception of the variable itself as a possible success factor. For example, under 'Attitude towards marketing planning', users were asked both about their attitude towards marketing planning (Q66) and whether the system had influenced that attitude (Q65, 67). This is indicated in Figure 5-1 and in the questionnaire description below by a "*" for the variable itself, and a "#" for the system's effect on the variable. See Appendix B for the questionnaire text.

Where feasible, a number of questions was used to measure each attitudinal variable. In the interests of content validity, care was taken to ensure that all aspects of the variable were covered by the questions (Moser and Kalton 1971), by reference to the literature and through the piloting process. Where possible, question wording was derived from the previous empirical research into marketing planning, from users' words in the system design evaluation or from other DSS questionnaires. Five-point scales (Hoinville et al 1988) were used for all attitudinal questions to indicate agreement or disagreement. Many of the questions were worded negatively, e.g.: "EXMAR does *not* offer significant help to marketing practitioners in the development of marketing plans". The question numbers referring to each variable, and notes on derivation of the questions, are given below.

Figure 5-1. Theoretical framework for questionnaire design



A 6-item user satisfaction scale (questions 77 to 82) was taken from Sanders (1984), after a review of a number of alternative measures of user satisfaction (Money et al 1988; Franz and Robey 1986; Larcker and Lessig 1980; Davis 1989; Baroudi and Orlikowski 1988; Montazemi 1988; Mahmood and Sniezek 1989) revealed no better options. As discussed in the previous chapter, most well-developed measures are heavily biased towards management information systems, and assume that the system's role is essentially to provide information: this ruled out many of the other options considered.

In addition, two questions relating to the system's overall utility at present (Q76), and its potential utility after further development (Q83), were included, in case the user satisfaction measure was found to be unsatisfactory in terms of reliability, and in order that reliability testing could establish whether these improved the 6-item user satisfaction measure.

The questionnaire was piloted on six users. It was also assessed for face and content validity by four experts in marketing planning and marketing software. In addition, as we have mentioned, the pilot experiment effectively formed a pilot for some of the questions, which were re-used from the experiment's questionnaires.

Scale development

Variables were examined for normality using the normal probability plot of the observed value against the expected value assuming a normal distribution (Norusis 1993). Where the deviance from a normal distribution appeared significant and systematic, consideration was given to transforming the variable. Four questions were accordingly transformed, all by taking natural logarithms: system usage, in months; system usage, in hours over the previous year; turnover; and seniority, as measured by the budget for which the respondent was responsible. In each case, as well as improving normality, the transformation was felt to be intuitively reasonable. For example, for groups at different levels of seniority, the variance of the budget might be expected to vary approximately as a percentage of the budget level, resulting in approximate equality of variance when the logarithm is used (Norusis 1993 p188). These cases are further discussed individually below.

Negatively-worded questions were reversed so that a high score corresponded to the presence of a benefit or the presence of a potential success factor. Multi-item Likert-type scales were then calculated using the mean of the items without weighting (Moser and Kalton 1971). All multi-item scales were tested for reliability using Cronbach's alpha (Kerlinger 1973), with 0.7 being regarded as a minimum acceptable value following the practice of many researchers (Nunnally 1967; Adams et al 1990; Guimaraes et al 1992), though others regard a lower value as being acceptable (Bozionelos 1994). An exception was made for the 0.66 value of 'Level of follow-through to implementation', for reasons discussed below. In addition, a correlation matrix was drawn for each scale, and the alpha score was examined when each item was deleted from the scale. Factor analysis was also used on each scale, as a further check that scales were not better regarded as comprising two or more variables (Hoinville et al 1988). This involved a principal component analysis with the Varimax rotation (Kerlinger 1973). The Oblimin oblique rotation algorithm was also tried but in each case gave similar results. Where a question seemed out of place with other items in the scale, consideration was given to whether it might form part of a scale with any other questions in the questionnaire: for purposes such as this, a general correlation matrix of all questions was calculated for reference.

In some cases, the questions on benefits did not result in a reliable scale. In the case of four hypothesised scales, the questions were considered as separate variables in subsequent analysis. For simplicity these questions are not individually listed in Figure 5-1. The relevant variables are the system's impact on attitude to marketing planning, alternatives exploration, data utilisation and time usage.

Notes on question derivation and scale development

The variables are listed below, following the structure of Figure 5-1. The questions measuring the variable are described, with notes on scale reliability testing and other aspects of scale development.

User environment

a) User

*# Knowledge and skills Only the user's knowledge of marketing planning is included; prior DSS knowledge/skills is omitted. Q68, 69. The two questions gave an alpha of 0.84.

The system's learning effects, or impacts on knowledge and skills, are addressed by Q42 to Q47. Q43 and 44 address organisational learning, the other questions dealing with personal learning. Q43 relates to the spread of learning through the organisation, while Q44 relates to its preservation and building over time, a notion often referred to by expert systems literature and, more recently, in discussions of 'groupware' (Holtham 1993). Personal learning can in turn relate to marketing knowledge and skills (Q42, 46 and 47) or an "updating of...intuition" (Little 1970) about the business (Money et al 1988) (Q45).

The five questions gave an alpha of 0.77. Without question 44, alpha was slightly higher at 0.79. Examination of individual responses suggested that this was probably due to confusion caused by the negatively-worded question 44, which some respondents may have scored as if it were worded positively. Q44 was therefore omitted from the scale.

* Marketing planning experience Marketing planning experience: Q91. No questions on education or general computing experience.
* Seniority Measured by three questions on organisational level (Q96), number of employees reporting to the respondent (Q97) and budget for which the respondent is responsible (Q98).

The budget variable had a poor match to a normal distribution. Transformation of the variable by taking the logarithm of the budget resulted in a good approximation to a normal distribution, and a higher correlation with the other questions on seniority. This was therefore used in subsequent analysis.

Regarded as a scale, the questions gave an alpha of 0.02. Removal of Q97 increased alpha to 0.47, an improvement though still not acceptable. Examination of individual cases suggested that the reason might have been that Q97 was ambiguous, being interpreted by most as including indirect reports, but by some as only including direct reports. Furthermore, comparison of job titles and organisational level suggested that some top managers within a business unit or subsidiary interpreted the organisational level within their parent organisation, whereas their subordinates scored organisational level within the business unit. Hence the instructions when interpreting questions relating to the organisation to "assume each applies to the organisational unit most relevant to you, for example the corporate whole, a single business unit, or a division" (taken from Bailey and Johnson 1994) were not consistently interpreted in this case. As a result of these difficulties, the transformed budget variable was used to measure seniority.

* <u>Function</u> Q90. Adapted from Bailey and Johnson (1994).

*# <u>Attitude towards marketing planning</u> Q66. System's impact on attitude: Q65, 67 - these were proposed by a pilot user and by one of the pilot experts. No questions on attitude towards decision support systems.

Questions 65 and 67 correlated very poorly (alpha = 0.37). Neither did Q65 (on whether the user was more or less daunted by marketing planning) correlate strongly with other questions such as Q40, 42 and 23. Q67 on enthusiasm did, however, correlate with the single-item success measure, Q76. In the benefits analysis, they were considered separately.

b) User's task

* <u>Definition</u> The task definition was only measured with respect to the type of plans produced (Q99). Two respects in which the plan type might influence system success were hypothesised: firstly, whether long-term or short-term plans were produced; and secondly, whether the system was used to support the creation of marketing plans or corporate/business plans. The question was therefore coded into two variables:

a) DSSLong: Use for long-term vs short-term planning:
0 = DSS used for neither 1-year nor longer-term plans.
1 = DSS used for long-term (strategic) marketing plan or long-term business plan
2 = DSS used for 1-year marketing plan or one-year business plan
3 = DSS used for both 1-year and longer-term plans.

b) DSSMark: Use for marketing vs corporate/business unit plans:
0 = DSS used for neither marketing nor corporate plans.
1 = DSS used for (short or long-term) marketing plan
2 = DSS used for (short or long-term) corporate/business unit plan
3 = DSS used for both marketing and business plans.

* Interdependence Q29.

c) Task context

*# Top management support for marketing planning Q48, 50, 54 together measure this variable (alpha = 0.8). The wording of Q48 and 50 inspired by Hopkins (1981). System's impact on top management support: Q56.

*# Top management involvement in planning Q51, 52, 58 (alpha = 0.74). Wording of Q51 derived from Hopkins (1981 p3), wording of Q52 and Q58 from Stasch and Lanktree (1980 p86). System's impact on top management involvement: Q60.

*# Level of follow-through to implementation Q53 (inspired by Ames 1968 and McDonald 1982), Q55 (proposed by a pilot user). System's impact on follow-through: Q57, 59.

Questions 53 and 55 on the variable itself gave alpha=0.66. As the equivalent questions 57 and 59 on the system's impact gave alpha=0.77, it was decided to proceed with both scales so that both the variable and the system's impact on it could both be measured. We should warn that this is slightly below the 0.7 figure we have taken as the minimum acceptable level.

Use process

* System usage Q94 (hours of system use in previous year) and Q95 (months of system use, adapted from Sanders and Courtney 1985).

As already mentioned, a logarithmic transformation of each resulted in a better approximation to a normal distribution. The two measures correlated poorly (alpha=0.15). Their correlation with the user satisfaction measure was explored, on the basis that as a surrogate for system success, system usage should correlate with another established measure of success. Q94 correlated much more closely than Q95 ($r=0.40$, $p=0.001$, versus $r=0.20$, $p=.11$), while both correlation coefficients were higher than for the untransformed variables. The logarithm of system use in hours was therefore used as a measure of system usage.

Process thoroughness Q1, 2, 3, 5, 7. Only the system's impact on process thoroughness is measured. Q3 proposed by an expert assessor during piloting: others derived from system design evaluation.

The scale gave an alpha of 0.61; however, question 1 did not correlate highly with the other questions in the scale, and without it alpha was 0.79. Having considered whether question 1 might correlate with other questions such as 15, 16 and 18, it was dropped from further analysis.

*# Process flexibility Q6 measures the flexibility of the process (wording from Ames 1968 p138). Q4 measures the system's perceived effect on this flexibility.

*# Data utilisation Q49 measures data availability, while six questions examine the system's effect on data utilisation. Q8, 9, 12 and 13 derived from Money et al (1988). Q10 and 11 from statements made during system design evaluation.

The scale for the system's effect on data utilisation gave an alpha score of 0.47. Without Q8 on information availability, alpha increased slightly to 0.49: this could not be improved by removing further questions. Factor analysis found three factors:
a) Information use and accuracy: questions 9 and 13 (alpha=0.58)
b) Information access: questions 11 and 13 (alpha=0.41)
c) Information availability: question 8, 10 (alpha=0.34).

None of these was acceptable as a scale. The questions were therefore considered individually in benefit analysis.

*# Alternatives exploration Q14 and 17 measure this variable, the negatively-worded Q14 asking if "the route to be taken is normally clear from our previous strategy" (wording derived from Ames 1968 p141) and Q17 asking the depth and breadth of exploration of alternative strategies. Q15, 16 and 18 measure the system's impact on alternatives exploration. The graphically-worded Q16 on innovation, corresponding to Q14, is taken from a user report in the system design evaluation. Q15 and 18 examine the breadth and depth of alternatives exploration respectively.

Questions 14 and 17 gave an alpha of -0.33 (even when q14 had been reversed). Ames (1968) had described unthinking repetition of prior programs as the opposite of choosing from a number of alternative strategies: it had therefore been expected that Q14 (when reversed) and Q17 would correlate. This was not, however, the case. Similarly, the three questions for the system's impact on alternatives exploration failed to produce an acceptable scale (alpha=0.35). Removal of Q16 improved alpha to 0.45.

It seems, therefore, that the concept tentatively termed 'innovation' represented by Q14 and Q16 is separate from concepts of alternatives breadth and depth. In subsequent analysis, Innovation was considered as a separate variable. The system's impact on alternatives breadth and depth (Q15 and 18) were considered separately in view of their inadequate alpha score of 0.45.

*# Time usage Time availability is examined in Q19 and Q22, focusing on the effort expended and the elapsed time respectively. Q20, 21, 23, 24 and 25 examine the system's effect on time usage. Q21 and Q24 due to suggestions during piloting. Q25 adapted from Money et al (1988).

Q19 and 22 did not correlate highly (alpha=0.28). They were considered independently as potential success factors.

The five questions on the system's effect on time usage gave an alpha of 0.42. Factor analysis suggested that Q23 and 24 on the time saving when producing a plan formed one factor, while Q20, 21 and 25 on time saving in all activities relating to marketing planning formed another. These factors were still, however, inadequate as scales, having alpha values of 0.62 and 0.50 respectively. The five questions were therefore considered separately.

Communication effectiveness Only the system's impact on communication effectiveness is measured, with five questions looking at aspects of communication summarised by Pinsonneault and Kraemer (1989): Q27 (mutual understanding), 30 (equality of participation), 31 (degree of consensus), 32 (agreed process) and 34 (concentration on task). The scale gave an alpha of 0.70, and the scale was accepted.

*# Cross-functional involvement Q26 is derived from Ames (1968 p140). The system's effect is measured by Q28 (wording from system design evaluation).

Planning outcome

Plan quality Only the system's impact on the relevant marketing planning barriers was considered: Q37 (documentation of intervention) and Q38 (level of detail). Alpha was 0.42, so the questions were considered separately.

Confidence in plan The system's impact on confidence in decisions (Q40) is also measured, as one surrogate for measurement of plan quality (Pinsonneault and Kraemer 1989).

Implementation process

* Training Q61. Adapted from Sanders and Courtney (1985). Also used by Guimaraes et al (1992).
* Purchase involvement Q85.
* Top management support for system Q62, 64. Adapted from Sanders and Courtney (1985). Also used by Guimaraes et al (1992). The scale gave alpha=0.85.

Operations process

* Support Q63.

Decision Support System

a) Characteristics

Content - data Not measured. See Data Utilisation.
Content - models Not measured. The system's models may impact, however, on variables such as Alternatives Exploration.
Content - process support Not examined specifically, but see Process Thoroughness and Process Flexibility.

* Presentation After consideration of a number of user interface measures (Chin et al 1988; Baroudi and Orlikowski 1988; Larcker and Lessig 1980), a 6-item measure of satisfaction with the user interface was adapted from Davis (1989) as Q70, 71, 72, 73, 74, 75. The scale gave an alpha score of 0.89.

b) Effectiveness measures

* Perceived benefits. The questions relating to the system's impact on the model's variables can together be regarded as an assessment of system benefits,

corresponding to the 'user benefit perception' success variable (Money et al 1988; Guimaraes et al 1992).

* User satisfaction The users' perception of system utility. Q76 to 84. The source of the questions was discussed at the start of this section.

  The 6-item User Satisfaction measure was tested for reliability, including the additional single-item questions 76 and 83. The original six-item scale gave an alpha of 0.86, while addition of the two extra questions made a marginal improvement to 0.87. Two factors emerged from factor analysis: a factor that can be termed 'organisational benefit' (questions 76, 78, 80, 81, 83), with alpha of 0.85, and a second factor that seems to represent 'personal dependence' (questions 77, 79, 82: alpha = 0.86). We warn that for this 8-item factor analysis, the ratio of cases (61) to items (8) is slightly lower than the 10:1 minimum recommended by Kerlinger (1973). The presence of two factors was supported by consideration of inter-item correlations: for example, correlations between the three 'personal dependence' items and the single-item success measure Q76 are between 0.18 and 0.21, whereas those between Q76 and the other 'organisational benefit' items are between 0.47 and 0.59. The factors also have very different mean scores, the means for personal dependence items varying from 2.7 to 2.9, whereas those for organisational benefit questions vary between 3.7 and 4.3. In terms of content validity, it seems intuitively reasonable that the benefits to the organisation might be separate from issues of individual dependence on the system.

  Accordingly, three measures were used in correlation and regression tests of the impact of hypothesised success factors on user satisfaction: firstly, an overall 8-item User Satisfaction measure; secondly, Organisational Benefit; and thirdly, Personal Dependence.

Organisational environment

* Size Measured in number of employees and in turnover (included in information collected by researcher). The number of employees was coded as 1 for 0-50 employees, 2 for 50-200, 3 for 200-1000, 4 for 1000-5000 and 5 for greater than 5000. The turnover was entered in millions of South African Rand.

  Turnover was transformed by taking the natural logarithm, in order to improve its normality. The coded number of employees did not need transformation: we note that such codings as that used for number of employees approximate to a logarithmic measure in any case.

  The measures correlated well (alpha=0.81). The turnover measure was used in analysis of success factors, as the data was thought to be of higher quality.

External environment

* Industry Collected by researcher.

5.7.5 Data analysis procedures

Success factors

The analysis was carried out using four measures of system success: system usage; the user satisfaction scale; and its two component scales, personal dependence and organisational benefit. First a correlation matrix was drawn up between the hypothesised success factors and the success measures. Those which correlated significantly at the 5% level with at least one of the success measures were included in a multiple regression analysis, to assess the relative contributions of the independent variables to system success. Specifically, the usefulness of an antecedent variable in explaining variance in system success was determined by examining the increment in R^2 when the variable was added to the regression equation (Kerlinger 1973).

For examination of categorical variables such as industry and function, one-way ANOVA (Cohen and Holliday 1982) was used where its assumption of homogeneity of variance was met. Otherwise, pairwise comparison of means using t-tests was used.

Benefits

As we have discussed, only indications of benefits can be obtained in the absence of a control group. Descriptive statistics were examined on the individual hypothesised benefits. The standard error of the mean (Cohen and Holliday 1982) was used to examine the hypothesis that the mean score on a given benefit in the population is greater than a certain level. A level of 3 was considered, on the basis that above 3, one might consider the weight of opinion to be that the system does indeed give the benefit. However, there are at least two problems with this argument:

a) As with case studies, users may be inclined to be polite about the system to its known originators, providing a positive bias.

b) Although the scale points give 3 as a neutral 'Neither agree nor disagree' point, the strength of wording of individual questions could affect whether a score above 3 can necessarily be regarded as representing a positive response, and could certainly affect the relative interpretation of scores of 4 and 5.

The results are therefore shown in chapter 7 for levels of 3.5 and 4 as an indication of which benefits appear to be supported by users' perceptions. Results should nevertheless be treated with considerable caution, as early indications only of system success, and as an exploration of where the greater benefits are perceived to lie to guide future research. The results are qualitatively discussed and contrasted with the results from the case studies in the final chapter.

5.8 EXMAR multiple-case study

5.8.1 Overview

In-depth case studies were conducted on ten organisations using the EXMAR prototype. The analytic induction strategy, as discussed at length in the previous chapter, was used to generate inductively a list of system benefits and success factors fitting the data.

Data was gathered primarily from 48 in-depth interviews in the ten organisations, of which 33 interviews in six organisations were selected for detailed analysis. In one of the six, interviews were complemented by participant observation.

5.8.2 Case and interviewee selection

The organisations selected had used the EXMAR prototype for at least six months. Within this constraint, the choice of companies provided maximum variation in several respects:

1. Perceived utility of the system. The sample had a spread in terms of system success, from business units within some companies where the system was not being used, to companies who regarded the system as delivering important benefits. This followed the argument of Bloor (1978) and others, discussed in the last chapter, that it is important to check cases where the phenomenon (here, benefits from DSS technology) does not occur, in order to check that the presumed causes (here, an appropriate system plus the presence of various success factors) are both necessary and sufficient. For this purpose, an initial judgement of system success was formed from conversations with the software distributor, from initial questionnaire responses (where available) and from exploratory telephone calls.
2. The breadth of use within the company, from one planning unit to multiple hierarchical business units.
3. Area of business. The sample included consumer and industrial companies supplying both goods and services. It also included nationalised, transitional and private sector organisations.

The primary unit of analysis (McClintock et al 1979; Yin 1984) was the team involved in marketing planning in a strategic business unit, whether aided by a DSS or not. Within this team, interviews were held with staff in a marketing or strategic planning role, with relevant line managers and with any staff facilitating the use of the DSS. Most interviews were one hour long. Wherever possible, interviews were held with individuals to maximise their openness and to allow exploration of their individual views, but in a few cases group interviews were with two or three people due to the interwiewees' preferences.

The interviews were arranged through an initial point of contact provided by the software distributor, who provided a complete list of companies who had obtained the software. As these initial contacts were presumed to be unrepresentatively favourably disposed towards the system, an attempt was made to ensure that the interviewees fully represented the different shades of opinion within the company. The first letter to the initial contact emphasised this, including the sentence: "If possible, I would like to meet you and any of your colleagues who have used EXMAR or taken part in EXMAR planning sessions, irrespective of their views about the system - indeed, a mixture of different views would be welcomed." The initial letter was followed up by phone, which was used as an opportunity to explore who was involved in marketing planning, as a further means of checking for bias. Wherever possible, representatives of different business functions were interviewed to explore whether their perceptions differed. A further source of information on potential interviewees was questionnaire responses, where available: if respondents seemed to hold particularly negative views (when assessed by the responses to the user satisfaction scale items), an attempt was made to interview them to explore their views. In other respects, the questionnaire responses were not studied prior to the interviews in the interests of a triangulation between the two approaches.

Due to the considerable bulk of material, the 48 interviews in ten organisations were narrowed down to six cases involving 33 interviews for purposes of transcription and detailed analysis. The choice reflected the criteria listed above for the original selection of cases, and was also guided by an endeavour to ensure that where a case seemed to explore system impacts or success factors not dealt with elsewhere, it was included. A reading of the notes from the omitted cases suggested no modifications to the propositions regarding benefits and success factors derived from the six cases studied in detail. Taking the omitted cases individually: case 7 in an engineering research organisation showed by its intermittent presence the importance of sufficiently wide involvement in the planning process, reflecting lessons from case 6. Case 8 was a medium-sized manufacturing organisation, similar in many respects to cases 1, 3 and 6, with positive perceptions of the system's role. Case 9 was a public sector organisation exhibiting a number of features in common with case 5, including the difficulties that can arise when the commitment to marketing planning comes from a marketing or strategy function without consistent support from above. Case 10, a services organisation offering leisure facilities, had relatively little experience of the software to date, although the extensive use of facilitated planning sessions in different parts of the organisation and the perceptions of the system's role seemed in many respects comparable with case 4, another case with a strong services component.

5.8.3 Data collection

An interview schedule listed the issues to be covered in each interview, under the broad headings of: company background; marketing and planning within the company; the history of EXMAR's introduction and use; and perceptions of the system's effects and how best to apply it. Probes were listed for exploring particular areas of the theoretical framework, such as learning effects, data-related issues, use of time and so on. These were deliberately left fairly open, in order to avoid leading the interviewee.

Hence, the author did not go as far as Lindesmith (1947, reported in Manning 1982), who said about his study, Opiate Addiction:

> "The literature on drug addiction was at first not consulted for fear that the opinions expressed would introduce an initial and perhaps decisive bias into the investigation."

Glaser and Strauss (1967) similarly argued that the findings should be related to the literature only after they had been developed inductively. Although this advice was not followed, the framework was used only insofar as it was necessary in order to be "selective what information should be collected and analysed" (Miles and Huberman 1994).

It was soon discovered that it was extremely difficult to probe a particular area without the interviewee assuming that the interviewer was expecting a system benefit. The interviewee seemed frequently to assume that the interviewer, having designed the system, would expect and desire the feedback to be positive. To illustrate, after an account of a market research exercise, a response to the question: "What was the trigger that prompted you to commission that research?" began: "No, we had decided to do that some time ago..." The interviewee seemed to answer as if he had been asked whether *use of the system* had been the trigger for the market research.

Two other potential sources of bias in the same direction were identified. Firstly, despite the attempt we have described to include interviewees with differing views, they may as a whole have been more likely to be favourable towards the system than their colleagues. Not least, as the search began with those who had tried to use the system, this may in some cases have been due to a predisposition towards use of software in general or the concept of software-supported marketing planning in particular. To some extent, this was counteracted by seeking interviewees equivalent to the users, but who had not used the system. But this general potential bias had to be borne in mind in the conduct of the interviews and the subsequent analysis. (We have discussed how a bias in the opposite direction can occur, whereby high user expectations can lead to disappointment in the system, even if it is found to be useful. This was perhaps easier to spot, as such expectations were on occasion explicitly stated. In any case, from the point of view of ensuring that the findings were conservative, this was a less important bias to detect.)

The second source of bias in the same direction was that most interviewees were inclined to attribute to 'EXMAR' changes that might have been a result of any of the package of measures typically introduced along with the software itself. As we have discussed under the subject of rival hypotheses, it is important to look for which effects are due to the use of the system, and which are due to the impact of a facilitator, or to the introduction of the planning procedures underlying the system (whether supported by software or not), or to the marketing training that may precede system use. This required great care in analysis, as discussed below and in the individual case analyses.

Some specific tactics were found to be useful during the interview itself for counteracting these biases:

1. In the introduction to the interview, it was stressed that the interviewer was from a university, that it was simply a hypothesis that the system might help, and that we were interested in finding what effects, if any, the system was having, whether positive or negative.

2. Questions concentrated on historical events, for example about what happened before EXMAR was introduced and afterwards. This meant that perceptions of system benefits and so on were often expressed without having been prompted for, removing one potential source of bias. This also meant that the perceptions were more likely to be related to historical accounts of planning exercises that could be followed up with other interviewees, in order to triangulate the perception with that of others and with the author's own interpretation of the incidents related. Follow-up questions were as neutrally worded as possible.
3. Perceptual statements were related back to historical events where possible. For example, one interviewee was concerned that in the absence of good data, the system might lead people to trust unsound analyses:

Interviewee: "You can't get at that information, it doesn't matter how hard you try...That's one reason why the EXMAR process worries me."
Interviewer: "Have you seen any evidence in EXMAR's use that yourself or anyone else has fallen prey to those dangers?"
Interviewee: "Yes, I've seen it myself. I just put in information, and the outcome, it's just absolute rubbish."
Interviewer: "So what happened then?" (Etc.)

As another example, an interviewee commented about the subjectivity of data such as SWOT analyses:

Interviewee: "A lot of it was very subjective. It requires a tremendous amount of honesty..."
Interviewer: "Did you have any problem keeping up that 'tremendous honesty' that's required by the system?"

This led to a detailed explanation of what had happened in one planning session, at which another interviewee was also present.

4. Rival hypotheses were introduced as necessary in order to explore their fit to the data. For example, after an interviewee had cited learning benefits from using the system, he was asked: "Would that learning effect not have been just as efficient if you had just read the book?" However, this was generally more successful when combined with 3 above, exploring the hypothesis historically. In the example below, after an initial hypothetical question, it was realised that it would be better to ask a historical one:

Interviewer: "If you had done the planning exercise on paper, how would it have been different?"
Interviewee: "That's difficult to imagine. What EXMAR did was it made us do certain things. That was a discipline in itself. So for every product-for-market you had to do certain things. If you talk to anyone in the business, they will talk about the price of 3mm glass and the glazing rate. Now, if any glass business is going to survive on that, they will fold within the first three months of operation. Going through the EXMAR thing forced you to look at other factors in the business. That

was a strength in it. Out of everything, that impressed me most. In terms of doing it on paper, you could do it, but it would take about 4 or 5 times the amount of time."

Interviewer: "Had there been any prior attempts to do this kind of thing on paper?"
Interviewee: "Yes, about 4 years ago..." (etc.)

5. If a probe for a perception was desired, an attempt was made to show that any answers were acceptable. For example, a question after an interviewee had mentioned the ease of conducting 'what-if' analyses with the software was:

   "I have heard some people say that software in this area saves time because of the use of what-if's and so on. But on the other hand, some people take the view that the time it takes to deal with issues like the software development and getting the data in outweighs that, and you end up taking more time altogether. What's your view?"

6. In response to positive benefit statements, 'devil's advocate' questions were often useful, to explore the fit of alternative views derived from theoretical considerations or from previous interviews, for example:

   "One could argue that the value of the forums that I was involved in was due to the presence of a facilitator rather than due to any particular process or the software."

   "It could be argued that systems of this sort are trying to quantify the unquantifiable, and make it seem excessively precise. What would you make of that argument?"

One other potential source of bias is that the questionnaire asked for the respondents' agreement or disagreement with a number of potential benefits and success factors. In those cases where the questionnaire was answered before the interview, this could have led the interviewee to consider possible views that had not been previously held. This effect was minimised through an attempt to have as much time as possible between the questionnaire response and the interview. If an interviewee had not yet responded to the questionnaire when the interview was arranged, it was left it until the end of the interview to ask if they could do so.

Further data sources were used where available, including marketing plans and internal marketing planning manuals.

5.8.4 Participant observation

One case study included participant observation as well as interviews. The author worked with the company for twenty days, to act as system trainer and facilitator, in exchange for use of information for research purposes, and funding for two of the visits to South Africa. This was carried out over two visits several months apart totalling seven weeks' duration, allowing time for other interviews to be carried out. (Further interviews in other companies were carried out on a third visit.) In addition to the collection of documents, notes were made on all aspects of the work in progress. As in much ethnographic work, informal interviews also sometimes occurred: these were recorded where possible.

This element of participant observation in the study helped to counteract the interviews' potential weakness of relying on reported events. An action research (Elliot 1991; Watson 1994) approach to information systems has been recommended for research into the application of new technologies (Wood-Harper 1985). It is believed that the resulting understanding has helped to interpret and balance the data arising from the interviews, achieving a measure of data triangulation within the multiple-case study.

5.8.5 Data analysis

The approach to data analysis was adapted from the analytic induction literature reviewed in the previous chapter, and most particularly from Cressey (1950; 1953). The procedure used was as follows:

1. The interviews were tape-recorded and transcribed, then annotated with themes, headings to group related material together, and methodological notes, such as occasions where the respondent appeared to have been influenced in their response by the interviewer. For example, although we have described how we endeavoured to avoid leading questions, transcripts revealed that sometimes this had not succeeded. These occasions required noting to ensure that the response was appropriately discounted.

A few interviews which were not recorded due to problems or mistakes with the tape recorder were written up from notes, but this was found to yield much less rich data, particularly where the interview was not written up on the same day. Also, this data evidently was not subject to the same degree of analysis of potential biases, so this data was treated with considerable caution. This problem only affected one and a half of the interviews in the six cases selected for detailed analysis.

2. Case descriptions were drawn up to summarise the impact of the system in each case, without reference to the hypotheses. This was found a useful summarising step in order to identify the main themes in the case and to assist with bringing out any unique features of the case, though constant reference was still needed to the original transcripts thereafter.

3. The first case was considered, and propositions were generated from it regarding the system's impact, either from user perceptions or through abstraction by the researcher from the reported or observed events. As Turner (1981) notes, "The emerging theory is likely to have a rather messy degree of complexity so that it is unlikely to fall readily into a set of simple logical propositions which express its essence." In order at least to contain this complexity and to facilitate cross-case analysis, the propositions were organised into two simple lists, one of benefits and the other of success factors, corresponding to the two research objectives. Each benefit or success factor was, as a result, fairly rich, relating for example to an area of potential benefits such as time savings. Each proposition was given a sentence or two to summarise it, as well as a brief title, for example:

Title: Save time, particularly on revisions
Summary: A time investment in learning systems is needed, unless a facilitator is used. Once this has been made, systems can save time compared with equivalent paper planning, particularly when revising existing plans.

The aim was to capture some of the richness of the proposition while maintaining brevity to ease the comparison against data. To assist with deriving the summary and with subsequent analysis, the transcripts were notated (in a word processing package) with an abbreviation for the proposition against any relevant sections, so that all information relating to the proposition could be easily reviewed.

4. The evidence for each proposition in the case was then weighed, to assess the extent to which the case supported the proposition. This qualitative and judgemental process took account of:

Data consistency and triangulation
- the consistency of the data from different interviewees;
- the substantiation of user perceptions with narrated events;
- the corroboration from observation or documentary evidence

Theoretical fit
- the fit of the data to the proposition;
- the presence of a plausible explanation for the proposition;
- the fit of known rival hypotheses to the data.

It was summarised in a rating based on a simple scoring system (described at the start of chapter 8), complemented by notes and illustrative quotations. However, this score should still be interpreted as a concise summary of qualitative data, not as an attempt at quantification.

5. Steps 3 and 4 were repeated for each case as follows:
i. Any new propositions arising from the case were listed and summarised as in step 3.
ii. For both new and previously generated propositions, the case's support for the proposition was assessed as in step 4.

6. Any mismatch between the data and the proposition caused a review of the proposition. If the data simply contradicted the proposition, it was scored negatively. If, as was more common, the proposition could be modified to cover the new data as well as the previous data, this modification was carried out. This might involve a change to the title, to the summary text, or to both. In this eventuality, all previous cases were checked to ensure that the modified statement still applied to them with the scoring originally applied, with modifications as necessary.

7. When all cases had been analysed, the evidence was summarised in a summary table containing the ratings for each proposition against each case. Using these ratings as a reminder of the evidence in each case, the strength of support for each proposition was then summarised in words. As the ratings were a highly abbreviated summary of rich qualitative data, this process was again qualitative and judgemental rather than mechanical.

Particular attention was paid in stage 4 to plausible rival hypotheses. As we have already mentioned, the most commonly relevant rival hypotheses - of which interviewees were often not aware - were:

a) That a benefit is caused by the introduction into the organisation of the marketing planning process or of tools that are incorporated into the system, rather than by the system itself
b) That a benefit is caused by a switch from previous planning by an individual to group-based planning
c) That a benefit is caused by the presence and actions of a facilitator, rather than by the system itself
d) That benefits in second and subsequent uses of the system are attributable to the learning impact of using the system on the first occasion, and would equally well be received in the absence of the system.

Evidence was sought to rule out these rival hypotheses - for example, by comparing planning exercises conducted with system support with previous or subsequent exercises conducted without it, but where a similar paper-based process and/or a facilitator were used. Much of the questioning focused on looking for such control information. Where the rival hypothesis was also consistent with the data, the case was regarded as inconclusive on the benefit in question, even if the interviewees were of the opinion that the system had indeed caused the benefit.

The interviews were carried out over three visits to South Africa totalling three months, over the course of a year. This allowed analysis between visits in order to inform the next round of interviews. During each visit, analysis was restricted to notation of interview notes and noting of ideas and tentative hypotheses, which were used to inform the questioning in further interviews during the visit.

The data analysis approach we have described was not defined in this final form at the start of the analysis. Initially, the analysis attempted directly to follow grounded theory (Glaser and Strauss 1967), with definition of categories and their properties being followed by definition of relationships between them. Following Stauss and Corbin's (1990) lead, the resulting model was discursively described in a draft thesis chapter, with theoretical points being illustrated by examples from the interviews. Wilson and McDonald (1994a), appended, includes extracts from an early version of this analysis relating to the system's learning effects. Feedback from anonymous reviewers of this paper and other reviewers of the material suggested that the analysis was in danger of appearing anecdotal - a charge which the author felt on reflection to have some merit. A search for a more structured approach involving a higher degree of theory testing led to the use of analytic induction, as described above and reflected in chapter 8 (as well as in Wilson and McDonald 1996, appended). Following this choice, the analysis began again with the interview transcripts as we have described, although the previous work inevitably informed the definition of propositions in such a way as to account for some of the data from following cases as well as from the case in question, resulting in fewer modifications to propositions as further cases were considered than might otherwise have proved necessary.

5.9 Exploration of generality of findings

5.9.1 Overview

As discussed in the previous chapter, the purpose of this stage was to assess the extent to which the results from the EXMAR formative evaluation could be generalised to other systems. The method was almost identical to that for the EXMAR multiple-case study, so this section concentrates on noting exceptions.

5.9.2 Case selection and data collection

An informal search was carried out for appropriate cases. Vendors of relevant products that had been found in the literature review were contacted to explore whether any of their clients would be appropriate. Bespoke systems were identified in a more ad-hoc way, through asking researchers and consultants at Cranfield, and other marketing and IT consultants known to the author, whether they knew of any appropriate systems.

The sampling used the simplified typology of systems described in chapter 3, concentrating on the category to which EXMAR belongs, marketing planning systems for multiple product-markets, but also including representatives of three other categories. Four of the systems studied provided marketing planning support for multiple product-markets, including support for analysis tools such as portfolio matrices, support for "what-if" modelling of the impact of marketing strategies, and in one case, direct assistance with production of a marketing plan document. One case was of the use of a planning system for one product-market or business unit; three cases were of causal modelling systems, one of which also used a multiple product-market planning system; and one case was of a data consolidation and display system. The final category, individual marketing technique packages, was omitted from this stage's scope, as being both more distant from EXMAR and more heterogeneous than the other categories.

As with the EXMAR multiple-case study, organisations selected had used a system for at least six months. Within this constraint, the choice of companies provided maximum variation in the systems being used, in order to explore the extent to which the theory developed in the EXMAR formative evaluation could be generalised. A particular dimension of variation concentrated on was the distinction between bespoke and off-the-shelf systems. Of the multiple product-market planning systems, three organisations used bespoke systems developed internally or commissioned for their own use, while the fourth used the EXMAR system, in conjunction with bespoke software for econometric modelling. This EXMAR-based case was included because of its use alongside other, causal modelling software, providing a rather different context to that of the South African cases studied in the previous chapter, and allowing for reflection from the interviewees on the applicability of each. There was a similar variation in development method for the causal modelling cases: two cases used off-the-shelf packages, while the third used a bespoke system. The remaining two cases used off-the-shelf packages. Again, the sample deliberately included a mix of successful and less successful applications of DSS technology.

A total of 21 interviews were carried out, ranging from one to three hours. Further data sources were used where available, including marketing plans and internal marketing planning manuals. In addition, one case included participant observation as well as formal interviews. The author worked with the company for seven days to act as trainer and facilitator, making a separate visit at a later stage to conduct formal interviews. In addition to the collection of documents, notes were made on all aspects of the work in progress.

5.9.3 Data analysis

This followed the same method as in the EXMAR formative evaluation, with the exception that the cases from each system type were considered separately. In the event, a cursory analysis of the data for the causal modelling cases and the data consolidation/display system showed that fit with the EXMAR-developed propositions was poor. As a result, propositions were generated inductively from scratch for these two system types. In the other two system types, though, the EXMAR-developed propositions formed a good starting-point for the analysis, changing little as a result of it, although the degree of support for different propositions naturally varied considerably.

Part 3: The EXMAR System

6. The EXMAR System

6.1 Introduction

The purpose of this chapter (the only chapter of Part 3) is to describe the EXMAR system.

In doing so, the feedback on the prototype version from the system design evaluation is summarised briefly, with the aim of motivating changes introduced in the subsequent full system specification. By way of evidence on the research objectives, however, we concentrate in this thesis on the subsequent evaluations of the prototype in live use (the multiple-case study and survey) and the subsequent exploration of the generality of findings with a wider array of systems, described in parts 4 and 5. Some early findings against the research objectives from the system design evaluation are published in the Journal of Strategic Marketing paper appended.

First we describe the model of the strategic marketing planning process developed as a basis for development of the DSS, in section 6.2. This section refers to Appendix A, which contains a description of the model from one of the specification documents produced for the demonstrator, the Analysis Report. Section 6.3 summarises the scope of each version of the system, referring to Appendix B for illustrative screen snapshots from four versions of the system. Finally, section 6.4 discusses the nature of the support provided by the system, including a summary of the feedback from the system design evaluation. The appended British Journal of Management paper contains a further discussion of the nature of the support offered.

6.2 Model of the strategic marketing planning process

6.2.1 The initial model

In section 5.2, we described how a model of the strategic marketing planning process was produced using systems analysis techniques, as a basis for the development of a computer system. The extract from the Analysis Report included in Appendix A describes the first version of this model, as used as a basis for the first, demonstrator system. The model contains:

- A functional breakdown, or hierarchical decomposition of the tasks involved in producing a strategic marketing plan (sections 3.1 to 3.3 in Appendix A). This uses a variant on functional decomposition (Hares 1990). The functional breakdown concentrates on the audit, SWOT analysis, assumptions and marketing objectives and strategies stages in McDonald's (1995) formulation of the planning process.
- A data model in an adapted entity-relationship notation (Barker 1989), showing the major data items typically examined in these stages (section 3.4 in Appendix A).

- Diagrams modelling the relationship between some of the techniques often used in strategic marketing planning (section 3.5 in Appendix A).

We note that the model was based on systems analysis working with the literature, the domain expert, and interviews with practitioners. It can be taken as a contribution to the prescriptive literature, providing in particular a formalisation of parts of it as a necessary precursor to automation. (Indeed, after presentation of the diagrams to the author's supervisor in his then role as domain expert, and amendment in response to his comments, much of the model was published by him in a conceptual marketing paper (McDonald 1990a).). However, as we have noted, the empirical literature evaluating the effectiveness of marketing planning is comparatively sparse, while specific techniques can broadly be regarded as prescriptive rather than of proven benefit (Armstrong and Brodie 1994a, Cronshaw et al 1994). In this situation it is hardly surprising that the prescriptive literature itself varies, influenced perhaps by the differing (and often informal in research terms) experience of its authors: differences are expressed, for example, between Piercy and Giles (1989) and Greenley (1989) on the planning process; between Armstrong and Brodie (1994a) and Wensley (1994) on the Boston matrix; and between Wensley (1995) and Saunders (1995) on market segmentation (some of which we discussed in chapter 2). Hence, no claim is made that the model is optimal.

Neither does the model attempt completeness, even as a generic description of marketing planning before it has been tailored to the needs of specific organisations, concentrating as it does on certain stages of the planning process, and within them on certain techniques commonly advocated for planning, in the interests of focus for the development of a computer system, as discussed in McDonald and Wilson (1990), appended. For example, as we will discuss, the model initially concentrated on revenue rather than profit, and support for detailed budgets is not included. This has the implication that software based on it would need to be supplemented by data and analyses conducted away from the system in order to produce a complete plan.

6.2.2 Summary of subsequent amendments

Significant modifications to the model made since the demonstrator development include:

1. The calculation of the competitive position axis of the directional policy matrix (DPM) (Hussey 1978, Wind 1981) was altered to indicate the organisation's strength relative to the strongest competitor. In the first formulation described in Appendix A, and incorporated in the demonstrator, competitive position or 'strength in market' was defined as the organisation's weighted average score on a number of critical success factors (CSFs), as described for example by Kotler in his description of the GE/McKinsey matrix (Kotler 1988 p45) (though Kotler does not use the term 'critical success factors'). Where CSFs are chosen as attributes of products on which buyers make their decisions, this corresponds to an expectancy-value model of consumer behaviour (Kotler 1988 p199). See Diagrams B1.2 and B1.4 (all diagrams with an identifier beginning with B are to be found in Appendix B) for illustrations from the demonstrator. In providing feedback on the demonstrator software, though, the domain expert reported that, when used on paper, this method was frequently resulting in a

clustering of product-markets in one corner of the matrix, thus nullifying its intended use as a means of distinguishing between the product-markets - a problem also reported by Kotler (1988). In discussion, the idea emerged of using a relative score, calculated relative to the best competitor, in a manner analogous to the use in the BCG matrix of relative market share (Aaker 1988). The resulting ratio of the organisation's weighted average CSF score to that of the leading competitor was termed 'relative strength in market', and used for the competitive position axis of the matrix. This would ensure, for example, that if a company's managers tended to regard themselves as good at everything, or simply tended to score highly when presented with 1-10 perceptual scales, the analysis was focused on a comparison against their competition. This was used for subsequent versions of the software. See, for example, diagrams B2.8 and B2.5. The domain expert subsequently published details of this and other aspects of the DPM clarified through the process of software development in McDonald (1990b).

Incidentally, we use the term 'directional policy matrix' rather than 'GE/McKinsey matrix' arbitrarily, given the similarity of these portfolio matrices, and given that we have taken features of each freely. In particular, the use of factor weights totalling 100 and factor scores is taken from the GE/McKinsey matrix, but in the software to date, the circle size is taken to be proportional to the organisation's revenue, rather than using a circle size proportional to market size with a pie chart to indicate market share as suggested by GE/McKinsey.

2. Porter's cost-differentiation matrix (Porter 1980a, 1985) is presented in the data model as plotting a 'cost' attribute against a 'differentiation' attribute for each competitor in a product-market. See Diagram B1.3. It was originally envisaged that differentiation would need to be subjectively assessed by the user, for example using a 1-10 scale. Based on subsequent critiques of Porter's use of the term 'differentiation' (Speed 1989; Sharp 1991; Cronshaw et al 1994), the model has been tentatively adapted to re-use the 'strength in market' measure as a measure of differentiation. This has the advantage of re-use of data that is collected for other purposes, hence reducing the work required to generate the cost-differentiation matrix.

The logic for this begins with Porter's (1985) statement that:

> "In a differentiation strategy, a firm seeks to be unique in its industry along some dimensions that are widely valued by buyers."

As the critical success factors contributing to 'strength in market' may be reasonably defined as "dimensions that are widely valued by buyers", a high differentiation strategy would seem to correspond to a high score on one or more critical success factors, with proximity to competitors on others, resulting in a higher overall strength in market. Similarly, an undifferentiated strategy as might be followed by a cost leader would involve a lower strength in market:

> "A cost leader...cannot ignore the bases of differentiation. If its product is not perceived as comparable or acceptable by buyers, a cost leader will be forced to discount prices well below competitors' to gain sales. This may nullify the benefits of its favourable cost position." (Porter 1985)

This description would suggest similar CSF scores to those of the competition, resulting in a relative strength in market of around 1, lower than in the differentiated case.

One issue arises where a CSF of 'price', or a similar price-related CSF, is present (as, for example, in Diagram B4.5). Should such a CSF be included in the calculation of strength in market used for the purpose of the differentiation axis? Sharp (1991) argues that price can form simply another means of differentiation, pointing out that low cost cannot be equated with low price (an argument reinforced the above quotation from Porter). This would suggest that price should be included in assessment of differentiation. On the other hand, Cronshaw et al (1994) imply that low cost generally corresponds to a low price, and that differentiation refers to dimensions of quality rather than dimensions of price. For example, when Porter's work is viewed from the perspective of product positioning, they argue that the 'stuck in the middle' hypothesis can be phrased: "Product competition must emphasise either price or quality and mid-market positions are generally unattractive or unprofitable." This would suggest that differentiation should be calculated omitting price-related CSFs. The full system specification allows for both possibilities, defaulting to exclusion of price-related CSFs, but allowing the user to include them if required. The first full implementation of the Porter matrix in the Visual Basic system excludes price-related CSFs.

We should note that this interpretation of the Porter matrix as a tool for situation analysis for individual product-markets does not capture all aspects of Porter's intent in his discussion of generic strategies. It represents an interpretation that relates to "strategy as positioning", that is, "the position the company's products enjoy in the market-place relative to their competitors" when analysed on an individual basis (Cronshaw et al 1994). As these authors argued, Porter also applied his ideas to "positioning as strategy": the notion that the company must adopt one of the generic strategies as an overall strategic thrust throughout its markets. This interpretation is not supported by EXMAR, except insofar as the company's position on the Porter matrix for each product-market can be compared and contrasted.

A related weakness is that the bases for differentiation may not, in Porter's view, relate necessarily to the customer's buying factors, but may rather relate to internal features that affect buying factors at one remove:

> "By positioning I mean positioning in all its dimensions, not just in the product or customer [dimension] but in manufacturing, distribution, service" (Porter 1980b).

By contrast, in the interests of simplicity and EXMAR's focus on the product-market dimension, EXMAR's critical success factors normally concentrate on aspects of the product or service that directly affect the customer - although users may, if they wish, use a wider range of factors.

Despite these limitations, the matrix in the limited form we have described is included because the data on critical success factors is already available for other purposes, and as a contribution to the user's consideration of positioning in an individual product-market.

3. A version of perceptual maps (McDonald 1995), product-space maps (Kotler 1988 p6) or product positioning maps (Kotler 1988 p70) has been included, by allowing one CSF to be plotted against another for all competitors in a product-market as a scatter-

graph. Kotler, for example, presents the example of ease against speed for various competing forms of transport. If the CSFs for a hypothesised transport market include ease and speed, then this data can be plotted for each competitor, either as a means of examining the different positioning of competitors within a segment, or as an aid to segmenting a market. See Diagram B4.1. This is analogous to the discussion of the Porter matrix above, in that by re-using data used elsewhere in the model, the work involved in using a technique may be reduced. This is, however, at the cost that perceptual maps can only be drawn which relate to two of the CSFs defined for a market, hence forming a limited implementation of the concept (Christopher et al 1991).

4. A further respect in which the model has become richer, re-using the same data to produce analyses based on a smaller set of input data, relates to the automatic calculation of certain CSFs and market attractiveness factors (MAFs). As actual financial figures on market size, growth and share are included in the model, it is plausible that the price CSF (if present) and MAFs for market size and growth can be derived from the financial information, through an algorithm that (taking the example of market size) allocates the largest score to the largest market, and so on. Hence when implemented by software, the user need not enter scores for these factors; furthermore, any changes to the financial figures will automatically be reflected in corresponding changes to the calculation of strength in market and market attractiveness. However, although specified in the full specification, this feature has not been implemented in the software at the time of writing.

5. The original model involves revenue information based on price, volume, revenue, market share and market size for each product-market (e.g. diagram B3.8). A cost/profit model has been defined which allows costs to be entered under a number of user-defined headings, both for costs allocated to specific product-markets and for unallocated costs. Hence a profit or contribution figure can be derived both for each product-market and for the business unit as a whole. For example, the cost of sales may be subtracted from net sales to yield a production contribution figure, from which marketing costs, entered under a number of headings, can be subtracted to give a calculation of marketing contribution. Marketing strategies can then be formally modelled in terms of their impact on costs as well as on revenue. As with the automatic calculation of certain CSF/MAFs, though, this has not as yet been implemented in software, with the exception that the Visual Basic system allows the contribution to be entered per product-market without further breakdown of costs.

6. In the Analysis Report, the author noted that:

> "The functional breakdown is perhaps less elegant [than the data model], and this is reflected in its lesser stability during development. But this is largely due to the absence of strict ordering of tasks within the domain, which has resulted in some shifting around of functions without substantially altering the essence of the model."

This process of re-ordering the functions or tasks in the process, and the mapping of techniques onto specific tasks, has continued, in some cases with relatively arbitrary choices as to the order in which tasks might best be performed, and how the tasks are grouped into stages. This reflects differences of opinion in the prescriptive literature (Piercy and Giles 1989; Greenley 1989). Compare diagrams B1.1, B2.1 and B3.1 in

Appendix B. This has implications for the flexibility with which the system allows users to work through the process. This and other respects in which the nature of the model suggests the appropriate nature of system support are discussed in section 6.4 below.

6.3 System scope

One way to describe the system is in terms of its scope. Table 6-1 summarises the scope of each software version in terms of stages commonly incorporated in the marketing planning process (e.g. Abell and Hammond 1979; Kotler 1988; Greenley 1986; McDonald 1995). Table 6-2 looks at system scope in terms of techniques commonly advocated as part of marketing planning. The discussion is illustrated by reference to the screen snapshots contained in Appendix B.

6.3.1 Scope by planning process stages

Table 6-1: System scope defined by planning process

	Demonstrator	**Prototype**	**Full specification**	**MacroScope system**	**Visual Basic system**
Mission/ corporate objectives	Prompted for as an input (with online help)	As demonstrator	As demonstrator	As demonstrator	As demonstrator
Situation analysis	System prompts for current revenue/market size & SWOT data, produces graphics/advice	As demonstrator but fewer analyses	As demonstrator + historical data, more analyses	As full specification but not all analyses implemented	As full specification
Forecasting	Financials only entered for start & end of planning period. Forecasts provided by user	As demonstrator	Yearly financials entered by user, with option of extrapolation	Yearly financials entered by user	Yearly financials entered by user
Marketing objectives	In terms of volume/value/share: others in words	As demonstrator	Also in terms of profit /contribution	As prototype	As full specification
Marketing strategies	Free text: up to the user to relate to marketing objectives & CSF changes	As demonstrator	Prompted for when CSF changed under several headings	Same but costs informal	As MacroScope system
Action programmes	No	Space to document in words, no other support	As prototype	None	As prototype
Plan documentation	None except printing out screens	Template plan provided; electronic cut & paste necessary	Automatic generation of default plan document	None except printing out screens	Automatic generation of default plan document
Monitoring	No explicit facilities, though a plan may be copied & updated	As demonstrator	As demonstrator	As demonstrator	As demonstrator

Mission/corporate objectives

In each version of the system, corporate objectives are regarded as an input to the marketing planning process, providing financial targets for the organisation or business unit towards which the process may iterate where desired, and qualitative statements of direction to provide further guidance in the case of a mission statement. The only system support, therefore, is to prompt for the relevant inputs (illustrated by Diagram B3.2), with online help on writing a mission statement if desired. The only financial objective formally stored in earlier versions of the system is a revenue target for the final year of the planning period, other objectives being entered in words. As the full specification contains a cost/profit model, it accordingly also prompts for a profit/contribution target for the business unit, so that gap analysis can proceed using profit as well as revenue: this is implemented in the Visual Basic system (though with the restrictions we have described in documentation of costs).

For the purposes of standardisation in the system, we use the terminology 'corporate objectives' for targets for the part of the organisation for which the plan is being developed, such as the whole organisation or a business unit. The term 'marketing objectives' is reserved for objectives relating to one of the product-markets in which the business unit operates.

Situation analysis

For each product-market, the system prompts for both 'hard' data on price, volume, revenue, market size and share, and 'soft' data relating to a SWOT analysis and an analysis of market attractiveness (e.g. Diagrams B1.2, B2.3, B3.6). As we have discussed, the revenue-based data is complemented by cost/profit data in the full specification, but in the first three software versions described, any cost/profit data must be entered in words. In the Visual Basic system, profit or contribution can be entered numerically, but any related cost details must be entered in words (with the exception of a judgemental, 1 to 10 score used for the Porter matrix). A variety of analytical tools are used to present graphical displays of the data and related advice, as shown in Table 6-2.

Forecasting

As described in Appendix A, we distinguish forecasting what the business unit's position will be on current trends assuming no remedial action is taken (the Forecast or Trends stage) from then modifying that forecast through the definition of marketing objectives and strategies.

The various software versions prompt the user to update both financial and 'soft' data to reflect the forecast situation by the end of the planning period, taking into account the situation analysis. In each case, the forecast is provided by the user, the system only providing limited support through graphical display of the data entered, and through, for example, allowing a future market size to be specified either in terms of market size or in terms of annual growth rate through the planning period.

The demonstrator and prototype systems were further restricted by only prompting for financial information for the current year and the final year of the planning period. In the full specification, and in the MacroScope and Visual Basic systems, information is requested for each year of the planning period, and for historical years in order to provide data for a product life cycle curve (diagram B3.8). The full specification allows the user the option of obtaining a statistical extrapolation of the historical market size and sales figures, as a starting-point for this forecast. However, there has been no attempt to duplicate within EXMAR the functionality of the various forecasting systems available that we discussed within the literature review.

Having entered forecast data, the various graphical tools can then be revisited. Diagram B2.5, for example, shows forecast circles on the DPM as well as current circles.

Marketing objectives

Marketing objectives can then be set in the light of the analysis carried out to date. Reflecting the early focus on revenue rather than profit, marketing objectives in the earlier versions can formally be entered in terms of revenue, volume or share for each product-market, other objectives being documented in words (diagram B3.10). This is extended in the full specification and the Visual Basic system to include profit/contribution objectives.

Marketing strategies

Marketing strategies that document how the marketing objectives are to be achieved are prompted for in each software version, in words. The user is also asked to make corresponding changes to critical success factor scores. In the demonstrator and prototype systems, it was left to the user to ensure that the text entered is kept in step with changes to CSF scores (see Diagram B2.8). In the full specification and the MacroScope and Visual Basic systems, the user is reminded to keep these in step through the system automatically prompting for text whenever a CSF score is modified. This is illustrated by Diagrams B3.12 and B3.13.

As with forecasts, the various graphical displays can be revisited during setting of objectives and strategies to show the effect of the numbers entered graphically. This is illustrated by diagram B3.11 (product life cycle) and B2.7 (DPM).

Action programmes

Due to EXMAR's emphasis on strategic marketing planning, support for specification of programmes of action to implement marketing strategies has not been given priority. The prototype allows free text to be entered against any stage of the planning process, and subsequently to be included in a plan document, so the user may document such issues as responsibilities and timescales as desired. The production of a default marketing plan in a word processing package in the Visual Basic system (diagrams B4.3 to B4.6) similarly allows the user to add detail at this point if required.

Plan documentation

The word "plan" may reasonably be used both for the electronic information held by EXMAR about a business unit's marketing situation, objectives and strategies, and for a paper plan document derived from it, a point explored in the case studies that follow. The Visual Basic system includes automatic generation of a plan document in a default, "textbook" format, in a word processing package (currently, Microsoft Word for

Windows) that allows the user then to change the plan as required before printing. See Diagrams B4.3 to B4.6. This feature was not implemented in the MacroScope system, though: with this system, the user would need to print out any diagrams and text required for insertion into a plan document (or use a 'screen capture' program to achieve this 'cut and paste' operation electronically). The demonstrator system similarly provided no explicit support for producing a plan document.

The prototype formed an intermediate design, in which substantial text, such as a mission statement, SWOT analysis, and documentation of marketing objectives and strategies, is entered in a document structured according to the marketing planning process, and accessed from the "Guidance Browser" that also provided online help (Diagram B2.8). A facility is available to produce a default plan document from this text. It is left to the user, though, to 'cut and paste' any diagrams or tables required from elsewhere in the system into the document before printing it. Facilities are provided for the user to perform this and any other editing on the document, through inclusion with EXMAR of a package called Analyst which provided word processing, graphics and spreadsheet support (Piersol 1986). This compromise allowed plan documents to be developed electronically, but without the ease of the Visual Basic system.

Monitoring

No explicit support has been included to date in EXMAR for monitoring progress against plan - a decision based on the assumption that this is less likely to be an issue with strategic marketing plans than with one-year plans. A user may, though, take a copy of a plan and update it with actual figures in order to compare the two if required.

6.3.2 Scope by techniques included

The scope of the various versions of EXMAR in terms of the marketing techniques included is illustrated in Table 6-2.

Ansoff matrix

Ansoff's growth vector matrix (Ansoff 1987) suggests distinguishing between existing and new products and existing and new markets (or 'missions', to use his terminology - clarified in his 1987 revised edition as referring to geographical areas, market needs, or both), as one factor determining the risk associated with strategies for a product-market combination. The full specification, and the MacroScope and Visual Basic systems, use a table laid out in this way to summarise the products, markets and product-market combinations that have been defined by the user as a basis for the plan, while the help advises the user about the possible risk implications. See Diagram B3.4, on which colour coding is used to indicate existing versus new products and markets, with new products being sorted to the right and new markets to the bottom of the list, and Diagram B4.1. The information entered by the user on whether a product or market is existing or new is also used in the gap analysis chart (diagrams B3.15, B4.2).

The demonstrator and prototype prompted for whether a product or market was existing or new, and included similar help text derived from Ansoff, but did not show this information graphically. It was found that in practice, many users in the system design evaluation would draw an Ansoff matrix on a white-board prior to defining products and markets on the system, suggesting that an Ansoff matrix would form a more intuitive means of defining the product-markets.

Table 6-2: System scope in terms of techniques

	Demonstrator	**Prototype**	**Full specification**	**MacroScope system**	**Visual Basic system**
Ansoff matrix	Yes but not graphical representation	As demonstrator	Yes. Existing/ new info used in gap analysis	As full specification	As full specification
Gap analysis	Limited (bar chart)	As demonstrator	Yes, by revenue/profit	Yes, by revenue only	As full specification
Product life cycle	Drawn by system, interpretation by user	No	Drawn by system, interpretation by user	As full specification	As full specification
SWOT/CSFs	Yes, words and quantified CSFs	As demonstrator	As demonstrator: stacked bar chart drawn of CSFs	As full specification	As full specification
Competitor analysis	Only in form of CSF scores for main competitor	Same plus free text	CSF scores for each, plus structured text	As full specification	As full specification
Market attractiveness	Quantified MAF analysis	As demonstrator, plus advice to avoid clustering	As prototype + stacked bar chart drawn of MAFs	As demonstrator	As full specification
Perceptual map	No	No	Yes (one CSF vs another only)	No	As full specification
BCG matrix	Yes	No	Yes	No	Yes
DPM	Yes	Yes	Yes	Yes	Yes
Cost/different-iation matrix	Yes	No	Yes	No	Yes

Gap analysis

The demonstrator and prototype only included a very limited form of gap analysis, in which the system summed the forecast and objectives set for each product-market and compared the resulting figures with any revenue target, or corporate objective for revenue, that had been defined at the start of the process. This is illustrated by diagrams B1.4 and B2.7. The full specification and the Visual Basic system (diagram B4.2) include a gap analysis chart summing revenue or profit information by year and by quadrant of the Ansoff matrix. The MacroScope system includes this chart for revenue only (diagram B3.15).

Product life cycle

Within EXMAR's marketing planning model, life cycle curves can be plotted either for each product/product group or for the 'market' as a whole. The latter, based on market size figures and termed in EXMAR a 'market life cycle', may correspond to Ansoff's 'demand cycle' - the aggregation of products satisfying the same need - or to his 'demand technology cycle' - the aggregation of products using similar technology to satisfy the same need - depending on the breadth with which the user has defined the market (Ansoff 1987). This was illustrated, but not fully implemented, in the demonstrator. The MacroScope and Visual Basic systems similarly allow a graph to be plotted both for the market size and for sales in volume/value terms: see diagram B3.11.

The system does not attempt to interpret the graph, for example to allocate the product-market to one of the classic stages of introduction, growth, maturity and decline, as in practice products follow such diverse patterns (Kotler 1988 p347-354). The textbook theory is, however, presented in the online help as an aid to interpretation by the user.

SWOT/CSFs

We have discussed in section 6.2.2 how critical success factors (CSFs) have been used as a basis for an assessment of 'strength in market' for one axis of the directional policy matrix. In each version of EXMAR, strengths and weaknesses can be summarised in words to complement this numerical analysis, with checklists being provided of commonly considered items (diagram B4.5). Opportunities and threats are similarly summarised in text, with checklists available in the help system (diagrams B3.6, B4.5).

The MacroScope and Visual Basic systems include a bar chart showing how the different factor scores contribute to the overall strength in market figure (Diagrams B3.5, B4.5). This is intended to complement the DPM by showing graphically how the horizontal position is arrived at, and hence reducing the weakness of the DPM reported by Kotler (1988) that product-markets with very different strengths and weaknesses can arrive at the same position on the matrix. Some users of the prototype have used the built-in Analyst facilities to provide their own similar graphics of the CSF scores.

Competitor analysis

Just as the organisation's CSF scores can be regarded as a summary of the organisation's strengths and weaknesses in a product-market, a competitor's CSF scores provide a summary of its market position. The demonstrator and prototype only allowed scores to be entered for one, main competitor in each product-market (diagram B2.8), complemented in the prototype's case by text about each competitor. In the MacroScope and Visual Basic systems, scores can be entered for a number of competitors, as shown in diagram B3.12. The 'competitor analysis' buttons on the diagram lead to a form on which text can be entered against headings of Strengths, Weaknesses, Business Direction and Current Objectives/Strategies for the competitor.

Market attractiveness

The relative attractiveness of different markets is assessed through a multi-factor approach to form the vertical axis of the DPM. This is illustrated by diagram B3.9.

We related in section 6.2.2 how clustering of circles on the matrix can occur in practice, and how this was countered on the horizontal axis by calculation of strength relative to the best competitor. For the vertical axis, it was decided to encourage the user to spread out the scores for any given factor, as this was more likely to result in a spread of vertical positions on the matrix. Some advice therefore appears in the prototype when all the markets are scored very close to each other on one factor (e.g. profitability scores all between 6 and 8). This is illustrated by diagram B2.3.

Perceptual map

We have discussed how the marketing planning model includes a form of 'perceptual maps' plotting one CSF against another. This is included in the full specification, but is only implemented in the Visual Basic system (diagram B4.1).

BCG matrix

The BCG matrix is included in the full specification, with documentation of its potential drawbacks in the help, on the grounds that it provides an alternative view to the DPM which may yield insights through comparing and contrasting the two displays. It was included in the demonstrator, but not in the prototype or MacroScope versions, being only again implemented by the Visual Basic system (diagram B4.6).

DPM

We have discussed the Directional Policy Matrix under our earlier description of the marketing planning model (section 6.2.2). It is included in each version of EXMAR. The user can choose which of the current, forecast and objective circles to display, and can also choose which product-markets to display (diagrams B2.7, B3.7). Diagram B2.6 illustrates the textbook advice that can be obtained for each quadrant (McDonald 1995), although the process instructions in the help make clear that this is no substitute for managerial judgement. Portfolio balance statistics can be obtained showing the proportion of revenue from each quadrant of the matrix, to help in assessment of portfolio balance (not illustrated). As with all graphical displays, the matrix is dynamically updated whenever a number is modified which affects a circle size or position, in order to support iteration and "what-if" exploration of strategies.

The display can be tailored by resizing the matrix or by changing the circle 'scaling factor', making all circles larger or smaller but keeping their relative sizes correct. In the MacroScope and Visual Basic systems, this is extended by the facility to determine the limits on each axis manually if required, providing a further protection against the previously-discussed problem of circles bunched together. The Visual Basic system (diagram B4.6) includes default axis limits which are determined by the limits of the data to be displayed, thus 'spreading out the circles'. The matrix can be used as a form of system navigation: the main data form for a product-market at a particular point in time can be obtained by selecting a circle with the mouse (diagram B2.5).

Cost/differentiation matrix

In section 6.2.2 we discussed the derivation of the differentiation axis on Porter's cost-differentiation matrix. The cost axis is assessed judgementally by the user on a 1-10 scale, for each competitor in the product-market. The help contains Porter's analysis as to the implications for each box on the matrix. The matrix is illustrated by diagram B1.3.

6.4 Nature of system support

To complete our description of EXMAR, we now discuss various aspects of the nature of the system's support for planning which cut across the marketing planning stages and related techniques that we have discussed so far. Table 6-3 lists these issues in the left-hand column and summarises the differences between the EXMAR versions. Table 6-4 summarises the feedback from the system design evaluation against the same headings. The following discussion traces the changes to these system 'features' in the various EXMAR versions. We will return to the role of these features in delivering benefits at the end of the EXMAR multiple-case study chapter (chapter 8).

Process support: navigation

By 'navigation' we mean how users find their way around the system (Canter et al 1985). In the demonstrator, this was achieved using a 'tree' representation of the process hierarchy that was presented in the marketing planning model in Appendix A. This is illustrated by diagram B1.1. The user clicks on the stage to be performed, on the top-level diagram, the 'strategic plan browser' (the main window in the diagram). A more detailed browser is then shown containing the steps within the stage, each represented by an icon similar to those in Appendix A. For example, the bottom window in the diagram illustrates a detailed browser for 'Predict relationship with markets', with icons for updating critical success factors and market attractiveness factors, viewing an updated product life cycle and documenting assumptions. When the user then selects an icon, the appropriate window is opened.

While the detailed browsers indicate which steps are regarded as compulsory and which were optional, the system does not endeavour to control which steps are actually performed - a feature common to all the versions of the system. The user is also free to perform tasks in any order. These decisions arose from the nature of the marketing planning model. The limited specification in the model of where iteration to earlier stages in the process might be appropriate, combined with the fluidity of the ordering of the steps within the process, suggested that it was important not to restrict the user to the suggested ordering of tasks.

While the prototype included a tree diagram outlining the process supported by the system (diagram B2.1, Task Overview), the primary means of navigation, the Action Panel (diagram B2.2), was organised around data rather than process. On the Action Panel, one first selects which data item one wishes to work on, such as a product-market. The various data forms available for a product-market can then be selected with the buttons at the bottom of the panel: buttons that do not apply to the currently-selected data item are greyed out. For example, one can select 'C' for 'current', the 'current product-market snapshot' form illustrated in diagram B2.5, or the 'CSF scores' button beneath it for current CSF scores. The buttons at the top of the panel provide access to other facilities such as the DPM. Instructions on using the Action Panel are contained in the online help facility, the Guidance Browser, which is organised according to the planning process.

Table 6-3: Nature of system support

	Demonstrator	Prototype	Full specification	MacroScope system	Visual Basic system
Process support Navigation	Process tree	Action panel	Process tree/menus + 'next screen'	Process tree/menus	Menus
Status feedback	None	Status Display	Combined with process tree	Combined with process tree	None
Help	Specific steps only	Per step in process	Per step: also obtainable from forms	Per step: also obtainable from forms	Per step: also obtainable from forms
Data handling Prompting Validation Calculations Constraint maintenance	On data entry forms with checklists & other guidance in help. Forms inconsistent	Numbers entered on forms; words largely in template plan in Guidance Browser. Field validation	Forms relate more directly to steps of process, and include words & numbers	As full specification. 'Post-it' facility for adding notes to numbers	As full specification. Facility for adding notes to numbers
Data presentation Tabulations Graphics	Hard-coded facilities	Main graphics hardcoded, others definable by user	Windows & spreadsheet link allow user to add to standard facilities	Hard-coded facilities	Windows allowing user to add to standard facilities
Data interpretation Advice	4-quadrant advice for BCG, DPM; portfolio balance advice for DPM	DPM only. Also process advice: MAFs. Portfolio balance statistics	Also advice derived from Porter matrix	4-quadrant advice for DPM only; PLC advice in help	As full specification
Usability issues	Forms inconsistent.	Forms consistent. Windows awkward	Microsoft Windows for standardisation.	High consistency but poor windowing	As full specification
Tailorability/ extensibility	Developed with object-oriented language (OOP)	Developed with OOP.	OOP. Various system options. Windows links	Not OOP. Various system options.	Various system options. Windows links. Visual Basic 'object-based'
Multiple plan support	Each plan is independent	As demonstrator. >1 plan can be viewed at once	Independent plans but consolidation routine available	As demonstrator	As prototype
Group support	None	None but typically used with projector	As prototype	As prototype	As prototype

Table 6-4: Summary of criticisms of prototype from system design evaluation

Area	Summary of comments from six participating companies
Process support	The disjunction between the 'action panel' (organised round data) and the 'guidance browser' (organised round the process) caused much confusion at first. One solution proposed was to organise the interface round the task overview tree (as had been the case in the demonstrator). See also 'usability issues'.
Data handling	Various extensions were requested to the basic financial information covering revenue, volume, price, market size and share. This needed to be enterable yearly throughout the planning period, and for the previous few years; and four companies wished to incorporate a simple cost/profit model. An important feature of the system was the power to associate text with numeric data. This could be easier to achieve, particularly for the market attractiveness factors and critical success factors, and when setting objectives and strategies.
Data presentation	A number of enhancements to the DPM and the qualitative analyses behind it were requested, including extended facilities for competitive analysis. Additional tools that were identified as potentially adding value were the Boston and Porter matrices; product life cycle and forecasting; perceptual maps; and market maps. At the end of the planning process, a marketing plan document should be assembled by the system from the information entered, for the user to take and adapt as required. Ideally this should be in a standard word processing package.
Data interpretation	There were differing views on the limited, 4-quadrant advice from the DPM. Two companies compared it with their expert system expectations, questioning whether the prototype "qualifies as a knowledge-based product", and asking for more fine-grained advice. But one felt that more subtle advice, even if achievable, would be ignored as it would have little chance of being correct given the limited information available to the system, while another suggested that the current 4-quadrant generalisations "only devalue all the useful and productive thinking that has occurred during the evaluation stages, and trivialise the lessons of marketing planning", and should be removed. Some additional consistency checks proposed, e.g. for the system to point out if 'strength in market' is high and market share is low, or vice versa, encouraging the user to review this potentially conflicting information.
Usability issues	The system needed to be easier to use and, critically, easier to learn. Users may not have extensive IT experience, and would have limited time available to learn the system. This implied a style that 'guides the user by the hand'. At present the system provided "a great deal of flexibility which is good for the experienced user", but could be "very overwhelming" for the novice. Objective and strategy setting needed particular attention. Some criticisms made of documentation and the ease of printing.
Tailorability/ extensibility	Four companies requested links to standard spreadsheets. One reason was to handle any cost details not included in EXMAR. One company mentioned importing text from word processors: another mentioned the desirability of interfacing to graphics packages. The two financial services companies thought they would need to tailor the definition of 'revenue', as 'price x volume' was an inadequate definition for them.
Multiple plan support	Two companies wished to be able to consolidate plans into an aggregated plan.
Group support	No requests for a multi-user version. Use was anticipated round a single monitor, very probably projected onto a wall screen.

This change from an interface organised around process to one organised around data took the notion that the ordering of tasks cannot be rigidly defined a step further. The rationale was that the Action Panel would allow quick access to any part of the system at random, which was expected to be the preferred approach for experienced users, while beginners would work through the process defined by the Guidance Browser following the instructions given.

However, feedback from the system design evaluation suggested that the Action Panel was hard to learn. Given the limited time available to users, ease of learning was at least as important as ease of use for the experienced user. The full specification and MacroScope system therefore returned to an organisation around a tree diagram of the process, albeit with a simplified and rationalised process hierarchy in which the major stages of Audit, Trends and Objectives shared as similar a structure as possible, and without the complication of second-level 'detailed browsers' (diagram B3.1). Freedom of ordering of tasks and of iteration were supported by better feedback on what tasks had been performed, discussed below. The Visual Basic system follows the same rationalised process, but to date with a menu interface only, without a tree diagram.

Process support: status feedback

If the user is to be allowed to perform tasks in any order, feedback on what tasks have been performed is useful to help the user to keep track of what remains to be done. The demonstrator contained no such 'status feedback'. The prototype provided a 'Status Display', illustrated in diagram B2.2, which showed which major stages had been performed for each product-market. The online help explained how the system deemed a stage to have been performed. For example, for the forecast stage to have been completed required forms to have been filled in for the forecast market size, share and revenue, and for CSF and MAF scores at the end of the planning period on current trends. On each form, a 'done' flag was set by the system when the form was deemed to be complete (e.g. diagram B2.4: here the 'done' flag was set when CSFs had been defined with weights totalling 100).

Naturally, this automatic assessment by the system of which steps were 'complete' is an imperfect one, as the user may well wish to iterate over previous data or decisions; but it was felt that automated feedback on which forms had been filled in was better than nothing. In the case of objectives and strategies, however, the task of indicating which were complete was left entirely to the user, who was asked to turn on a 'set' flag on each form to indicate that objectives or strategies were regarded as complete (diagram B2.8).

The status display summarising information from these 'done' and 'set' flags was found to be useful, but somewhat coarse-grained, it not always being immediately apparent to the user why a stage was not deemed to be complete. In the full specification and MacroScope system, therefore, status feedback was provided at a more detailed level, and combined with the process hierarchy. As well as providing a means of navigating round the system, the MacroScope system's Status Display in diagram B3.1 provided feedback through colour-coding on which steps have been completed, either overall or per product-market. At the time of writing, status feedback has yet to be implemented in the Visual Basic system.

Process support: help

Online help was provided in the demonstrator for certain screens, by selecting a '?' icon. In addition, checklists such as S.I.C. codes and possible critical success factors could be obtained from their own icon on the relevant detailed browser. This help was made more comprehensive in the prototype: the Guidance Browser (diagram B2.2) contained help on each step in the process, both on marketing planning issues (accessed by pressing the 'marketing planning guidance' button, illustrated by diagrams B2.4 and B2.7) and on how to operate the system (the 'system guidance' button).

However, the user could not obtain the relevant help screen directly from a data form or graphical display. This was remedied in the MacroScope and Visual Basic systems, in which each window has its own help button, in addition to the facility to browse through the help screens arranged in a hierarchy according to the planning process.

Data handling

In each version, the system prompts the user for important data through data entry forms. These forms had some inconsistencies with each other in the demonstrator. For the prototype, their format was standardised for ease of use - for example, using dotted lines around a field to indicate that the field is calculated by the system rather than entered by the user.

However, the forms' relationship with steps of the process was not always obvious to the user. This is part of the issue we have discussed of the prototype's organisation around data structures. In the prototype, each form corresponds to all the attributes of a particular entity, for example, all information relating to a product-market at the current time (diagram B2.5). In the process advocated by the Guidance Browser, though, this information is entered at different steps: the price, volume and revenue information is entered in the 'Identify products for markets' step, while the 'strength in market' field is calculated by the system at the 'Score critical success factors' step. Similarly, one step may involve modifications to more than one form. This was found to confuse users when first learning the system.

In the full specification, therefore, forms were designed to present all information needed at that step, and to request only information needed at that step. Hence, each step of the process corresponded either to a data entry form or to a graphical display for the user to view and reflect on. This resulted in some forms being more complex to develop. For example, the 'market size and revenue' form (diagram B3.8) contains some information relating to the market entity (market size and growth) and some information relating to the product-for-market entity (price, volume, revenue and market share). If the user of the MacroScope system defines two products as competing with each other in the same market, they share the same information on the left-hand, market side of the form, so the system copies this information as appropriate. For the user, though, it is more convenient to have this information displayed in the same window. As another example, when changing CSF scores as a result of intended strategies, the 'trend' figures are shown next to the updated, 'objective' figures for comparison (diagram B3.12). For the user, the effect of these changes is believed to be an interface closer to the ideal requested by several companies in the system design evaluation of "guiding the user by the hand".

Having prompted for information, the system then performs various validation checks and calculations on the data. Thorough validation checks were introduced from the prototype onwards, to check for example that the data type entered is correct (e.g. that numbers are entered in a numeric field) and that ranges are valid (e.g. that CSF weights do not total more than 100, that CSF scores are in the range 1-10, and that a price or revenue figure does not result in a market share of greater than 100%). Calculations affecting other fields in the same window are performed by the system when the number is entered: for example, calculation of the weighted average CSF score. Any impact on other windows in the system is calculated when the data entry window is closed, or on user demand, to avoid constant updating of other windows. For example, when revenue information has been updated in the prototype, the 'Accept' button will update the form aggregating the revenue information across all product-markets, as well as the DPM and gap gauge graphical displays.

Some calculations can be regarded as maintaining constraints. For example, price, volume and revenue satisfy the constraint that price x volume = revenue. Given any two of these numbers, one can calculate the third. Similarly, market size, share and revenue/volume are in a three-way relationship, as is market size and growth. The MacroScope and Visual Basic systems allow any two of the numbers to be entered, or any of the three numbers to be changed, and will recalculate other numbers as appropriate to maintain the constraint. This can be complex, as the constraints interrelate. For example, a change to market share in volume terms causes volume to be changed, which in turn causes revenue to be changed, which in turn updates market share calculated in revenue terms. The earlier software in some instances forced the user to enter (for example) price and volume, the system calculating the appropriate revenue figure: this was awkward if the best available figures were in terms of revenue.

In this discussion of data handling, we have so far considered numeric data. However, an important feature of the data model is its 'semi-structured' nature, consisting of a mixture of numeric data and text. In the prototype, as we have seen, text could be entered in the Guidance Browser for any step in the process, which would then form the basis for a plan document. The system provided a template for each step, prompting for appropriate information such as opportunities and threats. This separation of text and the largely numeric data entered on forms arose largely for reasons of ease of implementation. However, it led to some difficulties in relating words to numbers. For example, the user often wished to enter notes as to how CSF scores were arrived at, or to document strengths and weaknesses in words, or to document the strategies behind changes to CSF scores at the objectives/strategies stage. Because the relevant step in the guidance browser could not be obtained simply from the CSF scoring form, achieving this took a degree of experience with the system, and it was easy for such information to be lost.

The MacroScope and Visual Basic systems therefore relate words and numbers more closely, space being provided for text on the same form where appropriate, or on another form obtained via a button on the first form. An example is the 'competitor analysis' buttons on the CSF scoring form (diagram B3.12). Unstructured notes can be added to any numeric information, using a 'Post-it' metaphor in the MacroScope case: pressing the yellow 'Post-it' brings up a text window, while the 'Post-it' icon changes to indicate when text has been entered against a number (e.g. diagram B3.12).

Data presentation

In our literature review of parallels from other domains to which DSS have been applied (section 3.3), we noted that graphical display has been shown to impact decision-making positively (Benbasat and Dexter 1986; Jarvenpaa 1989), suggesting that if the effort involved in generating the displays was reduced, it would render the marketing tools more usable and hence aid with decision-making. As we have seen, each software version generates certain graphics from the data entered by the user.

A further point arising from the marketing planning model is that technique interrelationships, and their use of common data described in the data model, suggest further efficiencies from software, in that data entered once can be re-used in appropriate techniques automatically. This contrasts with some of the software systems supporting individual marketing techniques that we reviewed earlier (section 3.5), where each technique is regarded as a separate exercise with its own inputs and outputs. The potential of software here is under-exploited by the prototype, as graphics are limited to the DPM and the gap gauge. In the Visual Basic system, though, a change to a CSF score, for example, results in changes to the DPM, Porter matrix, perceptual map and CSF bar chart. This is illustrated to some extent in the demonstrator - where, for example, a change to revenue results in modifications to the product life cycle, the DPM and the Boston matrix - and in the MacroScope system, in which a change to revenue, for example, results in changes to the product life cycle, the DPM and the gap analysis chart.

One difference between the software versions concerns the flexibility with which graphical displays are defined. In the demonstrator and the MacroScope system, all graphics are 'hard-coded', that is, cannot be changed by the user. While in the prototype the DPM and gap gauge are hard-coded, the facilities of the Analyst included with EXMAR allow the user to define other graphical displays of the data using standard business graphics such as pie charts, bar charts and line graphs. However, these additional graphics require manual updating by the user, rather than being updated automatically when the data changes.

The full specification incorporates a spreadsheet link, in which data can be copied to or from a spreadsheet. Hence the user can use standard graphics facilities included with spreadsheets to extend the graphical displays provided by EXMAR. The Visual Basic system, while not including a direct spreadsheet link, stores the data in the Access database management system, allowing other tools to be used to analyse or present the information in different formats.

Data interpretation

On the whole, interpretation of data, such as drawing conclusions from graphical techniques, is left to the user, with only limited advice from the system. This emphasis results from the nature of marketing planning theory. While the prescriptive literature for several of the techniques has broad advice associated with the position on the graphical display, this advice is tentative and permits of many exceptions (as we have mentioned with respect to portfolio matrices). The Boston matrix, for example, assumes that market growth is an adequate measure of market attractiveness, and market share an adequate indicator of business strengths; the position on the relative market share axis can be very sensitive to the manner in which the market has been defined; and the classic advice for the four quadrants assumes a connection between relative market share and relative costs that may not always apply, although some evidence for these assumptions is available from the PIMS work and from data on the experience effect (Kotler 1988; Armstrong and Brodie 1994a; Abell and Hammond 1979). Similarly, the DPM can be very sensitive to the scores and, particularly, the weights used, which are often subjectively assessed, while as with the Boston matrix the prototypical movement of product-markets from the 'question mark' quadrant through the 'star' and 'cash cow' quadrants to the 'dog' quadrant is based on product life cycle ideas which do not always apply (Proctor and Kitchen 1990; Kotler 1988). Similarly, Cronshaw et al (1994) provide evidence to challenge Porter's assertion that "a firm that is 'stuck in the middle' is in an extremely poor strategic situation" (Porter 1980a p41), and Bowman and Daniels (1995) report a study showing that functional experience affects the perceptions of a firm's cost/differentiation positioning, showing the sensitivity of the perceived position to subjective factors. Furthermore, where different techniques yield conflicting advice, the literature provides little guidance on which to follow (McDonald 1992 p58-63 provides one attempt to integrate some of the techniques).

The solution adopted has been to present the 'textbook' advice relating to each technique (e.g. Diagram B2.6), together with a discussion in the online help of the technique's strengths and weaknesses and the rationale for the advice, and a general 'health warning' that managerial judgement is needed in interpreting advice, which may not apply in all cases, but which should rather be regarded as a starting-point for debate. The advice is deliberately transparent, the system making it quite clear how the advice is arrived at (in this case, by examining which quadrant the product-market is in). The simpler 4-quadrant advice is used for the DPM, there being no obvious way in which the system can reliably determine where the box boundaries should lie in the 9-box version (even the 4-box form providing difficulties in determining boundaries). The user is left to reconcile differing guidance received from different techniques. The aim is to empower the user to make mature and subtle judgements, not to present a "black box" which advises the user how to proceed based on hidden algorithms or rules. In general, the emphasis in development has been on other aspects of the support of the planning process that we have discussed, such as process support, data handling and presentation.

This approach is consistent with survey findings that showed that portfolio models:

> "tended to be used qualitatively, and that the experience curve thrust of the growth-share matrix was not a dominant part of the use of the models" (Aaker 1988)

and with Cronshaw et al's (1994) conclusion that:

> "The value of the 'stuck in the middle' suggestion...does not lie in its prescriptive content, but in its use as a framework for generating questions and thinking in a structured way about the strategy of a particular business".

An alternative approach to ours would be to attempt to overcome these weaknesses in available theory by improving upon textbook advice and integrating the advice arising from different techniques. The Business Insight system we reviewed earlier (also featured in case H) appears to attempt to do this. Apart from the argument that there may be little reason to suppose that the resulting advice would be any more valid than the user's own judgement, this approach, if achieved only with the loss of transparency and the emphasis on graphical display, seems somewhat peripheral to the key benefit cited by many users of portfolio models of:

> "achieving a better understanding of their businesses...by providing a vocabulary and graphic tools that aid communication" (Aaker 1988).

The support from the system design evaluation for the adopted approach was mixed (Table 6-4). Of the two companies requesting more advice, at least one seemed influenced by the "expert systems" label that was sometimes applied to the system. The label is only used with some reservations and qualification by the author: the senses in which it is, and is not, a valid label for EXMAR are discussed in McDonald and Wilson (1990) and in McDonald and Wilson (1993). We also return to this issue in our conclusions. Nevertheless, these expectations led to the useful suggestion that the system could aid more with validating soft constraints between data items entered, such as pointing out the potential discrepancy where market share is low and strength in market is rated as high, or vice versa. With some caution, for the reasons we have discussed, this check was added to the full specification, along with a few others such as:

1. An increase in market share is in general unlikely to be achievable without an increase in relative strength in market. The user is warned if this is attempted.
2. If the user creates more than 25 product-markets, the system asks the user if they are sure they wish to deal with so many units of analysis, and encouraged to consider combining product-markets, omitting unimportant ones or performing planning at more than one level.
3. Where the price CSF is not automatically calculated by the system, but rather is assessed by the user, the system checks that the price CSF and the actual price figure move in the same direction. If, for example, the price CSF score increases between the Current and Objectives stages (indicating more competitive pricing), but the price figure is actually increased or left constant, the system shows a warning message suggesting that the user check whether this is correct.

None of these has yet been implemented, however, and caution is felt to be appropriate about introducing advice without clear evidence from live system use that it is needed.

Usability issues

The system design evaluation, as we have mentioned, provided clear feedback that the system could be much easier to learn. We have discussed several respects in which this was addressed, notably under process support. A further change aimed at ease of learning concerned the windowing environment. The prototype used the windows environment integrated with its development language, Smalltalk-80. Within this environment, some operations were found to be quite difficult for those users less experienced with computers. Resizing of windows, for example, required 'dragging' the mouse over the rectangle the user wished to form the new window size, which proved difficult for first-time users; and some operations such as cutting and pasting text required the user to remember to seek a menu with the middle mouse button - a convention which broke the rule emanating from the same Xerox research centre that developed Smalltalk-80, that "recognition is generally easier than recall" (Bewley et al 1983).

Compared with this, the Microsoft Windows standard has a number of advantages. Virtually any operations not involving a selection with the left mouse button, for example, are provided by a menu option. Not the least of its advantages is its role (an emerging one when the full specification was written) as a de facto standard, which eases the learning for those used to other Windows programmes, and greatly increases the possibilities for integration of EXMAR with other programmes, discussed below. Microsoft Windows was therefore included in the full specification.

We have described in section 5.4 the differences in opinion with the sponsors which then led to choice of a development environment for the NCR-sponsored system, MacroScope, which did not support Microsoft Windows. The windowing within MacroScope suffered, in the author's judgement, from relatively poor performance and some unreliability problems. Nevertheless, where decisions were not otherwise dictated by the development environment, the system followed Windows conventions, making the transition from Windows in theory relatively simple, though this was not tested in practice with operators other than myself. A full Windows implementation had to wait until the recent Visual Basic development (diagram B4.1).

Tailorability/extensibility

One design aim was to allow modification of the system, either for subsequent iterations as a generic system applying to any organisation, or in order to tailor it to the needs of specific companies. The theoretical advantages of object-oriented programming environments (OOP) include the relative ease of adapting a program once written (Meyer 1992; Gibson 1990; Thomas 1989), as well as managing the complexity of complex systems (Shlaer and Mellor 1992; Coad and Yourdon 1990), points expanded on by the author with illustrations from the design of EXMAR in McDonald, Wilson and Hewson (1993 p43-45). This was one reason for the choice of object-oriented environments for the development of the demonstrator and the prototype, and was another respect in which the author disagreed with NCR's choice of development environment for the system. The Visual Basic system forms an intermediate stage, typically described as 'object-based' due to the absence of the inheritance concept, despite the presence of some other object-oriented concepts. However, none of the versions has to date been tailored through programming to the needs of specific organisations. This may well be largely because organisations have not until recently been offered the opportunity to do so, but for whatever reasons, the ease of tailoring the various versions has not as yet been tested.

One requirement arising from the system design evaluation that would not naturally form part of a generic system concerned the calculation of revenue in financial services. The prototype represents revenue as price x volume, where price and volume can be defined as desired by the user (for example, as daily rate x days charged in the case of a consultancy operation). Within the two financial services companies participating in the evaluation, though, revenue was calculated rather differently. The bank modelled revenue as:

a) Volume (units) x average balance = sales volume
b) Base rate + margin = earning rate
c) Sales volume x earning rate = interest revenue
d) Interest revenue + fee&commission revenue = total revenue.

The insurance company normally just used new premium revenue for planning purposes:

volume (units) x average premium = revenue.

This was complicated by the 'annualising' of figures.

In the interests of simplicity, the full specification and its subsequent implementations do not attempt to address all the possible requirements here. Instead, they simply allow the labels 'price' and 'volume' to be changed as required - for example, to 'earning rate' and 'sales volume', or to 'average premium' and 'volume (units)'. Alternatively, the user can enter a revenue figure calculated as desired and ignore price and volume. It seems likely, though, that this is one area where the system might need tailoring, if not for each organisation, then at least for the financial services sector.

This tailoring by the setting of 'system parameters', or system options, for the labels 'price' and 'volume' is extended to a few other parameters that the organisation may wish to change, illustrated in diagrams B3.16 and B3.17 for the MacroScope system. For example, default market attractiveness factors and weights can be defined which will form the defaults for each plan produced, assisting the company with standardising on how market attractiveness is to be assessed across multiple plans, if desired. Another example is the specification of the contents of the marketing plan document. The Visual Basic system includes a default set of contents, but provides a set of options screens whereby the user can choose what information to include in the plan document. Such an approach is intended to enable basic tailoring of the system without the need for further programming: a number of other 'system parameters' are possible.

In our discussion of data presentation, we mentioned that a spreadsheet link would enable users to define their own graphical displays of the data. This provides another means by which the system can in effect be tailored without programming, and was requested by four of the participating companies, partly to enable cost details to be handled where these were not included in EXMAR. Similarly, links to graphics packages and word processing packages were requested. These were included in the full specification, but not in the MacroScope system. The Visual Basic system facilitates such links through the use of standard Windows facilities, and through storage of EXMAR data in the Access database management system.

Multiple plan support

In each version of the system, the user works on one 'plan' at a time, for a particular business unit over a particular time period. It is envisaged that some organisations may wish to produce plans at more than one level of detail. For example, a corporate plan might include as its 'product-markets' the company's strategic business units. Each of these might have its own plan dividing the business unit into product-markets. These may in some cases be broken down into finer-grained market segments in individual product-market plans. For the demonstrator and prototype versions, though, each plan is entirely independent, with no data shared automatically between plans. To assist with comparing plans or copying information from one to another, though, the prototype allows more than one plan to be opened at once, and windows from each to be opened side by side.

This approach was adopted initially on the grounds of simplicity of implementation. It was also intended to have the advantage that users would not be restricted by a centrally-defined hierarchy of products and markets used to define a hierarchy of plans, but would rather be free to define product-markets creatively to meet a particular planning need - perhaps resulting, for example, in more than one market segmentation for the same market in parallel plans.

While the system design evaluation did not involve development of sufficient plans to explore this intended advantage, two of the companies did mention the desire to provide some aggregation facilities to assist with the combination of lower-level plans into a higher-level plan. For one, this would in their view be essential for EXMAR to be useful to the SBU used in the evaluation. For the other, it would be desirable.

The full specification therefore included a consolidation routine, whereby the user would specify how two or more plans would be combined into a higher-level plan, and the system would perform an aggregation of the plans when requested. The plans would nevertheless remain independent, allowing the same flexibility as before where this proved necessary. The automatically generated higher-level plan would not, however, be complete: no theoretical means was clear, for example, for aggregating critical success factors and scores from a number of product-markets into a single set of factors and scores for a higher-level product-market. The specification therefore left the user to define this information once the system had performed those automatic aggregations for which a specification could be provided.

Regarding the aggregation of financial information, one potential problem is that not all income streams would necessarily be entered into the system at the lower planning level, as some product-markets might deliberately be omitted for simplicity. To address this, the full specification included a special product-market called 'other', which would be used purely for financial information for omitted product-markets. This facility was included in the MacroScope system, though not in the Visual Basic system to date. The consolidation routine has not yet been implemented.

Group support

Two companies in the system design evaluation made the point that more senior 'users' may in fact not operate the system themselves, or may only take over actual system operation when much of the data is entered. One described the envisaged 'use' by divisional general managers, who would in practice find a staff member to operate the system, and hold planning sessions either just with the operator, or in a group as if round a whiteboard. In this group situation, it was envisaged that the PC screen would be projected onto the wall using an overhead projector and a LCD (liquid crystal display) panel. As will be seen in the EXMAR multiple-case study, this is indeed a typical mode of use of the prototype system. None of the companies requested the further group support of providing a multi-user version of the system, whereby a number of users at different terminals or personal computers could access the same information concurrently.

Each version of the system accordingly adopts the simplest approach of what is traditionally called a 'single-user' system, although in practice use with an overhead projector as described above, or simply use by a small group clustered around a single monitor (or two monitors connected to the same processor), is common.

Part 4: Formative System Evaluation

7. Survey of EXMAR Users

7.1 Introduction

In the first of two chapters on the formative evaluation of the EXMAR prototype, this chapter presents the results from the survey of users. We have described the survey's aims, hypotheses and measurement of variables and introduced its data analysis procedures in section 5.7. After describing the respondent profile (section 7.2), we present the analysis relating to system success factors in section 7.3. This substantial section is summarised in section 7.4. Finally, we present the descriptive statistics relating to perceived benefits in section 7.5.

7.2 Respondent profile

As reported in section 5.7, the questionnaire had 61 usable responses from 18 organisations, representing a response rate of approximately 33%. The responses by function are shown in Table 7-1. Table 7-2 shows respondents by industry sector. Table 7-3 classifies the job titles given by respondents. Of the 18 companies represented, eight were included in the multiple-case study.

Table 7-1: Respondents by function

Function	Frequency	Percent
Marketing/sales	33	54.1
Finance/accounting	3	4.9
General management	21	34.4
Production	1	1.6
Personnel	2	3.3
Corporate strategy	1	1.6
Total	*61*	*100.0*

Table 7-2: Respondents by sector

Sector	Frequency	Percent
Durable consumer goods	12	19.7
Heavy or capital goods	11	18.0
Other manufacturing	8	13.1
Research and development	6	9.8
Leisure	4	6.6
Financial services	2	3.3
Other services	3	4.9
Utilities	11	18.0
Public sector	4	6.6
Total	*61*	*100.0*

Table 7-3: Respondents by job title

Title	Frequency	Percent
Managing director	10	16.4
Other director	4	6.6
General manager	11	18.0
Other manager	28	45.9
Other, eg marketing executive	8	13.1
Total	*61*	*100.0*

To estimate non-response bias, the 38 responses received before the follow-up letter was sent out were compared with the remaining 23 that were returned after the follow-up letter, on mean scores for user satisfaction, system usage and a single-item measure of marketing planning effectiveness (question 84), these variables providing a simple indication of the key areas of the system's usage and perceived utility, and of its context within the organisation. No significant differences were found at 5% level (using a t-test).

7.3 Success factors: analysis

7.3.1 Correlation matrices

Table 7-4 shows the correlation matrix for hypotheses H1 to H10, those for which a one-tailed test was used. Table 7-5 covers hypotheses H11 to H17, the remaining hypothesised success factors measured on interval scales. H18 to H20 are tested using one-way ANOVA in the following subsection. Table 7-6 shows the correlations between independent variables that are not shown on the previous two tables.

The assumption that the linear model behind the calculation of r is correct was assessed by examination of scatterplots of each independent variable with each dependent variable, as recommended by Norusis (1993). Where the plot appeared non-random, the data appeared consistent with a linear relationship.

Table 7-4 shows that the four success measures were all significantly associated with each other at the 5% level. The only relationship not significant at the 1% level was that between system usage and personal dependence ($r=.23$; $p=.038$).

Table 7-4 shows three variables correlating significantly with one or more success measures. User interface satisfaction is associated with user satisfaction ($r=0.40$) as well as with its subsidiary factors, personal dependence and organisational benefit. Attitude to marketing planning correlates with organisational benefit only ($r=0.34$). Top management support for the DSS correlates most highly, with $r=0.54$ for user satisfaction and 0.60 for personal dependence. Its correlations with organisational benefit ($r=0.36$) and system usage ($r=0.27$), while lower, are still significant.

Table 7-4: Correlation matrix, hypotheses H1-H10 (n=61)

	Mean	S.D.	TRA	INV	TDSS	SUP	UIS	ATT	INT	TPLA	LEVF	TINV	USE	ORG	PERS	USAT
H1 Training (TRA)	2.98	1.20														
H2 Purchase involvement	2.66	1.47	.41													
(INV)			.000**													
H3 Top management support	3.58	.83	.01	.10												
for DSS (TDSS)			.47	.22												
H4 Support (SUP)	3.56	.97	.31	.05	-.06											
			.008**	.34	.32											
H5 User interface satisfaction	3.34	.79	0.60	.12	.19	.24										
(UIS)			.000**	.19	.075	.032*										
H6 Attitude to marketing	4.79	.52	.02	-.08	.03	.11	.12									
planning (ATT)			.44	.28	.41	.21	.18									
H7 Task interdependence	3.70	1.07	-.03	.04	.23	-.10	-.06	.06								
(INT)			.41	.38	.034*	.22	.33	.31								
H8 Top management support	3.66	.92	.07	.01	.31	.13	.03	.21	.47							
for planning (TPLA)			.31	.47	.007**	.16	.42	.056	.000**							
H9 Level of follow-through to	3.39	.81	-.01	-.01	.31	-.01	-.01	.24	.28	.42						
implementation (LEVF)			.47	.48	.008**	.46	.47	.033*	.016*	.000**						
H10 Top mgt involvement in	3.27	.80	.06	.08	.28	.26	.09	.21	.39	.68	.53					
planning (TINV)			.32	.28	.015*	.021*	.24	.054	.001**	.000**	.000**					
System usage (USE)	3.37	1.54	.14	.24	.27	-.06	-.06	.09	.00	.-.10	.13	-.13				
			.13	.032*	.017*	.32	.32	.24	.50	.23	.15	.15				
Organisational benefit (ORG)	3.98	.63	.20	.27	.36	.15	.37	.34	.02	.14	0.06	-.09	.44			
			.058	.017*	.002**	.13	.001**	.004**	.45	.13	.31	.25	.000**			
Personal dependence	2.78	.84	.09	.30	.60	.04	.31	-.02	.02	.02	.14	-.07	.23	.50		
(PERS)			.24	.009**	.000**	.37	.008**	.44	.43	.44	.13	.29	.038*	.000**		
User satisfaction (USAT)	3.53	.61	.18	.33	.54	.12	.40	.21	.02	.10	.03	-.09	.40	.90	.83	
			.086	.005**	.000**	.18	.001**	.053	.44	.22	.40	. 24	.001**	.000**	.000**	

Key: Each cell contains the correlation coefficient followed by p value. *Key* *: p<= 0.05; **: p<= 0.01 (2-tailed)

Table 7-5: Correlation matrix, hypotheses H11-H17 (n=61)

	Mean	S.D.	MPEX	SEN	TURN	FLEX	DATA	ALTE	INNO	TPER	TELA	USE	ORG	PERS	USAT
H11 Marketing planning	53.33	49.51													
experience (MPEX)															
H12 Seniority	7.09	4.50	.19												
(SEN)			.15												
H13 Organisation size (turnover)	6.81	1.38	-.06	-.42											
(TURN)			.62	.001**											
H14 Process flexibility (FLEX)	3.88	.90	.11	.23	-.43										
			.39	.074	.000**										
H15 Data availability (DATA)	2.85	1.17	.03	.32	-.45	.28									
			.84	.010**	.000**	.028*									
H16a Alternatives exploration	3.44	.96	.09	-.02	-.00	-.06	.13								
(ALTE)			.47	.87	.98	.66	.30								
H16b Innovation (INNO)	3.33	.94	.025	.01	.06	-.06	-.03	-.14							
			.85	.92	.64	.62	.82	.28							
H17a Time availability (personal)	2.33	.83	-. 05	.07	.09	.173	.17	.09	.00						
(TPER)			.69	.60	.51	.18	.18	.49	.97						
H17b Time availability (elapsed)	2.79	.90	.01	-.11	-.10	-.08	.26	-.02	.10	.16					
(TELA)			.96	.42	.43	.56	.046*	.85	.45	.21					
System usage (USE)	3.37	1.54	-.01	.17	-.21	.40	.04	-.03	-.04	.03	-.20				
			.95	.19	.11	.001**	.74	.83	.76	.80	.12				
Organisational benefit (ORG)	3.98	.63	-.07	.21	-.35	.37	.25	.16	-.16	.06	.08	.44			
			.60	.11	.006**	.003**	.053	.22	.20	.62	.54	.000**			
Personal dependence	2.78	.84	.13	.37	-.35	.26	.25	-.02	-.09	.16	-.04	.23	.50		
(PERS)			.31	.003**	.005**	.041*	.051	.86	.51	.21	.74	.038*	.000**		
User satisfaction (USAT)	3.53	.61	.02	.32	-.41	.37	.29	.09	-.15	.124	.23	.40	.90	.83	
			.86	.011*	.001**	.003**	.025*	.50	.25	.34	.82	.001**	.000**	.000**	

Key *: p<= 0.05; **: p<= 0.01 (2-tailed)

Table 7-6: Correlations between independent variables, H1-10 vs H11-20 (n=61)

	TRA	INV	TDSS	SUP	UIS	ATT	INT	TPLA	LEVF	TINV
Marketing planning experience	.18	.17	.21	.15	.11	-.07	.09	.16	.20	.33
(MPEX)	.17	.19	.11	.25	.40	.58	.50	.23	.12	.010**
Seniority	.00	.17	.48	-.18	.06	.16	.12	.11	.21	.13
(SEN)	.97	.18	.000**	.17	.61	.21	.35	.42	.10	.33
Organisation size (turnover)	-.11	-.24	-.56	.04	-.07	-.06	-.16	-.20	-.31	-.20
(TURN)	.40	.063	.000**	.75	.57	.64	.21	.12	.014*	.13
Process flexibility (FLEX)	.18	.16	.34	.09	.14	-.02	.17	.13	.24	.16
	.16	.21	.008**	.49	.28	.88	.18	.33	.065	.22
Data availability (DATA)	-.05	.10	.24	-.01	.16	.06	.10	.22	.23	.09
	.71	.46	.062	.94	.21	.66	.45	.09	.078	.50
Alternatives exploration (ALTE)	.27	.18	-.08	.35	.16	.33	.24	.35	.17	.42
	.038*	.16	.56	.006**	.21	.010**	.059	.006**	.18	.001**
Innovation (INNO)	.07	-.10	-.07	-.08	-.17	.01	-.10	-.04	-.04	-.17
	.58	.46	.59	.55	.18	.93	.47	.75	.74	.19
Time availability (personal)	.00	.14	.11	.05	-.01	.01	.04	.15	.28	.00
(TPER)	1.00	.28	.41	.73	.95	.92	.74	.24	.029*	.97
Time availability (elapsed) (TELA)	.07	.03	-.11	.20	.08	.12	.02	.05	-.08	-.01
	.57	.80	.40	.13	.52	.38	.88	.69	.54	.91

Key *: p<= 0.05; **: p<= 0.01 (2-tailed)

It could be argued that for top management respondents, top management support for the DSS and user satisfaction might be to some extent equivalent. The relevant correlations were therefore examined with top managers removed. Specifically, managers at 0 or 1 organisational level below the chief executive or managing director were removed, and the correlations between top management support and system success were re-calculated. The results are shown in Table 7-7, along with similar results for other variables relating to top management.

Table 7-7: Top management support and system success (n=40)

	Top mgt suppt for DSS (TDSS)	Top mgt suppt for planning (TPLA)	Top mgt involvement in planning (TINV)
System usage (USE)	.26	-.14	-.22
	.054	.20	.085
Organisational benefit (ORG)	.37	-.20	-.26
	.010**	.10	.05
Personal dependence	.63	-.13	-.10
(PERS)	.000**	.21	.27
User satisfaction (USAT)	.54	-.20	-.22
	.000**	.11	.085

Table 7-7 shows that the correlation coefficients for top management support for the DSS are changed little by removal of the presumed 'top managers'. While the values of p have increased somewhat, this is to be expected with a smaller sample size (n=40). Hence, we conclude that the association of top management support for the DSS with system success is not simply due to the inclusion of top managers in the sample.

Another four variables correlating significantly with one or more success measures are added by Table 7-5. Process flexibility correlates with all success measures, while seniority is positively associated with personal dependence and user satisfaction. Data availability is associated significantly only with user satisfaction, and only at the 5% level ($r=.29$, $p=.025$): this correlation should thus be treated with caution. Organisation size negatively correlates with the three perceptual success measures.

Several relationships between independent variables are significant. We discuss those significant at the 1% level. Training, support and user interface satisfaction correlate with each other. Training also correlates to purchase involvement. Various variables relating to the task, task context and implementation process are correlated with each other: top management support for the system, top management support for planning, top management involvement in planning, the level of follow-through to implementation and task interdependence.

Turnover is negatively associated with process flexibility, data availability and top management support for the system. Other factors related to top management support for the system are seniority and process flexibility. Seniority is also associated with lower organisation size and greater data availability.

Alternatives exploration is associated with support, attitude to marketing planning, top management support for planning and top management involvement in planning. Top management involvement in planning is also related to marketing planning experience.

7.3.2 Nominal variables

The hypothesised success factors sector, function and task definition (hypotheses H18 to H20) are measured by nominal variables for which a one-way ANOVA or pairwise comparison of means are appropriate. We look at each of these variables in turn.

H18: System success by sector

Descriptives for the success measures by sector are shown in Table 7-8.

To test whether system success varies by sector, one-way ANOVA is appropriate. An assumption of one-way ANOVA is that the groups whose means are to be compared have the same variance in the population. To test for this assumption - in this case, that variances in system success by sector are the same - the Levene test was used. The results are shown in Table 7-9 for the four measures of system success.

The assumption of homogeneity of variance was not rejected at the 5% level for personal dependence. One-way ANOVA was therefore used to examine differences in personal dependence by sector. The results are shown in Table 7-10. The null hypothesis that the mean personal dependence scores are invariant by sector is not rejected at the 5% level. A similar result (F prob=.16) was obtained when several of the smaller service sectors (leisure, financial services, other services) were grouped together in order to increase their group size.

The assumption of homogeneity of variance was rejected at the 5% level for the other three success measures - system usage, organisational benefit and user satisfaction. For these measures, a limited number of pairwise comparisons of group means were therefore made on the basis of specific hypotheses, as recommended by Kerlinger (1973). The hypotheses were that success would vary by:

i) Manufacturing versus services organisations
ii) Public versus private sector organisations. The public sector category included utilities and R&D, based on knowledge of the ownership of the relevant organisations gleaned from the multiple-case study.

The means were compared using a t-test. The results are shown in Table 7-11 and Table 7-12. The t-test significance level was calculated on the assumption of equal or unequal variances, depending on the result of a Levene test for the two specific groups being compared. No significant differences in means were found at $p<=0.05$, for any of the success measures.

In summary, the null hypothesis that system success is invariant by sector was not rejected.

Table 7-8: System success by sector - descriptives

Sector	Count	USE Mean	USE S.D.	USE S.E.	ORG Mean	ORG S.D.	ORG S.E.	PERS Mean	PERS S.D.	PERS S.E.	USAT Mean	USAT S.D.	USAT S.E.
Durable consumer-goods	12	3.81	.83	.24	4.16	.58	.17	3.11	.80	.23	3.77	.60	.17
Heavy/capital goods	11	4.00	.93	.28	4.12	.42	.13	2.80	.80	.24	3.63	.45	.14
Other manufacturing	8	3.34	.97	.34	3.93	.24	.08	2.58	.80	.28	3.42	.38	.14
Research & development	6	3.40	1.50	.61	4.17	.66	.27	3.11	.75	.31	3.77	.69	.28
Leisure	4	3.13	1.02	.51	3.97	.27	.14	2.64	.44	.22	3.47	.13	.06
Financial services	2	3.75	1.79	1.26	3.00	1.41	1.00	2.17	.71	.50	2.69	1.15	.81
Other services	3	3.65	1.31	.76	4.13	.81	.47	3.78	1.07	.62	4.00	.88	.51
Utilities	11	2.21	2.74	.83	3.72	.91	.27	2.20	.87	.26	3.15	.72	.22
Public sector	4	3.26	.50	.25	3.90	.26	.13	3.00	.38	.19	3.56	.26	.24
Total	61	3.36	1.54	.20	3.98	.63	.08	2.78	.84	.11	3.53	.61	.08

Table 7-9: Levene test of homogeneity of variance of system success by sector

Success measure	Statistic	df1	df2	2-tail sig.
System usage (USE)	5.95	8	52	.000**
Organisational benefit (ORG)	6.47	8	52	.000**
Personal dependence (PERS)	.68	8	52	.70
User satisfaction (USAT)	2.71	8	52	.014*

Key *: p<= .05 **: p<= 0.01

Table 7-10: One-way ANOVA of personal dependence by sector

	D.F.	Sum of squares	Mean squares	F ratio	F prob.
Between groups	8	10.09	1.26	2.05	.058
Within groups	52	32	.62		
Total	60	42.11			

Table 7-11: System success, manufacturing vs services

Success variable	No of cases	Mean	S.D.	S.E.	Levene's test for equality of variances: p	t-test sig: equal variances	unequal variances
System usage	Services: 24	2.85	2.03	.41	.006**		.065
	Manuf: 37	3.70	1.01	.16			
Organisational benefit	Services: 24	3.78	.78	.16	.011*		.082
	Manuf: 37	4.10	.48	.08			
Personal dependence	Services: 24	2.60	.89	.18	.84	.165	
	Manuf: 37	2.90	.79	.13			
User satisfaction	Services: 24	3.34	.70	.14	.54	.051	
	Manuf: 37	3.65	.53	.09			

Key *: p<= .05 **: p<= .01

Table 7-12: System success, public vs private sector

Success variable	No of cases	Mean	S.D.	S.E.	Levene's test for equality of variances: p	t-test sig: equal variances	unequal variances
System usage	Private: 40	3.69	.96	.15	.000**		.070
	Public: 21	2.75	2.16	.47			
Organisational benefit	Private: 40	4.03	.56	.09	.018*		.448
	Public: 21	3.88	.76	.17			
Personal dependence	Private: 40	2.88	.82	.13	.77	.241	
	Public: 21	2.61	.86	.19			
User satisfaction	Private: 40	3.60	.57	.09	.26	.255	
	Public: 21	3.40	.68	.15			

Key *: p<= .05 **: p<= .01

H19: System success by function

Descriptives for the success measures by function are shown in Table 7-13.

Table 7-13: System success by function - descriptives

	Count	USE			ORG			PERS			USAT		
		Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.
Marketing/sales	33	3.21	1.92	.34	4.05	.01	.11	2.78	.81	.14	3.57	.59	.10
Finance/accounting	3	4.42	.81	.47	3.87	.23.	.13	2.78	1.17	.68	3.46	.56	.33
General management	21	3.42	.83	.18	3.91	.70	.15	2.81	.86	.19	3.50	.67	.15
Production	1	4.38	-	-	4.60	-	-	2.33	-	-	3.75	-	-
Personnel	2	3.89	1.27	.90	3.90	.14	.10	3.50	.70	.50	3.75	.35	.25
Corporate strategy	1	2.48	-	-	2.80	-	-	1.33	-	-	2.25	-	-

Table 7-14: Levene test of homogeneity of variance of system success by function

	Statistic	df1	df2	2-tail sig.
System usage (USE)	4.80	2	58	.012*
Organisational benefit (ORG)	.27	2	58	.76
Personal dependence (PERS)	.37	2	58	.69
User satisfaction (USAT)	.08	2	58	.92

Key *: p<= .05 **: p<= .01

Examination of the descriptive statistics suggests that the main functions represented, marketing/sales and general management, have similar mean scores on all success measures. This is confirmed by the inferential analysis that follows.

For purposes of analysis, the functions represented by only a few respondents (finance, production, personnel and corporate strategy) were grouped together as one 'Other' category. To test for the assumption made in one-way ANOVA that the variances of the three resulting groups are the same, the Levene test was used. The results are shown in Table 7-14 for the four measures of system success.

The assumption of homogeneity of variance was rejected at the 5% level only for system usage. One-way ANOVA was therefore used to examine differences in success by function as measured by the three perceptual measures. The results are shown in Table 7-15. In each case, the null hypothesis that the success measure is invariant by function is not rejected at the 5% level.

Table 7-15: One-way ANOVA of perceived system success by function

	D.F.	Sum of squares	Mean squares	F ratio	F prob.
ORGANISATIONAL BENEFIT:					
Between groups	2	.389	.194	.482	.62
Within groups	58	23.38	.403		
Total	60	23.77			
PERSONAL DEPENDENCE:					
Between groups	2	.049	.024	.034	.97
Within groups	58	42.06	.725		
Total	60	42.11			
USER SATISFACTION:					
Between groups	2	.174	.087	.225	.80
Within groups	58	22.45	.387		
Total	60	22.63			

For system usage, the means for the two main groups, marketing/sales and general management, were compared using a t-test. The results are shown in Table 7-16. No significant difference was found at p<=0.05.

Table 7-16: System usage, marketing/sales vs general management

Success variable	No of cases	Mean	S.D.	S.E.	Levene's test for equality of variances: p	t-test sig: equal variances	unequal variances
System usage	Marketing: 33	3.21	1.92	.34	.006**		.58
	Gen mgt: 21	3.42	.83	.18			

In summary, the null hypothesis that system success is invariant by function was not rejected.

H20: System success by task definition

As previously discussed, two variables were coded from Q99 on task definition:

a) DSSLong: whether the DSS was used to aid with long-term or short-term plans
b) DSSMark: whether the DSS was used to aid with marketing plans or corporate/business unit plans.

We consider the impact of these on system success in turn.

H20a: System success by long-term vs short-term plans

Descriptives for the success measures grouped by long vs short-term plans are shown in Table 7-17.

Although intended for strategic marketing planning with a typical plan length of 3-5 years, the system was used solely to aid with one-year plans by 12 of the respondents, while a further 22 used the system to aid both with long-term and short-term plans. Four respondents used the system for neither one-year nor long-term plans. Individual examination of these cases, and cross-reference with other cases from the same organisations, suggests that in two cases, the system was evaluated but not used for live planning by the respondents; in the third case, the system was used briefly but, for whatever reasons, did not influence any marketing or business plan that was produced; and in the fourth case, the respondent had in fact participated in planning which led to production of marketing plans, but had not recorded the fact in his questionnaire response.

Table 7-18 shows the results of the Levene test of the homogeneity of group variance for groups defined by variable DSSLong. The assumption of homogeneity of variance was only rejected at the 5% level for system usage. One-way ANOVA was therefore used to examine differences in success by plan length as measured by the three perceptual measures. The results are shown in Table 7-19. In the cases of organisational benefit and user satisfaction, the null hypothesis that the success measure is invariant by plan length is rejected at the 5% level.

In the cases of organisational benefit and user satisfaction, pairwise comparisons were made of all group means to establish which differed significantly. To reduce the probability of finding spurious random correlations when all possible pairwise comparisons are made amongst several groups, the Scheffe test was used (Kerlinger 1973). Table 7-20 shows which pairs of group means differed significantly at the 5% level.

Both organisational benefit and user satisfaction only vary significantly between group 0, those who have used the DSS neither for long-term nor for short-term plans, and the other groups. No significant differences were found between those using the system for one-year planning and those using it for longer-term plans.

Table 7-17: Success measures by length of plans - descriptives

	Count	USE			ORG			PERS			USAT		
Values of variable DSSLong		Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.
0: Neither long nor short-term plans	4	2.32	..49	.24	2.90	.93	.47	2.00	.90	.45	2.56	.89	.45
1: Long-term plans	21	3.65	.99	.22	4.08	.51	.11	2.77	.69	.15	3.59	.52	.11
2: 1-year plans	12	2.01	2.41	.69	3.96	.73	.21	2.63	.62	.18	3.46	.55	.16
3: Both 1-year and long-term plans	22	3.94	.97	.21	4.05	.43	.09	2.97	.88	.19	3.65	.48	.10

Table 7-18: Levene test of homogeneity of variance by plan length

	Statistic	df1	df2	2-tail sig.
System usage (USE)	13.40	3	55	.000**
Organisational benefit (ORG)	2.62	3	55	.060
Personal dependence (PERS)	.81	3	55	.49
User satisfaction (USAT)	.94	3	55	.425

Key *: p<= .05 **: p<= .01

Table 7-19: One-way ANOVA of perceived system success by plan length

	D.F.	Sum of squares	Mean squares	F ratio	F prob.
ORGANISATIONAL BENEFIT:					
Between groups	3	4.99	1.66	5.21	.003**
Within groups	55	17.58	.32		
Total	58	22.57			
PERSONAL DEPENDENCE:					
Between groups	3	3.48	1.16	1.97	.130
Within groups	55	32.45	.59		
Total	58	35.93			
USER SATISFACTION:					
Between groups	3	4.17	1.39	4.82	.004**
Within groups	55	15.85	.29		
Total	58	20.02			

Table 7-20: Scheffe test of means for DSSLong groups

	ORG BEN				USER SAT			
DSSLong values (plan length)	0	1	2	3	0	1	2	3
0: Neither long nor short-term plans								
1: Long-term plans	*				*			
2: 1-year plans	*				*			
3: Both 1-year and long-term plans	*				*			

Key *: group means differ significantly (p<=.05)

For system usage, specific t-tests were performed to examine group means as follows:
a) Long-term vs 1-year plans
b) Long-term plans vs neither
c) 1-year plans vs neither.

The results are shown in Table 7-21. Those using the DSS for long-term plans have significantly higher system usage (p=.042) than those using the system for one-year plans, and higher usage (p=.016) than those who have used the system to assist with neither short-term nor long-term plans.

Table 7-21: Variations in system usage by plan length

Groups compared	No of cases	Mean	S.D.	S.E.	Levene's test for equality of variances: p	t-test sig: equal variances	unequal variances
Long-term vs 1-year plans	Long-term: 21	3.65	.99	.22	.000**		.042*
	1-year: 12	2.01	2.41`	.69			
Long-term plans vs neither	Long-term: 21	3.65	.99	.22	.243	.016*	
	Neither: 4	2.32	.49	.24			
1-year vs neither	1-year: 12	2.01	2.41	.69	.003**		.682
	Neither: 4	2.32	.49	.24			

H20b: System success by marketing vs corporate plans

We now consider the other aspect of task definition hypothesised to affect system success: whether the system is used to assist in the production of marketing plans or corporate/business plans.

Descriptives for the success measures grouped by marketing vs corporate planning are shown in Table 7-22.

Although the system was intended to assist with strategic marketing plans, 18 respondents used it to aid with corporate or business unit plans as well as marketing plans, while 5 further respondents used the system only for corporate/business unit plans. Four respondents used the system neither for marketing nor business plans. These were the same four respondents that did not use the system for either long-term nor short-term plans, discussed individually above.

Table 7-23 shows the results of the Levene test of the homogeneity of variance for groups defined by variable DSSMark. The assumption of homogeneity of variance was not rejected at the 5% level for any of the four success measures. One-way ANOVA was therefore used to examine differences in success by plan type. The results are shown in Table 7-24. In the cases of organisational benefit, personal dependence and user satisfaction, the null hypothesis that the success measure is invariant by plan type is rejected at the 5% level.

In these cases, pairwise comparisons were made of all group means to establish which differed significantly, using the Scheffe test. Table 7-25 shows which pairs of group means differed significantly at the 5% level for organisational benefit and user satisfaction. No means differed significantly for personal dependence.

Both organisational benefits and user satisfaction only vary significantly between group 0, those who have used the DSS neither for long-term nor for short-term plans, and the other groups. No significant differences were found between those using the system for marketing plans and those using it for corporate/business unit plans.

To summarise the positive findings related to H20 on task definition:

i) Those using the DSS for long-term plans have significantly higher system usage (p=.042) than those using the system for one-year plans, and higher usage (p=.016) than those who have used the system to assist with neither short-term nor long-term plans.
ii) Both organisational benefits and user satisfaction are lower for those few respondents who have used the DSS neither for long-term nor for short-term plans, than for the other respondents.

Table 7-22: Success measures by type of plan - descriptives

	Count	USE			ORG			PERS			USAT		
DSS used to assist with:		Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.
0: Neither mkting nor bus plans	4	2.32	.49	.24	2.90	.93	.47	2.00	.90	.45	2.56	.89	.45
1: Marketing plan(s)	32	3.47	1.47	.26	4.04	.59	.10	2.64	.78	.14	3.52	.54	.10
2: Corporate/business unit plan(s)	5	3.83	1.21	.54	4.20	.42	.19	2.96	.71	.32	3.73	.33	.15
3: Both corporate & mkting plans	18	3.18	1.87	.44	4.00	.44	.10	3.09	.67	.16	3.66	.48	.11

Table 7-23: Levene test of homogeneity of variance of system success by plan type

	Statistic	df1	df2	2-tail sig.
System usage (USE)	1.16	3	55	.334
Organisational benefit (ORG)	1.43	3	55	.244
Personal dependence (PERS)	.259	3	55	.862
User satisfaction (USAT)	1.15	3	55	.335

Table 7-24: One-way ANOVA of perceived system success by plan type

	D.F.	Sum of squares	Mean squares	F ratio	F prob.
SYSTEM USAGE:					
Between groups	3	6.38	2.13	.884	.45
Within groups	55	132.31	2.40		
Total	58	138.69			
ORGANISATIONAL BENEFIT:					
Between groups	3	5.03	1.68	5.26	.003**
Within groups	55	17.54	.32		
Total	58	22.57			
PERSONAL DEPENDENCE:					
Between groups	3	4.91	1.64	2.90	.043*
Within groups	55	31.02	.56		
Total	58	35.93			
USER SATISFACTION:					
Between groups	3	4.24	1.41	4.93	.004**
Within groups	55	15.78	.29		
Total	58	20.02			

Table 7-25: Scheffe test of means for DSSMark groups

	ORG BEN				USER SAT			
DSSMark values (plan type)	0	1	2	3	0	1	2	3
0: Neither mkting nor bus plans								
1: Marketing plan(s)	*				*			
2: Corporate/business unit plan(s)	*				*			
3: Both corporate & mkting plans	*				*			

Key *: group means differ significantly (p<=.05)

7.3.3 Regression

Introduction

The correlation analysis found various variables which were associated with system success. In order both to estimate their relative contribution to system success, and to examine interrelationships between the success factor variables, a regression analysis was performed.

The variables found to have a significant correlation with one or more of the success measures were entered into a linear regression equation as independent variables, using each perceptual success measure in turn as the dependent variable. The independent variables were user interface satisfaction, attitude to marketing planning, top management support for DSS, process flexibility, seniority, data availability and organisation size.

For the equation for system usage, only those variables correlated significantly with system usage were entered as independent variables. These were purchase involvement, top management support for the DSS, and process flexibility.

As insufficient theoretical grounds were available to choose the order of entry of independent variables into the equation, the forward selection procedure was used, in which at each step, the variable is entered that has the highest partial correlation with the dependent variable, adjusted for independent variables entered in previous steps. This procedure continues until the variable considered for entry has a probability associated with the F test of greater than 0.05 - that is, until the hypothesis that the coefficient of the entered variable is 0 cannot be rejected at the 5% level (Norusis 1993).

Table 7-26, Table 7-27 and Table 7-28 (on page 156) show the results for the regression analysis for organisational benefit. Table 7-26 summarises each step, showing the variable added at the step. The value of R^2, the multiple coefficient of determination, is shown for the equation so far. R^2 represents the proportion of the variance of the dependent variable explained by the equation. The increment to R^2 due to the variable introduced in the current step, or squared part correlation, is also shown. This indicates the contribution to the variance of the dependent variable made by the variable introduced at this step, after the independent variables introduced in previous steps have been taken into account. This forms a commonly-used means of estimating the importance of each independent variable (Kerlinger 1973 p621, 624). The F test applies to the equation so far, testing the hypothesis that all population regression coefficients are zero. 'Beta in' shows the standardised partial regression coefficient when the variable is entered. The adjusted R^2, an estimate of R^2 for the population, is shown for the equation as a whole.

Table 7-27 shows the variables in the final equation. B shows the partial regression coefficient, shown in its standardised form in the Beta column. SE B gives the standard error of B. Tolerance is a measure of collinearity, showing the extent to which the variable is a linear combination of the other independent variables in the equation, where 1 represents independence from other variables. The t test is for the null hypothesis that the population partial regression coefficient for this variable is 0.

Table 7-28 summarises the variables not in the equation. 'Beta in' shows what their standardised partial regression coefficient would be if introduced, while the t test is for the hypothesis that 'beta in' is 0. 'Tolerance' shows what the tolerance of the variable would be if it were added to the equation.

Similarly, the results for personal dependence, user satisfaction and system usage are shown in Table 7-29 to Table 7-37 (pages 156 to 158).

Before discussing the regression results, though, we check that the assumptions of multiple regression hold for our data.

Regression assumptions

Three assumptions are necessary in deriving inferences about population values based on sample results:

1. Normality: That for given values of the independent variables (success factors), the dependent variable (success measure) is distributed normally with the same variance.
2. Linearity: that the means for the success measure for different values of a given independent variable lie on a straight line - that is, that the linear model is appropriate.
3. Independence of observations: That the values of the independent variable are statistically independent of each other.

The normality assumption was examined by consideration of residuals. For each success measure, a histogram of standardised residuals was plotted with a normal curve superimposed. The residuals were also plotted against the expected value in a scatterplot. For user satisfaction, these charts are shown in Figure 7-2 and Figure 7-3.

Figure 7-2 appears a reasonable match to a normal distribution. There is, perhaps, some suggestion of a skew in the distribution, with slightly higher frequencies than expected with positive residuals, balanced by three outlying cases with large negative residuals.

On the scatterplot, these outliers are shown to have moderate predicted values, in the range -1 to 1 on standardised scores. Otherwise, the scatterplot seems consistent with a random distribution of residuals, with no obvious change in variance with changes in the predicted value.

Figure 7-2: Residual histogram, user satisfaction

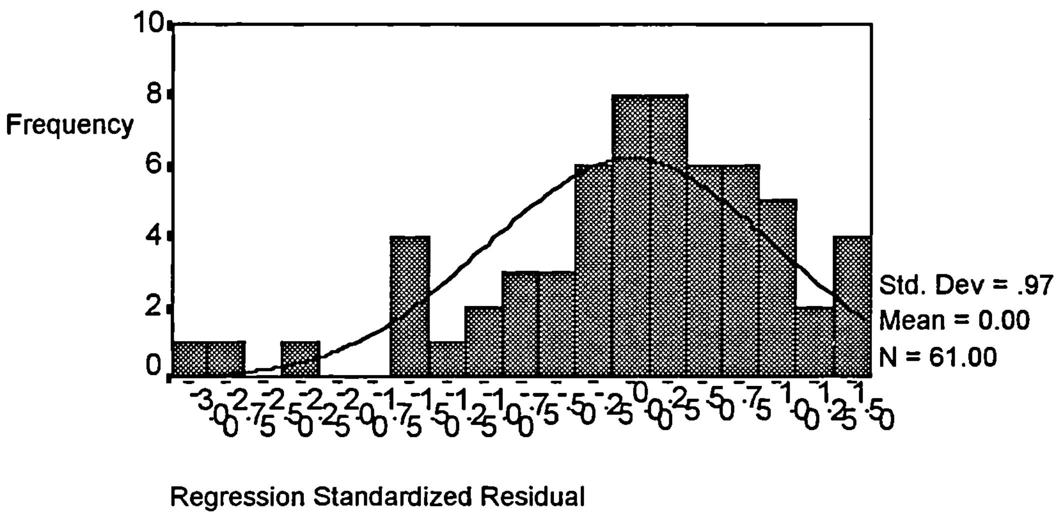
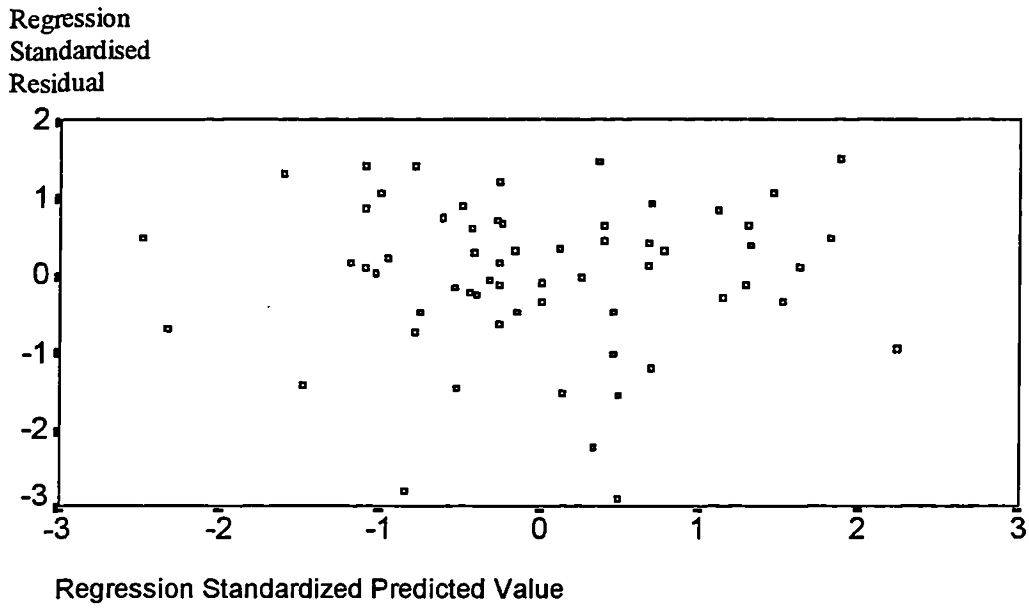


Figure 7-3: Residual scatterplot, user satisfaction



The outliers were individually examined. Starting with the largest negative residual, they were:

1. Case 57 (user satisfaction 2.38, predicted 3.73): a marketing manager in a utility, with a system usage of 0 hours in the last year. Maximum scores for user interface satisfaction increased the expected value of user satisfaction. A telephone call suggested that shortage of personnel and continuing restructuring may have accounted for its limited recent use, and perhaps hence for the low user satisfaction.
2. Case 58 (user satisfaction 1.88, predicted 3.18): a general manager in a financial services organisation, with 12 hours' usage in the last year. The questionnaire revealed no obvious reasons for the discrepancy. In a telephone call, the respondent reported that "We haven't implemented the system due to a cost/benefit assessment. I found it useful, but it has taken longer to spread than expected." This leaves open a number of possibilities, including untested success factors relating to how the system is 'spread' in the organisation, and the possibility that the system may need adapting for financial services organisations - the sample having contained only two financial services respondents.
3. Case 31 (user satisfaction 2.63, predicted 3.67): a general manager in a manufacturer. Interviewed for the multiple-case study (case 1), this manager was the most concerned about the ease of manipulation of the system, and the source of two quotations on this topic in the case description. This theme led to the introduction of a success factor on manipulation in the multiple-case study analysis.

The organisational benefit and personal dependence histograms showed a similar pattern, and their scatterplots showed no obvious variation in variance with changes in predicted value. No deviance from a normal distribution was apparent with system usage. The two outliers for organisational benefit where the standardised residual was more than two standard deviations from the mean were the cases 57 and 58 we have discussed above.

Personal dependence had just one such outlier, case 50 (personal dependence 1.33, predicted 3.36). This very senior executive, responsible for a group of companies, had low scores on personal dependence as the system was operated by a staff member, though high scores on organisational benefit.

No deviance from a normal distribution was apparent with system usage. The four outliers included case 57 discussed above, and were from the same organisation. All with system usage of 0, restructuring may account for the lack of use in the past year after previous use: this was explicitly mentioned by one further respondent who was contacted by telephone.

In summary, the assumption of normality does not appear unreasonable, given the research on the importance of this assumption surveyed by Kerlinger (1973 p287-8), from which he concluded that "The evidence to date is that the importance of normality and homogeneity is overrated...Unless there is good evidence to believe that populations are rather seriously non-normal and that variances are heterogeneous, it is usually unwise to use a non-parametric test in place of a parametric one."

The assumption of linearity was assessed by examining scatterplots of each independent variable against the dependent variable. Where any relationship was apparent, it appeared consistent with a linear relationship.

Previous surveys examining system success (e.g. Sanders and Courtney 1985, Snitkin and King 1986) have implicitly made the assumption of independence of observations, even where more than one respondent is from the same organisation. The dominance of perceptual measures suggests that most relevant variables can reasonably be regarded as functions of the individual rather than of the organisation. It would be difficult, in any case, to associate (say) process flexibility with the organisation rather than the individual, as such task context variables will vary in different parts of the organisation, as well as varying in the perception of individuals. Jones and James (1979), for example, provide evidence that the use of aggregated individual perceptions in order to measure aspects of the work environment is inappropriate, except for some homogeneous sub-units of the organisation. Nevertheless, it should be recognised that independence of observations is a simplifying assumption that presents a potential source of error.

As a final point about regression assumptions, we note that the limited sample size provides a further potential weakness (Kerlinger 1973). This may result in fewer variables entering the equation than might be the case with a greater sample size, for which relatively small partial correlations are more likely to be statistically significant. It also leads to a lower confidence in the relative weights and the relative part correlations of the various variables in the equation.

Having examined the assumptions of multiple regression, we now turn to the regression results.

Organisational benefit

Table 7-26: Regression, organisational benefit - stepwise summary

Step	Variable	R^2	ΔR^2	F (Eqn)	Sig F	Beta In
1	User interface satisfaction	.14	.14	9.63	.003	.37
2	Process flexibility	.25	.11	9.46	.000	.33
3	Attitude to mkt planning	.34	.09	9.93	.000	.31
4	Purchase involvement	.39	.05	8.86	.000	.22

Adjusted R^2 for equation: .34

Table 7-27: Regression, organisational benefit - variables in the equation

Variable	B	SE B	Beta	Tolerance	t	Sig t
User interface satisfaction	.21	.09	.27	.96	2.50	.015
Process flexibility	.22	.08	.31	.96	2.89	.005
Attitude to mkt planning	.40	.13	.33	.98	3.14	.002
Purchase involvement	.09	.05	.22	.96	2.01	.048
(Constant)	.25	.71			.36	.72

Table 7-28: Regression, organisational benefit - variables not in the equation

Variable	Beta in	Tolerance	t	Sig t
Top mgt support for DSS	.20	.86	1.80	.078
Seniority	.03	.90	.29	.78
Size	-.11	.85	-.96	.34
Data availability	.09	.90	.80	.43

Four variables - user interface satisfaction, process flexibility, attitude to marketing planning and purchase involvement - together account for 39% of the variance in organisational benefit, or around a third of the variance in the population (from the adjusted R^2). Their high tolerance suggests that the ΔR^2 figures are reasonable indicators of the relative importance of the variables.

The tolerance figures for those variables not in the equation are somewhat lower. This collinearity accounts for the absence from the equation of top management support for DSS and organisation size, despite their significant correlations with organisational benefit reported earlier (negative in the case of organisation size). From the earlier correlation tables (Table 7-4 to Table 7-6), it seems relevant that both top management support for DSS and organisation size correlate significantly with process flexibility ($r=0.34$, $p=0.008$ and $r=-.43$, $p=.000$ respectively).

Personal dependence

Table 7-29: Regression, personal dependence - stepwise summary

Step	Variable	R^2	ΔR^2	F (Eqn)	Sig F	Beta In
1	Top mgt support for DSS	.37	.37	34.09	.000	.61
2	Purchase involvement	.43	.06	21.52	.000	.25

Adjusted R^2 for equation: .41

Table 7-30: Regression, personal dependence - variables in the equation

Variable	B	SE B	Beta	Tolerance	t	Sig t
Top mgt support for DSS	.59	.10	.58	.99	5.81	.000
Purchase involvement	.14	.06	.25	.99	2.46	.017
(Constant)	.30	.39			.77	.44

Table 7-31: Regression, personal dependence - variables not in the equation

Variable	Beta in	Tolerance	t	Sig t
User interface satisfaction	.18	.96	1.78	.081
Attitude to mkt planning	-.02	.99	-.17	.86
Seniority	.06	.76	.56	.58
Size	-.21	.65	-1.74	.09
Process flexibility	.03	.87	.30	.77
Data availability	.09	.94	.90	.37

In contrast with the organisational benefit equation, top management support for the DSS is the most significant predictor of personal dependence, alone explaining 37% of its variance. Purchase involvement is again present as a factor, although again a relatively minor one ($\Delta R^2 = .06$).

Of the variables not in the equation, several correlate significantly with personal dependence: user interface satisfaction, seniority, size and process flexibility (Table 7-4 and Table 7-5). The correlation between user interface satisfaction and top management support for the DSS (r=.19, p=.075), while not significant at the 5% level, may be sufficient to account for the absence of user interface satisfaction from the equation (t=0.081). Seniority, size and process flexibility correlate more strongly with top management support for the system (Table 7-6), which would appear to explain their much higher tolerances and their absence from the equation.

User satisfaction

Table 7-32: Regression, user satisfaction - stepwise summary

Step	Variable	R^2	ΔR^2	F (Eqn)	Sig F	Beta In
1	Top mgt support for DSS	.29	.29	13.01	.000	.54
2	User interface satisfaction	.38	.09	17.80	.000	.31
3	Purchase involvement	.44	.06	15.04	.000	.25

Adjusted R^2 for equation: .41

Table 7-33: Regression, user satisfaction - variables in the equation

Variable	B	SE B	Beta	Tolerance	t	Sig t
Top mgt support for DSS	.34	.08	.46	.96	4.55	.000
User interface satisfaction	.22	.08	.28	.95	2.78	.007
Purchase involvement	.10	.04	.25	.98	2.51	.015
(Constant)	1.30	.35			3.70	.001

Table 7-34: Regression, user satisfaction - variables not in the equation

Variable	Beta in	Tolerance	t	Sig t
Attitude to mkt planning	.19	.98	1.90	.06
Seniority	.05	.75	.47	.64
Size	-.17	.65	-1.41	.16
Process flexibility	.16	.87	1.53	.13
Data availability	.12	.92	1.13	.26

As the user satisfaction scale is made up of the personal dependence and organisational benefit scales, it is not surprising that the factors present in its equation are a combination of those in the scales we have presented above. As with personal dependence, top management support for the DSS is a dominant predictor of user satisfaction, accounting alone for 29% of the variance. User interface satisfaction explains a further 9%, while purchase involvement is again present as a relatively minor factor.

Of the remaining variables, we have seen that seniority, size and process flexibility have strong correlations with top management support for the DSS (negative in the case of size). Data availability has a weaker correlation which may be due to chance (Table 7-6: r=.24, p=.062): this may nevertheless have removed it from the equation derived from the sample despite its correlation with user satisfaction (r=.29, p=.025). Attitude to marketing planning, while high in tolerance, did not correlate significantly with user satisfaction, although it did with organisational benefit (Table 7-4).

System usage

Table 7-35: Regression, system usage - stepwise summary

Step	Variable	R^2	ΔR^2	F (Eqn)	Sig F	Beta In
1	Process flexibility	.16	.16	11.15	.001	.40

Adjusted R^2 for equation: .14

Table 7-36: Regression, system usage - variables in the equation

Variable	B	SE B	Beta	Tolerance	t	Sig t
Process flexibility	.68	.20	.40	1.00	3.34	.001
(Constant)	.71	.81			.87	.39

Table 7-37: Regression, system usage - variables not in the equation

Variable	Beta in	Tolerance	t	Sig t
Purchase involvement	.18	.97	1.49	.14
Top mgt support for DSS	.16	.89	1.24	.22

In none of the previous regression equations have process flexibility and top management support for DSS both occurred in the equation: we have noted that these two variables are correlated significantly (r=.34, p=.008). This pattern continues, with process flexibility the only independent variable. Unlike the equations using perceptual success measures, purchase involvement does not enter the equation: in the sample, it is correlated with r=0.16 to process flexibility, though this may have arisen by chance (p=.21). The variance of system usage explained by the equation is lower than that for the previous equations: just 16%, or 14% taking the adjusted R^2 figure as an estimate for the population.

7.4 Success factors: summary and discussion

7.4.1 Summary of results

Table 7-38 and Table 7-39 summarise the results we have presented for the hypotheses relating to success factors, against each of the four success measures. Correlation coefficients are only shown where significant at the 5% level. Where a success factor forms part of the regression equation for a success measure, the step on which it was introduced is shown, with the resulting increment to R^2.

Five variables are significantly correlated with each of the perceptual success measures: purchase involvement, top management support for the system, process flexibility, user interface satisfaction and organisation size (negatively correlated). The first three of these form the only success factors correlated with system usage. In addition, seniority correlates with personal dependence and user satisfaction; data availability correlates only with user satisfaction; and attitude towards marketing planning correlates only with organisational benefit.

The regression analysis sheds light on the relative contribution of these variables to system success. Top management support for the system is the strongest contributor to both user satisfaction and personal dependence, alone explaining 37% of the variance in personal dependence. Organisational benefit has no such dominant factor: user interface satisfaction, process flexibility, attitude to marketing planning and purchase involvement are all present in the equation. The equation for system usage only contains process flexibility.

7.4.2 Discussion

Top management support for system

Top management support for the DSS appears to have a substantial impact on personal dependence on the system. This suggests that use of the DSS, in the wider sense of the impact of the system on the respondent's job, is not entirely optional. Top management support seems less influential on the respondents' perception of benefits to the organisation. It seems plausible that users should be freer in their views than in their jobs: the influence of the user's attitudes on perceived organisational benefit is suggested by the significant association between attitude to marketing planning and organisational benefit.

The association of top management support with organisational benefit is still significant, however. As well as the role of individual attitudes, top management support may provide conditions in which the system is more likely to deliver benefits. The high correlation of top management support with process flexibility seems to be an example.

Table 7-38: Success factors - results summary, interval variables

Hypothesised success factor	System use: Correl-ation r	System use: Regress step	System use: ΔR^2	Organisational benefit: Correl-ation r	Organisational benefit: Regress step	Organisational benefit: ΔR^2	Personal dependence: Correl-ation r	Personal dependence: Regress step	Personal dependence: ΔR^2	User satisfaction: Correl-ation r	User satisfaction: Regress step	User satisfaction: ΔR^2
H1 Training												
H2 Purchase involvement	.24*			.27*	4	.05	.30**	2	.06	.33**	3	.06
H3 Top mgt support for system	.27*			.36**			.60**	1	.37	.54**	1	.29
H4 Support												
H5 User interface satisfaction				.37**	1	.14	.31**			.40**	2	.09
H6 Attitude towards mkt planning				.34**	3	.09						
H7 Task interdependence												
H8 Top mgt support for planning												
H9 Level of follow-through												
H10 Top mgt involvement												
H11 Mkt planning experience												
H12 Seniority							.37**			.32*		
H13 Organisation size				-.35**			-.35**			-.41**		
H14 Process flexibility	.40**	1	.16	.37**	2	.11	.26*			.37**		
H15 Data availability										.29*		
H16a Alternatives exploration												
H16b Innovation												
H17a Time availability (personal)												
H17b Time availability (elapsed)												

Key *: $p<=.05$ **: $p<=.01$ (1-tailed for H1-10, 2-tailed for H11-17)

Table 7-39: Success factors - results summary, nominal variables

Hypothesised success factor	*Results*
H18 Industry sector	No significant differences found in success measures by sector
H19 Function	No significant differences found in success measures by function
H20 Task definition	Those using the DSS for long-term plans have higher system usage than those using the system for one-year plans, and higher usage than those who have used the system for neither long-term nor short-term plans Both organisational benefits and user satisfaction are lower for those few respondents who have used the DSS neither for long-term nor for short-term plans than for the other respondents.

User interface satisfaction

How easy the system is to use seems of considerable importance in how useful the system is to the organisation, appearing first in the regression equation for organisational benefit and second for user satisfaction. Of course, all the respondents were using the same system, but *perceived* ease of use may vary with such factors as previous experience of computers, the time available for learning the system, the training and support received, and whether a facilitator operates the system. Supporting this argument, user interface satisfaction is highly correlated with training ($r=.60$, $p=.000$) and also significantly correlated with system support ($r=.24$, $p=.032$).

It would seem reasonable to conclude that ease of use should be an important factor in choosing a system, and an important design consideration in software development. The quality of training and support may also be relevant in increasing perceived ease of use.

Purchase involvement

Involvement in the decision to purchase the system is significantly correlated with all the success measures, and appears as the last variable in the regression equations for all three perceptual success measures. There are several possible reasons:

1. Understanding: Involvement in the purchase decision is likely to lead to a better understanding of the strengths and weaknesses of the software and how to apply it effectively. Although much of this knowledge may be passed on to colleagues, imperfections in this communication process (whether deliberate or not) may mean that those involved in the purchase decision nevertheless on average gain slightly greater benefits.
2. Commitment: Being consulted about the software purchase may lead to an emotional commitment to make the software work, with positive effects on the impact of the system.
3. Sample bias: Given that respondent companies *did* decide to purchase the system, those involved in the purchase decision clearly reacted favourably to the system. They may therefore as a group be more predisposed to see benefits from software for marketing planning than some of their colleagues.

It is worth noting, however, that the effect of purchase involvement on reported benefits, though present, is a relatively small one.

Process flexibility

Process flexibility is significantly correlated with each perceptual success measure, and is the only variable in the regression equation for system usage. We note from descriptive statistics that excessively structured, inflexible procedures are a problem only found by a minority (variable mean=3.88; only six respondents (9.8 percent) agreed or strongly agreed that "our procedures for marketing planning in this organisation are so structured that they act as a hindrance rather than a help"). The size of the correlation suggests, though, that when the problem arises, it can be a significant dampener on system benefits.

Attitude towards marketing planning

The perceived importance of marketing planning is correlated with perceived organisational benefit, accounting for 9% of the variance of organisational benefit in the regression equation. This suggests that introduction of a system may need to be accompanied by an educational programme, aiming to change attitudes about the importance of marketing in general and marketing planning in particular.

The attitude of users towards marketing planning was not, however, found to have a significant impact on their personal dependence on the system. It seems plausible that personal dependence on the system depends more on the views of the user's manager than on the user's own views.

Seniority

Seniority is significantly correlated with personal dependence and user satisfaction. Senior managers are more dependent on the system than more junior managers (r=.37). This is consistent with the notion that strategy is primarily formed at senior levels of the organisation. Seniority is not, though, correlated significantly with system usage. Senior executives are no more likely to use the system than more junior colleagues, but they do on average depend on it more in performing their job. This suggests that whoever has operated the system or participated in system-aided planning sessions, the outputs are more likely to be critical to senior executives.

Organisation size

Size is negatively correlated with the three perceptual success measures. It does not, however, appear in the regression equations. We have seen that this seems to be due to its correlation with other success factors, particularly top management support for DSS and process flexibility. It seems that larger organisations are more likely to suffer from inflexible, over-structured procedures, and are less likely to have top management support for the system. For both of these reasons, system success may be affected. The tendency of large organisations towards bureaucracy is comprehensible, but why they should also tend to have less top management support for the system is not clear. One possible reason is that in smaller organisations, the decision to purchase and use the system is likely to involve much of the senior management team. In larger organisations, there is more scope for a decision to obtain the system to be taken at lower levels, without strong commitment from above, or for varations in opinions between functions or divisions. This may lead to lower top management support as a whole, and in turn to lower benefits.

Data availability

The final variable showing a significant correlation with at least one system success measure is data availability, significantly associated only with user satisfaction (r=.29). It is plausible that when relevant data is difficult to obtain, the quality of the system's outputs may be questionable, and hence the perceived benefits may be lower. However, the marginal significance level (p=.025), combined with the lack of correlation with other success measures, suggests that this result should be treated with caution.

7.5 DSS benefits

Having discussed factors affecting system success, we now explore more briefly perceived benefits of the system. As we have discussed, early indications only can be obtained of system benefits from the questionnaire, in the absence of a control group. The respondents' views on the system's impact on a number of variables are summarised in Table 7-40. The hypotheses were listed in chapter 5, which also described the scales or single items measuring each variable. The table shows the mean score for each variable, its standard deviation and the standard error of the mean, and a 95% confidence interval for the mean. A star is used in the 'Mean' column to indicate that the population mean is greater than 3.5 (at 95% confidence level); two stars indicate that the population mean is greater than 4.0 (at 95% confidence level).

Table 7-40: Perceived benefits

System use has an impact on:	Mean	S.D.	S.E.	Mean 95% C.I.
H21 Knowledge & skills	4.16**	.55	.07	4.02-4.30
H22 Plan quality - level of detail	3.44	.98	.12	3.19-3.69
- documentation of intervention	3.72	.92	.12	3.49-3.96
H23 Alternatives exploration - alternatives breadth	3.43	1.09	.14	3.15-3.70
- alternatives depth	3.56	1.04	.13	3.29-3.82
- innovation	4.15**	.54	.07	4.01-4.29
H24 Communication effectiveness	4.02*	.54	.07	3.89-4.16
H25 Cross-functional involvement	3.92*	.99	.13	3.66-4.17
H26 Data utilisation - data availability	3.61	.92	.12	3.37-3.84
- data utilisation	3.62	.82	.11	3.41-3.83
- data requirements	4.25**	.65	.08	4.08-4.41
- data storage	3.92*	.78	.10	3.72-4.12
- data accuracy	4.15*	.70	.09	3.97-4.33
- data timeliness	3.51	1.07	.14	3.23-3.78
H27 Process flexibility	2.97	1.17	.15	2.67-3.27
H28 Process thoroughness	4.08*	.57	.07	3.94-4.23
H29 Time usage - efficiency of managerial time	3.82*	1.01	.13	3.56-4.08
- relief of constraints	3.44	.90	.12	3.21-3.67
- time to complete plan	3.51	.94	.12	3.27-3.75
- time to update plan	4.24**	.78	.10	4.03-4.44
- time on clerical activities	3.30	1.02	.13	3.03-3.56
H30 Level of follow-through	3.48	.79	.10	3.28-3.69
H31 Top mgt involvement in planning	3.63	.93	.12	3.40-3.87
H32 Top mgt support for planning	3.40	1.00	.13	3.14-3.66
H33 Attitude to marketing planning - less daunted	4.02*	.87	.11	3.79-4.24
- enthusiasm	4.07*	.91	.12	3.83-4.30

Key

**: population mean is greater than 4.0 (at 95% confidence level)

*: population mean is greater than 3.5 (at 95% confidence level)

As we have discussed, considerable caution should be used in interpreting this analysis, as there may be a number of reasons for a positive score. Hence, the use of a star notation should not be taken as providing support for the hypothesis equivalent to the use of stars to indicate correlation significance levels: we use stars simply as a convenient means of drawing attention to those areas where the greater perceived benefits seem to lie. In the concluding chapter we will contrast this exploratory analysis qualitatively with the conclusions from the multiple-case study. We discuss the results below. A more extensive discussion, including frequencies for individual item responses, is given in McDonald, Wilson and Hewson (1996).

One of the variables eliciting the most positive response was knowledge and skills, where the system is perceived to have a learning effect. The response was lukewarm on two aspects of plan quality arising from marketing planning barriers: the reduction in excessive detail, and the better documentation of interventions by which objectives are to be achieved.

While mean scores for the system's impact on breadth and depth of examination of alternatives were moderate, that for the variable tentatively termed 'Innovation' (question 16) was high. The full question, taken from a statement made by a user in the system design evaluation, was: "EXMAR provides the "fresh pair of eyes" that is essential if planning is to be able to break the accepted truths that have been built up by the organisation". We recall that this question was originally intended as part of measurement of alternatives breadth, but due to low inter-correlations it was left separate. Its high score suggests that the system, rather than leading to consideration of more alternatives in greater depth, leads to an altered perspective on the available options.

Whether part at least of this altered perspective derives from better communication is left open by the communication effectiveness and cross-functional involvement variables, where the system seems to have a positive impact.

Regarding the system's data-related impacts, its role in clarifying data requirements was the strongest supported. This does not as clearly translate into higher data availability: the possible reasons include the time delay between identifying data requirements and obtaining the data, and constraints in resources or systems. Similarly, the system does not necessarily make it quicker to obtain information. Other hypothesised benefits receiving a positive response were the system's role in data storage, via a "useful central point for key data", and data accuracy. The moderate response on data utilisation, or whether more of the relevant data is considered in marketing decisions, is consistent with the moderate response on alternatives exploration.

The system seems to have a role in improving the thoroughness of the planning process. There is no indication, though, that it improves its flexibility - which rather, we have seen, can be a factor affecting system success. The negatively-worded Q4, "EXMAR forces you to use too rigid a planning process" was neutrally scored (mean=2.97), suggesting that not all users regard the system as being sufficiently flexible - 19 users (31%) agreeing or strongly agreeing with the statement. This may be related to the lack of tailorability of the prototype system being evaluated: no service was offered to users of the prototype to tailor the system to requirements specific to the organisation.

The time-saving role of the system is clearer when updating existing plans in subsequent years than when first completing a plan. The question using the word 'efficiency' (question 20: "EXMAR leads to less efficient use of management time", reversed) received a more favourable response than those referring to time savings or reductions, with the exception of the specific question on updating plans. Perhaps any time savings on individual activities, such as calculations or graphics, are counteracted by use of a more thorough planning process: this interpretation is consistent with the high score for the process thoroughness variable.

Several variables relating to the task context are not conclusively improved by the system: the level of follow-through to implementation, and top management support for, and involvement in, the planning activity. This suggests that these, instead, form potential success factors both for marketing planning and for system effectiveness - the manner in which they have been treated earlier in this chapter.

A perhaps surprising effect of system use seems to be modifications to attitudes towards marketing planning. Users report that they are both less daunted by marketing planning and more enthusiastic about it as a result of using the system.

8. Multiple-Case Study of EXMAR Users

8.1 Introduction

8.1.1 Structure of chapter

The following sections (8.2 to 8.7) each present one case study. Each section begins (8.x.1) with a case description, which summarises the use and impact of the system in the organisation, without reference to hypotheses. This is followed by the inductive derivation of propositions arising from the case, and a summary of the evidence for the propositions generated in this and preceding cases (8.x.2 for benefits, 8.x.3 for success factors).

Both the case description and the generation and testing of propositions have been described in the research method description in section 5.8. It should be noted that the case description is intended as a summary of the interview data, illustrated by characteristic examples, which is then more analytically and critically examined in the proposition assessment that follows. Hence, the description does not necessarily explore all the possible interpretations of the data, such as whether a benefit perceived by users permits of rival explanations, nor can it present all the data relating to a particular point: instead, its role is to convey the context of the case, to summarise what appears to be the system's impact, and to introduce more discursively than in the tables that follow the major themes on which the case provides evidence. As we have seen in the discussion of method, the issue of rival explanations plays a prominent part in the assessment of support for propositions.

The final sections, 8.8 and 8.9, integrate the findings from the case studies, covering benefits and success factors respectively. Discussion of the contribution of the results is left until the final chapter, when they are also compared with results from the survey and from the exploration of generality of findings.

8.1.2 Keys to ratings tables

The tables summarising the case against hypothesised benefits and success factors incorporate a rating followed by notes, as space allows. The keys for the ratings are as follows:

Table 8-1: Key to benefits tables

+, ++	The benefit appears to have occurred in this case. ++ = the case supports the proposition; + = data consistent with proposition but inconclusive. Factors used in assessing include: a) Data consistency/triangulation: consistency of story from different interviewees; the substantiation of user perceptions with narrated events; corroboration from observation or documents b) Theoretical fit: the fit of the data to the proposition; the fit of rival hypotheses to the data; the presence of a plausible explanation. For a ++ score, all three points under b) and at least one point under a) need to be addressed.
-, --	Dysfunctional effect on benefit area, where the system has made the relevant variable worse. -- Indicates clear evidence, - indicates some indication. Allocation as for + and ++.
+/-	While in some respects the effect of the system on the benefit area is positive, in other respects the effect is dysfunctional.
x	No effect on benefit area despite conditions where the benefit has an opportunity to be present (eg, for group planning benefits, the planning has been done by a group).
SF	No effect on benefit area - attributable to known success factors being absent
NA	Benefit area does not apply (eg group planning benefits where system used by individual)
DK	Insufficient data to assess. Reasons include inadequate exploration of issue in interviews; inconclusive replies; the system impact cannot be separated from other possible causes

Table 8-2: Key to success factors tables

	RATING OF PRESENCE OF FACTOR
*, **, ***	The extent to which the factor is present in the case. *** indicates the factor is fully present, * indicates that it is not present. Eg: * indicates poor training, *** indicates thorough training.
DK	The data is insufficient to rate the case on the factor.
	RATING OF INFLUENCE OF FACTOR
+, ++	The factor appears to be influential in determining system utility. ++ = the case supports the proposition; + = data consistent with proposition but inconclusive. Factors used in assessing include: a) Data consistency/triangulation: consistency of story from different interviewees; the substantiation of user perceptions with narrated events; corroboration from observation or documents b) Theoretical fit: i. where the factor is fully or partially absent, benefits are reduced or absent ii. where the factor is present, benefits are present, or there is some more plausible reason for their absence iii. a plausible causal explanation links the factor to the benefits obtained. For a ++ score, all three points under b) and at least one point under a) need to be addressed.
-, --	The factor is not influential in determining system utility. -- indicates clear evidence, - indicates some indication. Normally due to evidence that one of the three statements above does not hold.
o	While there is no or insufficient indication that the factor is influential in determining system utility, there is equally no or insufficient indication that it is not.
DK	Insufficient data to assess. Reasons include inadequate exploration of the issue in interviews; inconclusive replies to questions in interviews; the impact on benefits obtained cannot be separated from other possible causes.

8.1.3 Benefits: controlling for rival hypotheses

The benefits assessment includes an assessment of the fit of rival hypotheses to the data. Although an individual judgement has been made for each benefit in each case, this judgement is easier in those cases where control for the rival hypothesis is available.

Table 8-3 and Table 8-4 show for each case the extent to which a comparable paper planning exercise is available to contrast with system-aided planning. This summarises the control available for the following rival hypotheses:

a) That a benefit is caused by the introduction of the marketing planning process, rather than by the system itself
b) That a benefit is caused by a switch from previous planning by an individual to group-based planning
c) That a benefit is caused by the presence and actions of a facilitator, rather than by the system
d) That a benefit is caused by the learning that has accompanied introduction of the system, such as courses offered to users.

Table 8-3: Controlling for rival hypotheses (1)

	Case 1	Case 2	Case 3	Case 4
System use Facilitation	Brief external, then internal	Extensive, external	No	Yes
Group planning	Yes	Yes	Yes	Yes
Learning support	None mentioned	Books	No	Facilitator attended course
Paper comparison When	Previous	Previous (2 exercises)	Previous	Parallel (different SBUs)
Facilitation	No	No	No	Yes
Group planning	Yes	(1): plan written by planner (2): partially	Yes	Yes
Forms-based planning process	Left after course	(1) No (2) Yes	Yes	Yes
Learning support	Course	(1) No (2) Course; books	Course; books	Facilitator an academic
Notes	Comparison with previous paper planning but limited data about it	Second previous exercise provided paper planning comparison. Lack of facilitator control	Good comparison with previous paper planning	Parallel comparison. Interviews held with strategists who drove both, but only with SBUs using system (with one exception)

Table 8-4: Controlling for rival hypotheses (2)

	Case 5	Case 6
System use Facilitation	Yes	Yes, initially
Group planning	Yes	Yes
Learning support	Champion read books	None mentioned
Paper comparison When	None in the SBU ('region') that used system: region became part of 'distributor' which had begun paper planning	None, except strategic plans written by MD
Facilitation	Yes (in 'distributor')	No
Group planning	Yes	No
Forms-based planning process	Yes	No
Learning support	Assistance from consultancy (who initially facilitated); courses	None mentioned
Notes	The region's experience with system not directly comparable to distributor's experience without it	Difficult to isolate effects of system from effects of collaborative planning and structured process

On some occasions, a direct comparison is available in which the relevant 'variable', e.g. facilitation, is similar in each case, and can thus be 'controlled for'. For example, in case 3, no facilitator was used either in the previous paper-based planning or in the system-aided planning. The previous planning was also based on a similar process to that incorporated in the system.

On other occasions, the variable is not controlled for so simply. Sometimes, a degree of control can be sought from variations within the system-aided planning exercise. For example, in case 2, when considering the hypothesised benefit relating to more efficient use of marketing tools, a comparison is available between the experience of using those tools which are supported by the system, and the experience in the same exercise of using other tools without support from EXMAR. Sometimes, however, difficulties in eliminating a rival hypothesis result in a neutral rating even if interviewees are confident that a benefit has been obtained.

8.1.4 Interviewee list

Table 8-5 lists the interviews carried out for the six cases presented in this chapter.

Table 8-5: Interviewee list for six cases analysed in detail

Code	Organisation	Interviewee title
Case 1	Glass manufacturer	
1.1		General manager of a sales division
1.2		Managing director
1.3		General manager of a sales division
1.4		HR director
1.5		Financial manager of a sales division
Case 2	Branded products importer/distributor	Note: also participant observation (20 days)
2.1		Managing director (various informal interviews)
2.2		Strategy manager
Case 3	Industrial & consumer products manufacturer	
3.1		General manager
3.2		Marketing manager
3.3		Marketing manager
3.4		Marketing manager (not involved in system use)
3.5		Sales manager
Case 4	IT products & services group	
4.1		Marketing director
4.2		Marketing director (2nd interview)
4.3		Product manager
4.4		Marketing manager
4.5		Product manager
4.6		Marketing manager
4.7		General manager
4.8		Managing director for software subsidiary
4.9		Marketing manager
4.10		Group strategy director, marketing planning manager
Case 5	Utility	
5.1		Marketing manager for region
5.2		Market research manager for region
5.3		Marketing planning manager for distributor
5.4		Marketing manager for distributor
5.5		Market research manager, head office
5.6		Marketing manager for region
5.7		Market research manager, head office (2nd interview)
Case 6	Engineering firm	
6.1		Managing director
6.2		Marketing director
6.3		Design director
6.4		Director of a business unit

8.2 Case 1: A glass manufacturer

8.2.1 Case description

Background

This large glass manufacturer is now South African owned. The company which the forms the subject of this case forms the marketing side of its building glass operation, providing distribution and retailing of glass to both industrial and consumer sectors.

The company enjoys a high market share, particularly of the distribution market, with somewhat less of the retail market. Historically, this was protected by import duties and restrictions, resulting in very high profitability. The large ROCE of the group was "almost an embarrassment". A few years ago, these barriers were broken, resulting in competition from imports, considerable price pressures, and much lower profitability - a natural result of re-entering a world market which has considerable over-production worldwide. The leading competitor has made substantial inroads into the company's market share. But as its share nevertheless remains high, much of the focus of the company is inevitably on protecting rather than increasing it. Even this is a significant marketing challenge.

Marketing planning

Historically, the company had a number of sales regions organised geographically. The managing director re-organised these into divisions with distinct styles and patterns of business: a division for country areas, another for towns, and a third for mirrors and related products. A fourth handled the distribution to the other divisions.

Previously, marketing had been co-ordinated by a central marketing department. As part of the process of empowering the divisional managers, marketing was made each division's responsibility, with each having its own marketing manager to assist the general manager. The general managers had a trading background and, in some cases, little formal marketing knowledge. The managing director organised marketing seminars for the senior managers to help to fill this gap.

He also modified the planning outputs required of divisional managers. He requested a greater strategic content in the one-year divisional plans, and his consolidated three-year plan described key thrusts in words to complement financial information - rather than years 2 and 3 simply forming extrapolations of year 1 as in the past.

Introduction of the system

It was within this context of a number of actions towards a greater marketing focus that the EXMAR system was introduced. The managing director and his human resource director, who held an MBA, tried the system on an experimental basis. They concluded that its structuring of the planning process would be of value to the new divisions, or SBUs. The managing director reported that the experimental use:

> "had the impact of saying it's got to be a worthwhile tool at the SBU level, for structuring their plans and giving them some format - whereas up until now it's been - informal may be the wrong word - but not formatted. That's what appealed to me, that there was a logic to it."

Each division then went through the marketing planning process with the system. Typically, the division's general manager, financial manager and marketing manager formed the planning team. In one case, a number of branch managers were also assembled to participate in a planning session. The HR director acted as a facilitator, after some initial training from the software supplier. This he found a natural role, as:

> "it's my job to develop the managers...to ensure that managers develop a set of tools they need to do their job effectively."

This first marketing planning exercise was only loosely tied to the annual business plan, and was carried out outside the annual planning cycle. The managing director intended to require the next year's business plans to incorporate EXMAR outputs, to ensure close integration between the marketing plan and the business plan.

Impacts of the system

Learning

The HR director had explicit educational reasons for acting as the system facilitator. What educational effect was the system having, in his view?

> "It's been a superb tool, to get people who have never been exposed to have some concept of marketing. EXMAR, to the extent that it's actually been an educational tool in this organisation, has contributed hugely...What EXMAR has done is it's highlighted to people that they now know what they don't know. It brings people to that phase when they become acutely and consciously incompetent. But then it supports them through that phase. And that to me is change...The propensity is to go out there, muddle through, do it. That mostly means cut the price and then see what happens."

This perceived learning effect was illustrated by a general manager who described how he now thought differently.

> "It's changed me in terms of specialising in markets, understanding that they are different. Before, if I got a call, whether it's an insurance company or a shop didn't make a difference, either to me or my managers. So it's creating awareness - the insurance market is totally different to the man in the street, not only on pricing and billing and return and size, also the way you approach it."

The learning was not, however, unimpaired. One danger at early stages seemed to be the unthinking application of the process embodied by the system. Users needed to develop over time a mature sense of the role of each marketing technique incorporated in the software, in the HR director's view:

> "I have found from time to time that the DPM induces what I call box thinking. I have found that I need to continually caution against it. They get very simplistic because it's in a box...We will only discover what the true benefit of it is once we've done another two rounds of EXMAR. I found myself to be very mechanistic initially."

Efficiency benefits

Most users had not developed marketing plans previously, so had little basis for assessing whether the system saved time. But one financial manager had been involved in a previous marketing planning exercise about four years before. After using EXMAR, he reflected:

> "In terms of doing it on paper, you could do it, but it would take about 4 or 5 times the amount of time. At the end of the day we got similar answers, but it would have been a lot more easy and logical to use EXMAR. It's the discipline of checking everything. Also you can go back and change and play what-if's if you want to. And that helps, and saves time. Because we were

meeting in a team environment and coming from all parts of the country. So it took a long time. Now with EXMAR it would have been a lot quicker."

The HR director reported a particular efficiency benefit for the facilitator:

"Certainly EXMAR has given me a lot of leverage over getting the job done. I'm not particularly fond of having transcribed these things pasted all over the walls. EXMAR certainly has lightened the load for me in that sense, as it's normally the facilitator who has to get the stuff on the walls into something readable."

Data requirements and information systems

Several managers reported that the system had clarified what data needed to be collected. For example, a general manager cited one market which was focused on as important, but where the market size was not known.

"It's easy to put that we're going to grow this market size by 35%. If the research comes out and we've already got 90%, then it's not right. It made us more aware that we needed it."

This incidentally contrasts with some of the other cases (such as case 2) where a low market share made market size seem less relevant. Assessing competitors' strengths and weaknesses in each market was another respect in which data requirements were believed to have been clarified.

Perhaps the most significant perceived impact on data requirements, though, was in terms of the definition of product-markets themselves. The company's operational database was restructured to aggregate information by the product-markets that had been chosen as the units of analysis in the system. One manager related:

"EXMAR made very clear to us the need to restructure our database. We're doing it as a direct result of our work with EXMAR. Whereas our information system has always been accounting driven, by sitting down with the EXMAR model, it highlighted what we don't know."

The managing director explained further:

"The very big influence it has had is on how we structure the database...We have said, how can we logically divide our customer base into however many - 4 or 6 or whatever it is? And divided that from the perspective of marketing. So the man on the street is going to have a very different marketing approach and plan to insurance companies to institutions...That's been a huge advantage of the process, is trying to bring our customer base down into some reasonable compartments which we could effectively market."

A disciplined approach to group planning

The managing director had introduced the system because of its structured approach to planning. This structure seemed to be appreciated by his managers, a general manager for example saying:

"What EXMAR did was it made us do certain things. That was a discipline in itself. So for every product-for-market you had to do certain things. If you talk to anyone in the business, they will talk about the price of 3mm glass and the glazing rate. Now, if any glass business is going to survive on that, they will fold within the first three months of operation. Going through the EXMAR thing forced you to look at other factors in the business."

Some managers reported that this structured approach helped to coordinate the planning session when several people were involved. Could this have been done on paper just as well?

> "No, I don't think so. We've done it in the past and it's easy to dream up stuff. Whereas this process pulls out all those nitty-grittys - it does get you to pull out the pros and cons and are you sure about this. It does get the individuals to agree and disagree and that type of thing. So going through it was good. It forces you to go step by step."

The facilitator did not think that the structure was excessively restrictive:

> " I enjoy the structure of the process. It allows people to get on with the creativity of whatever they want to conjure up, but at the end of the day there's a constructive output. And of course because it's on the machine you can go and play what-if."

Factors for success

Avoiding manipulation

What had the company learned about how to apply the system effectively? The first area, which was discussed by four of the interviewees, concerned the need to be honest with the system, and to avoid manipulating it to achieve the desired result where this did not reflect reality.

> "A lot of it was very subjective. It requires a tremendous amount of honesty. We found that you got to know your strongest competitor quite intimately. If you were kidding yourself that he was always weaker than you, then why was he in business?"

Did the managers have any problems keeping up this "tremendous amount of honesty"? One said no:

> "No, we went into it, and we said, look, we've got to be honest about it. The first time we went through it, we said that's too good to be true, so we went back and revisited the CSFs and said let's be a little bit more realistic."

Another, though, was asked if people had manipulated the system.

> "Yes, I'm sure of that, but I shan't tell you who. Either to finish it, or I don't know what would be the motive. Everybody goes to the end result and comes back again and revisits and retunes some of those other numbers so that the end result looks a bit better. But maybe what has come out of there first time is maybe the most important thing, because that says what the real problem is."

It is not immediately apparent what designers of computer systems can do to avoid such "manipulation", to which paper-based planning is presumably equally exposed - unless subjective analyses were entirely removed from the system. A degree of assistance could be offered, though, by such means as checking that a high score on critical success factors corresponds to a high market share, and questioning the user otherwise. The HR director summed up this issue philosophically:

> "You know when you're manipulating it. It's a question of how honest you want to be with yourself. One can view it as the ease of manipulation, or as the flexibility of modelling. What's the difference? I like the flexibility of modelling. It does require some mature insight, if you like."

The user interface and facilitation

The managers felt that the EXMAR version they used was not as easy to use as it could have been. This particularly applied when they were first exposed to the system: "It seemed very cumbersome when we first started using it." Once some experience had been accumulated, "lights started to come on in my mind, and it started to become fun". Partly, this complexity was inherent in the marketing planning process supported: concepts such as the distinction between forecasts, objectives and strategies needed to be learned. But it was clear that the user interface presented some unnecessary barriers, such as the ease with which windows were opened and closed. Support for Microsoft

Windows was requested to gain the benefits of standardising the look and feel with other systems, as well as enabling the system to interface to standard word processors. A clear lesson seemed evident about the importance of simplicity in user interface design, particularly to avoid putting off the first-time user.

As with many of the cases, the learning curve for both the system and the process was shortened by use of a facilitator, in this case the HR director, as we have seen. He was a typical candidate for this facilitation role, being by his own admission an early adopter: "I like using technology - it's just a personal thing". He was also well acquainted with the marketing theory underlying the system. He reflected on other qualities required of a facilitator. A difficult but important lesson was:

> "In making sure that you're fulfilling the facilitating role and no more. Because of your position in the organisation you want to get involved in the content. But what I enjoy in facilitation is when the lights start coming on by themselves, rather than being pushed on by me as the facilitator. Then the guy goes off, he owns it."

Embedding the system in planning processes

In this first year of using the system, the marketing plans developed were not closely synchronised with the company's annual budgeting process. This meant that although the system could assist with working out how to achieve revenue objectives, there was no formal mechanism for changing those objectives up or down in the light of the marketing planning process - these changes would have to await the next year's budgeting activity. This was obviously far from ideal:

> "Where we did have a major problem was we had the whole thing back to front. We had done our budgets, and we were committed to it, that that was part one of the three year plan. So that was already cast in concrete, in terms of total revenue and in terms of total revenue by product. It was a question of working it out from there... We realised we had the wrong sequence of events, and we said that first we must formulate our plan, and then stick our budgets through that."

The managing director accordingly intended to use the system as an integral part of the budgeting process that was shortly to begin. As well as addressing the issue of timing, he was also looking for ways to tie the system's logic more closely to the requirements of the business plan. If an intervention was made in a product-market, such as advertising, he wished to be able to simultaneously look at revenue impacts and profit impacts. The former were handled by the system, but the latter were not.

> "It may mean that one doesn't design this into EXMAR, but at least one allows that to come at the end of EXMAR, so you don't say, OK, we did that in EXMAR, how the hell do we translate that into the business plan?"

The company, then, had yet to work out in detail how best to coordinate marketing planning with one-year business planning, but recognised that this needed to be done.

Was the organisation also moving towards the concept of the continuously-updated marketing model, from which annual snapshots formed the marketing plan? There were as yet little signs that this was an objective. Establishing an effective pattern of annual use was the priority, although the potential benefits of regular updating were recognised:

> "If you want to know if I would use EXMAR again, yes, I'm damn sure. If we had time to update every three months and just fine-tune it that would be ideal, because it does require a fair amount of time."

8.2.2 Benefits

First we show propositions on system benefits generated from the case in Table 8-6. We then discuss the extent to which the case provides support for these benefits in Table 8-7. A key to the rating is shown in Table 8-1.

Table 8-6: Case 1 benefits generated

Improve support for planning process	The system can provide a consistent, logical process to follow, of particular value to users inexperienced in marketing planning. Navigation facilities, status feedback and online help can result in better process support than equivalent paper-based systems.
Aid use of marketing tools through calculations, graphical display, guidance on use	Marketing tools can be more easily used with appropriate system support, due to calculations, graphical display and guidance on their application. Hence in limited time, tools are more likely to be used. This can update the users' intuition on their markets and their place within them.
Aid identification of data requirements	A system can assist with identification of critical data requirements. This can help target market research and specify marketing information systems, and clarify assumptions where data is absent.
Save time compared with equivalent paper planning	A time investment in learning the system is needed, unless a facilitator is used. Once this has been made, systems can save time compared with equivalent paper planning, due particularly to calculations and graphical display.
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	DSS support for fast iteration facilitates collaborative workshops. Incorporation of a planning process provides a readily agreed agenda. These can result in better focused discussions, better mutual understanding and greater consensus about the strategies that emerge. The system can depersonalise disagreements, leading to more equal participation.
Aid individual and group learning about marketing planning	Through planning with the system, users learn to apply the process and techniques it includes, knowledge they can apply in future planning, whether DSS-aided or not.

Table 8-7: Case 1 support for benefits

Benefit	**Rating**	**Notes, illustrative quotations**
Improve support for the planning process	++	"It certainly takes you through a structured route looking at where you're going". Relative to previous paper exercise, "We've done it in the past and it's easy to dream up stuff...It forces you to go step by step".
Aid use of marketing tools through calculations, graphical display, guidance on use	+	"What excited me was that we could see where we were going and where we would come unstuck - in terms of gap analysis and things like that...also doing the SWOTs was very good..what came up was that the [firm's] name was a strength. We actually checked it out afterwards". Insufficient corroboration for ++
Aid identification of data requirements	+	Database restructured as a result of system. "To that extent it's a huge contribution that's going to come out, reshaping our data". But the system is giving this strongly perceived benefit simply by prompting for data: it seems feasible that a paper-based planning system may have the same effect, hence only one +. Provides mechanism for documention of assumptions: "if you said something about our competitor, all of us had to be on side with that. We had to be constant throughout the whole thing with that assumption."

Save time	+	Positive comparison drawn with previous exercise: "discipline of checking everything" and ease of what-if's cited as reasons. Facilitator found system had "lightened the load". The presence of a facilitator avoided learning curve for most, but one using it on his own reported: "when you start by yourself and you have to go through alone, then you battle." The "sheer workload that's required to feed information in" expected to be reduced with restructured database
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	++	"It took you through quite a lot of deliberations with your counterparts", which he didn't think had been done as well on paper. "It does get the individuals to agree and disagree and that type of thing." Useful for explaining strategy to branch managers - "it gave them an idea of what we were trying to do". Also involving branch managers
Aid individual and group learning about marketing planning	+	"My background is more in accounting...It certainly was a good introduction to get into the marketing side" "...it's changed me in terms of specialising in markets, understanding that they are different" "..it's been a superb tool, to get people who have never been exposed to have some concept of marketing". But for an MBA, "it's taught me nothing"

Key: see Table 8-1 on p167

8.2.3 Success factors

First we show propositions on system benefits generated from the case in Table 8-8. We then discuss the extent to which the case provides support for these benefits in Table 8-9. A key to the rating is shown in Table 8-2.

Table 8-8: Case 1 success factors generated

Presence of a system champion and sponsor	Two important roles are a champion to drive the process of system introduction, and a senior level sponsor to provide a supportive environment.
Adequate training	Training is needed both in how to use the system, and in how to apply underlying concepts. Facilitation may partially substitute for training.
Adequate facilitation	A facilitator can complement the system in tasks such as market segmentation, and can help to manage time and enhance the learning process for inexperienced users. Good facilitators are knowledgeable about marketing theory and cautious with advice.
Coordination of system use with planning cycle	Use outside the organisation's formal planning processes may restrict the extent to which the strategy is influenced by the planning exercise.
Flexibility in planning processes	Procedures, whether on paper or incorporated in a system, should be followed flexibly to avoid hampering creativity. For example, inexperienced users can exhibit a "new convert effect", assuming that the marketing technique they have just learned about on the system is the answer to all problems, and interpreting it dogmatically. Given that a single model is a simplifying perspective on reality, other perspectives may be needed to gain a balanced picture. Users may at first be mechanistic.
Garbage in, garbage out: avoiding manipulation	The system's outputs are determined by the user's inputs. Until this is recognised, users may doubt the tool, and those in receipt of outputs may be subject to manipulation for political reasons.
Ease of use	Ease of use, and particularly, ease of learning, help to motivate users, and to reduce the difficulties when staff and roles change

Table 8-9: Case 1 support for success factors

Success factor	Presence/ influence	Notes, illustrative quotations
Presence of a system champion and sponsor	***/+	The managing director's sponsorship of system helped ensure the system was tried. "The wonderful thing is that when the boss thinks it's a good idea, things start happening all by themselves. That's why it's working as well as it has." HR director acted as champion & facilitator
Adequate training	*/+	One reason why system not used at first: user "never got together with [x] to learn system". Subsequently, inadequate training did not help commitment. Half day training more of a demonstration: "..really recapping on the whole program. That I found may not have been enough...So when you start by yourself and you have to go through alone, then you battle". When facilitator available, though, training not necessary.
Adequate facilitation	***/+	Facilitator avoided need for others to learn system. Probably also helped with process
Coordination of system use with planning cycle	**/+	Use after marketing objectives had been set restricted the utility of the exercise in some ways
Flexibility in planning processes	**/+	The internal facilitator did not think the system necessarily inhibited creativity: "It allows people to get on with the creativity of whatever they want to conjure up, but at the end of the day there's a constructive output". But mechanistic thinking was a danger: "I have found from time to time that the DPM induces what I call box thinking. I have found that I need to continually caution against it. They get very simplistic because it's in a box." The tendency to be mechanistic applied to himself as well: "I found myself to be very mechanistic initially. I have had the advantage of going through four plans, perhaps five, which they haven't had."
Garbage in, garbage out: avoiding manipulation	**/+	Subjects felt strongly that manipulation needed to be avoided. According to one, it hadn't always been: "I'm sure of that, but I shan't tell you who. Either to finish it, or I don't know what would be the motive."
Ease of use	**/++	"Could be more user-friendly, I believe. Going straight into it without it being user-friendly, you lose momentum." "It seemed very cumbersome when we first started using it" In one SBU, work had halted when person who pressed buttons left. Word-processing facilities not used: "I have tried to read those manuals but they're far too complex. It made me suffer from indigestion just looking at the index"

Key: see Table 8-2 on p167

8.3 Case 2: An importer and distributor

8.3.1 Case description

Company background

This company is a medium-sized importer and distributor of branded products to industrial and consumer markets. Owned by a large conglomerate, it has been regarded over the last few years as a successful though relatively small 'cash cow' for the group.

The company is the sole distributor in South Africa of a well-known brand with a good reputation. However, high import tariffs, in combination with low local manufacturing costs, result in a significant price premium over the locally produced alternatives which dominate the market. This provides a natural limit to the market share which can be achieved, and the company is inevitably a niche player. This is reinforced by import permit restrictions that further protect the local manufacturers.

Nevertheless, until recently, the company enjoyed a number of years in which it could sell all it brought in. A well-trained sales force with an emphasis on technical competence and customer service found industrial customers who valued the personal service and high quality, while the product's technical superiority ensured a niche at the top end of the consumer market. The managing director, with a background in engineering, personnel and military intelligence, built up impressive logistics and sales support that could cope with the increased demand with plenty to spare, while the main challenge was often fine-tuning the inventory to make best use of the import permits.

More recently, though, supporting the brand's price premium has become harder. The locally manufactured alternatives have been catching up technically, and their greater advertising muscle has ensured that this has been more than reflected in consumer perceptions. The competitors have not neglected the importance of the dealer channel, buying into the distribution network and offering financial incentives to ensure dealer push as well as consumer pull. At the same time, the competition among importers has increased, both from Europe and the Far East.

As well as these pressures on market share, market size decreased in the recession leading up to the 1994 elections. Aggressive discounting followed from the local manufacturers to protect their volumes. While the company tried to stay out of this price war, it was inevitably drawn in to some extent.

The company, then, faced a number of threats. These were complemented by opportunities from the new political situation. In particular, the prospect of reduced or abolished import permit limits, and reduced import tariffs, looked likely as South Africa increased its links with the world economy.

Marketing within the company

The managing director was not sure what conclusions to reach from this changing and uncertain situation: "We knew that things were not right, we had this uncomfortable feeling". He did suspect, though, that the future would not be an extrapolation of the past, and that a rethink of the company's strategy was necessary. Although intuitively customer-focused, he began to turn for the first time to marketing theory to help him think through the implications of the market changes, reading widely about marketing strategy and planning.

One realisation was that there were gaps in the marketing intelligence available. The company had long had a philosophy of staying close to its customers, so the intuitive feel for customer requirements in the industrial sector was good. In the consumer sector, information was more indirect, as the sales force had contact primarily with the dealers. There was perceived to be a need to find out more about consumer buying factors and brand perceptions. There was also a shortage of more structured information such as market sizes and competitors' market shares.

The managing director therefore appointed one of his sales managers to a marketing role and asked him to develop a marketing plan. Information was collected on a wide array of topics, such as economic forecasts for the relevant countries and overall sales in the relevant product categories. The result was "hordes of information, but it wasn't an actionable proposition". The exercise had suffered from lack of a clear process to follow, and the absence of buy-in to the plan from the management team.

The managing director realised that his brief to his newly appointed marketing manager was inadequate. Changing tack, he decided to conduct the first marketing planning exercise himself, to learn what needed to be done. He intended then to delegate plans for future years. He delegated all he could to his operations director to provide the considerable amount of time he felt would be needed.

History of system

At this point he obtained the EXMAR prototype. His first step was to bring in a facilitator to conduct a two-day marketing planning workshop, with the dual purpose of training in the system and initiating the marketing planning exercise. During the two days, the senior management team began to sketch out a plan for the key consumer market.

The exercise was promising, providing a format for the executives to pool their ideas on strategy, rather than delegating one person to "write a plan" as had happened previously. But it showed clearly that the management team had no idea how to segment the consumer market, which formed a large proportion of the company's revenue. As they were clearly a niche player, it was apparent that an undifferentiated view of the market was not adequate.

The managing director had a sense that a solution was both important and urgent. Within two weeks, he had commissioned two parallel market research studies to produce a market segmentation. He also booked 20 days of further facilitation, provided by the author, to follow the plan through, to coincide with receipt of the market research results.

One of the studies produced an unconvincing segmentation. The other, however, resulted in four segments that both matched and went beyond the intuition of the management team. The segments varied substantially on wealth and price sensitivity, buying criteria and the company's market share.

These were used as the "units of analysis" in the plan for the consumer market, while the buying criteria and brand perceptions from the market research formed important data inputs. Segments for the industrial markets were readily defined without the need for market research. The facilitated planning exercise was spread over several months, allowing time for the company to collect information between visits of the facilitator.

Impact of the system

Focusing on critical information

When the system was first used, the company was already awash with information. Its well-established operational systems provided a wealth of detail on sales of individual products, and the more recent marketing activities had collected a detailed picture of the industry as a whole and the competitive position of each player.

What was found to be missing, in the author's view as facilitator, was information organised according to the critical middle layer of market segments. The detailed product information, although invaluable for month-by-month sales and inventory management, was too voluminous for strategic analysis, and could not be compared against competitors as directly equivalent products did not always exist. On the other hand, the overall industry data was too undifferentiated to form a basis for strategy definition for a minor player operating in particular niches.

The system's starting-point was definition of market segments as the units against which information was entered on segment size and share, critical success factors and so on. As we have seen, the prompting for this information seemed to encourage market research to fill this gap in the consumer market. The system then served as the repository of information at this middle layer of detail, forming a concise database of key information that could be drawn upon for strategic decisions. This seemed both to help the company to avoid the information overload on which the previous marketing efforts had been foundering, and to focus the managers' attention on obtaining important information that was missing. The managing director reported that since use of the system started,

> "we've focused on the essentials. We haven't worried by saying allright chaps, let's have a look at your marketing audit. Show us your figures. Because we haven't got three quarters of them."

On the other hand, "If you are a company that has a lot of data, you need a good handle on a few things" such as size and growth by segment, and critical success factors. This information could not be ignored, in the managing director's view:

> "There's a danger that you become complacent and focus on social interaction, whereas in the beginning you focus on finding information."

Marketing tools: the updating of intuition

The support for various marketing tools in the system had a number of perceived impacts, that can be summarised as updating the executives' intuition on the company's markets and their place within them. We will discuss some of these impacts.

Coordinating intelligence: segmentation and critical success factors

The critical success factor (CSF) analysis provided a means of consolidating the employees' perceptions of the product's strengths and weaknesses in each market segment. The managing director reflected:

> "I think you have to look at EXMAR in terms of what does it do for us? It's just a formal discipline that has asked us to think about ostensibly the same market as different markets. We've forced our people to segment a bit...What's clear is that there are in fact different CSFs for those different users. For us it was a case of go and do a good service, get the product at the right time, get the right price, and we did. But as times get harder, we need to do other things better."

This provided an valued baseline for strategy definition in each segment. For example, brainstorming led to a number of specific actions to improve two low CSF scores in a highly attractive segment.

Impact on creativity: opportunities and threats

The formal analyses incorporated seemed to lead to fresh insights about possibilities overlooked and threats ignored. Reporting on a group planning session, the managing director said:

> "They've fallen on two or three good ideas this morning...You think of things in terms of your job, and you just do it, because you know it. But if you're asked to say well give us a breakdown, how much share have we got, what potential is there, people have to start to think about things. The things you take for granted - things that get overlooked because they're commonplace - and you overlook possibilities. And that's what's happened. They hadn't thought about the potential and possibility in certain markets. We might have had an idea a year ago and said let's try something, and maybe the first attempt wasn't successful."

Similarly, threats were clarified. In one segment, this was through a realisation that the company's market share was close to 50%: retaliatory action from the local manufacturers was thought to be inevitable. In another case, this was through graphical display of CSF scores:

> "You've got to take the finished product, CSFs and weights, and say well there it is, does that fairly represent where we are? Having debated it, it's in black and white, it's all in picture form, it may bring up different points. They may say we don't agree with the weightings any more, or we don't agree with the scoring. When you throw it up at them, and say is that really so, it does two things. One, and this has been the most valuable contribution of this exercise, we have been extremely foolish in ignoring the silent threat from the revitalised [X] company in this country. Now maybe in the scoring the guys have overcompensated, but where we might have ignored it, and they have perhaps overemphasised it, the reality is it's still there, and we shouldn't ignore it. And that's the advantage of looking at the figures in black and white. That's where these charts are good, because you can see it, you've got these nice little bar charts. But it's certainly sharpened a lot of our thoughts and a lot of ideas."

Where to put effort in: market attractiveness

The market attractiveness analysis resulted in a number of modifications to the previous perception of which market segments were the most attractive, and hence where the company's efforts should be focused. In one market, for example, past sales had primarily been to a technically-minded segment where customers were most likely to be aware of the product's technical strengths. It transpired, however, that another segment where few customers were currently buying the product seemed an equally good target, demanding high quality but not generally appreciating the differential advantages of the company's products. A strategy was devised to address this segment through advertising and sales literature, while not ignoring the existing customer base.

In other cases, the strategies resulting from consideration of market attractiveness were internal, to do with the way in which the company was organised. The common thread was a clearer view of where effort was to be focused. The managing director reported after one planning session:

> "You've got no idea, we're off on a completely new company structure. That's what we've spent half the day on. In terms of who works where, how do we focus the people. [A sales manager] is all for cutting the company up into two. I'm not saying we're going to do it. What I'm saying is, this has stimulated a focus on what effort we are putting in for the return we're getting out. There are many reasons why we can't do it, but that's not important. We are going to change the company structure as a result of this. Not much, but some."

Manual versus automated use of tools

The marketing tools we have discussed can also be used without computers. What difference, then, does the computer make? The managing director felt that it makes their use more practical, as well as providing valuable discipline:

> "It's nothing to do with the system. You could do all these things manually, we know that. But because it's there, and it's reacting quickly to the information that's fed in, it makes it easier to do. Imagine if you had to do this manually, it would be such a pain in the backside. Whereas the fact that all the calculation is done for you, it takes away the excuse - oh, hell, we have made this error, we will have to redo all this again. You just key in the number. That, I think, is the benefit. It's a good servant. It's rather like a family butler, that wouldn't allow you to go out at night without being properly dressed. The system if you use it properly doesn't allow you to make shortcuts."

Learning impacts

The system was felt to have changed the way in which executives thought about their business, even when they were not using it. One observer said that

> "the benefit is in understanding the market, but more in getting people around here to *think in terms* of understanding the market." (Emphasis added by author.)

The managing director commented:

> "The problem with all the marketing theory is everyone's studied it...Everyone knows the Boston matrix - there's no problem with that. But as it has come out of the book, people don't understand it. You need guidance to take you through it."

As well as a cognitive impact, the system was perceived to have an emotional impact on the enthusiasm for planning activities.

> "[The staff] who have been exposed to the process of EXMAR have got quite excited by the results. It's focused their thoughts. The singular great thing is by keying in a few numbers, they are able to see how they relate to their competitors. It's funny, they really don't have an objective view of how they stack up against their competitors. EXMAR is giving them a number and this is something that they can relate to. Their enthusiasm has gone up enormously. This is the big thing to be able to print out, and say, look, we've put it down on paper. That's very motivational."

External communication

As well as forming a communication tool within the company, the system was used for communication of marketing strategy externally. The company's shareholders were presented with a summary of the plans developed on the system. This was said to have been well received: the summary

> "was the most significant document they had seen in terms of marketing planning - that was the comment from the chairman."

The advertising agency were also briefed using the system's outputs, and presented their proposals using the same market segmentation and critical success factor analysis to derive advertising objectives.

Success factors

The system-aided planning exercise, then, was regarded as successful. It had not, however, been pain-free: the managing director thought he had "learned the hard way". To some extent this was perhaps inevitable:

> "You can't do it in three months. The biggest risk you have is that people think they can do it in limited time."

Time was needed to collect information and to involve executives in the planning process. But what other lessons had been learned that would help others?

"A degree of calculated imprecision"

An important step was the realisation that not all numbers entered into the system needed to be exact in order to proceed with planning. Much time was spent in the early days looking for market size information that did not ultimately seem critical, given the company's situation. The managing director reflected:

> "Given that you've got an adequate market size-wise, what is going to determine success or failure? Market size has nothing to do with it. If your capability is selling thousands, whether it's hundreds of thousands or millions makes no difference to you. At the end of the day the thing that's important is your ability to deliver to the satisfaction of consumers in the marketplace the real CSFs. What's more important in terms of this exercise is that you are asked to think about market size. Exactly your graphs again. And before you rush off and get excited spending a lot of time and effort on something, you are doing the obvious and checking you have got a market to sell into."

Interestingly, the computer seemed to some extent responsible for the initial assumption that "three decimal places" were necessary:

> "The one drawback of having it on a computer is because it's on a computer people expect to key in exactness - mathematical exactitude - whereas in fact it's not about that at all. What's more important is the amount of thought that you put into defining your CSFs or MAFs correctly, your products and your market segmentation, that's the most difficult thing."

Perhaps systems could help to warn users against this pitfall with appropriate advice on-line.

Market segmentation

The company made important judgements on the appropriate basis for segmentation and the level of detail to which it should be carried out. The company settled on two levels of planning. At level 1, the consumer market represented one unit of analysis, along with the various industrial markets. At level 2, each level 1 market was broken down into segments. As we have seen, it had rapidly become clear that the consumer market needed to be segmented, but the right level of segmentation and basis for segmentation took some iteration. The planning team considered various breakdowns including the type of dealer, the type of equipment in which the product was incorporated, and the price band, before settling on a segmentation based on buying style and purchase influences, derived from one of the commissioned market research studies. A third level of planning was also begun but rejected as too detailed to be workable.

These judgements, and decisions about the order in which planning was to proceed, seemed critical to the usefulness of the planning exercise. The level 2 segments proved the most illuminating, providing insights into the company's positioning and how it could be improved. This analysis necessitated some modifications to the level 1 plan which had been developed first, and which initially had simply modelled the current intentions of the directors. Although the segment definition was developed top down, then, planning in practice proceeded as a combination of top down and bottom up approaches.

The system itself provided little help with these judgements, beyond incorporating textbook theory on segmentation in the on-line help system. This theory, while found useful, certainly did not guarantee success in this intuitive area. The facilitator's presence was perhaps more important, though even this did not enable a satisfactory segmentation without some iteration.

For the managing director, segmentation was an area where more assistance would be welcome, whether from textbooks or from software.

> "I have to say that it's the only thing that I have really grappled with. It is a problem, and it's something I got more and more frustrated with. A rank amateur could go horribly wrong. None of it seemed right, and what's more important, none of it was measurable. One feels stupid because it ought to be obvious who you're selling to."

System transparency

An important learning step for the planning team was the realisation that the system was under their control, not some black box that would disempower them and tell them what to do.

> "The system becomes less threatening to the lay user or receiver of information from the system. They have input into CSFs, they have input into MAFs. But it's something that goes into a computer. When a DPM comes out there's almost an aura of mystique about it. When people sit down and you involve them afterwards, and...somebody says we should do this, and you say that's a good idea, let's put it into the system, the system lands up being subservient to their thought processes. It's not a box up there to worship...You are humanising a very dehumanised process, by involving people, and lets them see that the machine is working for them, and not them for the machine."

The importance of overcoming these fears of losing control suggests that the design decision to make all calculations visible and transparent was a correct one - and that the user interface design could go further in ensuring the maximum transparency of what the system is doing. This also emphasises the importance of wide involvement in the planning process to ensure comprehension of and commitment to the results.

8.3.2 Benefits

First we show propositions regarding system benefits generated from the case, or modified from those generated in case 1, in Table 8-10. Underlining indicates changes from the case 1 proposition descriptions. We then discuss the extent to which the case provides support for all the benefit propositions generated to date, in Table 8-11. A similar structure is followed in the cases 3 to 6.

Table 8-10: Case 2 benefits generated/modified

Aid use of marketing tools through calculations, graphical display, guidance on use	Marketing tools can be more easily used with appropriate system support, due to calculations and graphical display, re-use of data between techniques, and guidance on their application. Hence in limited time, tools are more likely to be used. This can update the users' intuition on their markets and their place within them.
Aid identification of data requirements, improving accuracy & availability	A system can assist with identification of critical data requirements. This can help target market research and specify marketing information systems, and clarify assumptions where data is absent. In time this can lead to better availability of accurate data.
Increase marketing planning confidence and enthusiasm	For many managers, the learning effect of the system adds to their confidence in their marketing planning skills, and their enthusiasm for marketing strategy activities.

Table 8-11: Case 2 support for benefits

Benefit	**Rat-ing**	**Notes, illustrative quotations**
Improve support for the planning process	++	MD cited process support: "It's just a formal discipline that has asked us to think about ostensibly the same market as different markets...It has said, well, think about this." A previous attempt to plan using books seemed unfocused by comparison, collecting a large amount of information without a clear process. The system had a useful disciplinary role, if not of compulsion, then at least of strong encouragement, due to its process guidance, status feedback and the dependencies between techniques, which forces (for example) market size and share figures to be entered before a DPM analysis: "The system if you use it properly doesn't allow you to make shortcuts".
Aid use of marketing tools through calculations, graphical display, guidance on use	++	"Imagine if you had to do this manually, it would be such a pain in the backside." Calculation, graphical display, ease of iteration and guidance cited. Some comparison available with previous paper exercise. Also, planning exercise included some tools which weren't in the system: these took much time for re-keying data into a spreadsheet package and setting it up to perform calculations and draw graphics, demonstrating the system's advantage of re-using data automatically between techniques.
Aid identification of data requirements, improving accuracy and availability	+	Since use of system started, "we've focused on the essentials". Certainly, for example, market research was commissioned as a result of the first system-aided planning exercise. But the causal mechanism seems to be simply the prompting for certain data on certain screens - it seems plausible a paper manual embodying an identical process, with a facilitator, might have had the same effect.
Save time compared with equivalent paper planning	+	See marketing tools above. The result was probably more analysis rather than less time on planning - certainly, the latter wasn't cited by managers.

Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	NA	Most information was collected from managers on paper forms or flip charts, and then entered into the system by the facilitator, sometimes with the MD, and analyses printed out. So unlike many other cases, much group planning was offline rather than online. When the researcher left the company, work was just starting on translating the analysis into objectives and strategies, the stage at which iteration is perhaps most at a premium. Although the process, then, appeared to have some group benefits, these could not be ascribed to the system in this case. One factor may have been the lack of an LCD panel to display onto an OHP screen.
Aid individual and group learning about marketing planning	+	Theory not properly understood until system used: "Everyone knows the Boston matrix" but "as it has come out of the book, people don't understand it.. You need guidance to take you through it". System combined learning by doing with reducing the learning required through automation of tasks (eg calculation of logarithmic axes and circle position on the DPM). However, the MD had done some background reading, which he regarded as essential: "if you don't understand this theory, and where it's coming from, there's no way you can take these things and slap them down in front of a group of non-marketeers...That's a pretty picture, so what?"
Increase marketing planning confidence and enthusiasm	+	While the process captured beliefs about the workings of the markets, its feedback to participants in system outputs seemed motivational: "[The staff] who have been exposed to the process of EXMAR have got quite excited by the results...Their enthusiasm has gone up enormously...This is the big thing to be able to print out, and say, we've put it [your views] down on paper. That's very motivational." This suggests that one mechanism is simply the smartness of the output.

Key: see Table 8-1 on p167

8.3.3 Success factors

First we show propositions generated from the case, or modified from those generated in case 1, in Table 8-12. Underlining indicates changes from the case 1 proposition descriptions. We then discuss the extent to which the case provides support for all the success factor propositions generated to date, in Table 8-13.

Table 8-12: Case 2 success factors generated/modified

Coordination of system use with planning cycle	Where formal planning processes are strong, system use outside them may restrict the extent to which the strategy is influenced by the planning exercise.
Sufficiently wide team definition	The planning team needs to be sufficiently wide to incorporate the perspectives of those with relevant market experience.
System perceived as empowering not controlling	A system that is seen as empowering will gain better-quality results than one which is seen as controlling.
A degree of calculated imprecision	Although good-quality inputs are important, obtaining exact information may be a time-consuming diversion.

Table 8-13: Case 2 support for success factors

Success factor	Presence/ influence	Notes, illustrative quotations
Presence of a system champion and sponsor	***/+	Managing director acted as both sponsor and champion, driving the system-aided planning himself. A gap in planning activity when he became closely involved in another issue suggests a potential disadvantage of the champion and sponsor roles being combined: he then appointed a strategy executive to take on system champion role, but it is not known how this worked out.
System perceived as empowering not controlling	***/+	A feeling that "the machine is working for them, not them for the machine" arose from the experience of seeing ideas put into the system and reflected in the outputs. Thus "the system lands up being subservient to their thought processes". A transparent system design seems to contribute to this. Also reinforces the importance of sufficiently wide team definition. No corroboration from users other than MD, hence single +.
Sufficiently wide team definition	**/+	The 'level 1' planning, at a higher level of aggregation, was perceived to be less useful by MD than the 'level 2' planning. One reason he cited was that at level 2, he more frequently "grabbed people on the fly for an hour or two", gaining input from sales managers on the marketplace, and from fellow directors on relative market attractiveness. Another factor may have been that the units of analysis at level 2 were less well explored in previous planning, yielding more fresh insights.
Adequate training	***/+	Directors trained initially by distributor. Although work on system then ceased until researcher arrived, this can be explained by the wait for market research data & the anticipated arrival of researcher. No indication that training was inadequate for these highly computer-literate users.
Adequate facilitation	**/++	"I have to say that a lot of what we've achieved is because of the continuous process of ourselves thinking it through with you sitting in the background, so to speak." Facilitation concentrated on process with few interjections on content. Definition of CSFs and MAFs were areas where the system was misunderstood until facilitator intervened: "I don't think EXMAR is user friendly in the sense that you can come in and you can fly immediately." Facilitator initially went along with search for exact information, thought later to be misplaced: "The single thing that's changed for me is that in the beginning we were looking for exactitude...What has changed on visit 2 is that we've said let's chuck them up, let's have a look."
Coordination of system use with planning cycle	**/o	System used outside formal planning, but results presented to 'shareholder' (manager representing parent organisation), and influenced plans when produced (eg marketing plan May 1993 influenced by first system use). Formal planning processes don't appear to be a strong determinant of strategy. With modified factor wording, this data doesn't contradict it.
Flexibility in planning processes	***/o	No evidence noted of excessively inflexible procedures, or of dogmatic interpretation of marketing techniques.

Garbage in, garbage out: avoiding manipulation	***/o	No examples observed of either manipulation for political reasons, or fear of it. The role of the system was well understood, perhaps aided by the MD's extensive IT experience.
Ease of use	**/o	No problems with ease of use observed or reported. However, as most use was by facilitator, it cannot be said to be positive evidence that ease of use was a determinant of system success.
System perceived as empowering not controlling	***/+	A feeling that "the machine is working for them, not them for the machine" arose from the experience of seeing ideas put into the system and reflected in the outputs. Thus "the system lands up being subservient to their thought processes". A transparent system design seems to contribute to this. Also reinforces the importance of sufficiently wide team definition. No corroboration from users other than MD, hence single +.
A degree of calculated imprecision	**/+	Attempts to gain more or less exact figures on market size, sales etc used much time at beginning of participant observation. A decision to relax these efforts was perceived to be correct by MD and researcher, as resulting strategic decisions did not appear to be critically dependent on exact numbers.

Key: see Table 8-2 on p167

8.4 Case 3: A fibre manufacturer

8.4.1 Case description

Background

This manufacturer produces synthetic fibres for industrial and consumer markets, ranging from tyres and conveyer belts to clothes and carpets. Formerly part of a British blue-chip company, the manufacturer is now a member of a large, diverse South African conglomerate, though the British company still holds a minority stake.

The organisation had matched its British counterpart both in its technical strengths and, in the past few years, in its drive to complement these with increased market focus. Market sector managers had a brief to look beyond the immediate customers to understand the needs of manufacturers, retailers, and consumers. A close relationship between marketing and the plant was forged through a marketing technical department and through cross-functional business teams focused on parts of the product range. "Deferred branding" was adopted to brand the final garment rather than the yarn, with strong brands being pioneered in the sports sector, in an attempt to counter the traditional image of nylon and polyester.

The marketing group believed that their efforts would need to be redoubled in the times of change ahead. The import duties providing protection from competition had decreased from 30% or more to 15%, a modest amount in South Africa, and were thought likely to decrease further. This was helping Pacific Rim manufacturers to sell competitive products at very low prices. On the positive side, the growing retail "informal sector", driven by high local unemployment, provided opportunities that though difficult to formalise and quantify, were thought to be very real as well as socially desirable.

Marketing planning and system introduction

In order to provide a systematic approach to addressing its markets, a marketing planning process was introduced into the company. Initially, the system was manual, based on paper forms. The importance of wide commitment to the process was recognised, in the recollection of a marketing manager:

> "Being a systems-driven company, when we first started using it, we took the executive through the process and got total support from the Board of Directors."

When the company then became aware of the EXMAR system which provided automated support for much of their manual process, it seemed a natural step to use it.

Initially, the planning process was adopted by the consumer part of the business which produces yarn for clothes and other household textiles. The process was followed for each market sector, each of which was further segmented. The computer system was used to summarise the segmentation and SWOT analysis in a directional policy matrix, which then formed the basis for exploration of marketing objectives and strategies. The interviews took place about a year after this initial exercise.

Impacts of the system

Visual display as an aid to prioritisation

The managers participating in the initial planning exercise cited a number of impacts of the system. Firstly, the system was thought to have helped in clarifing priorities both for investment and for allocation of scarce management time. With eight marketing staff in a R750m (£150m) organisation, a focus on selected markets was important, in the view of a market sector manager:

> "It's not really a big marketing function, we have to be quite focused on what we are doing. It has helped us to identify the key market sectors to focus on. Before, I think it was more of a scatter approach. We would tackle everything."

The visual display of information was thought to help in achieving this clear sense of priorities:

> "It's helped us very definitely prioritise opposite which markets to put what amount of effort into, by visually being able to measure on your matrix where you are now, where you believe you're going to go if your strategy comes off, and what's behind that strategy. There are a couple of areas where we have actually withdrawn effort and reallocated resource...Everything here, this is our global marketing strategy, actually comes from EXMAR. Without going into visualising it through EXMAR, I don't think we would have cracked it as well as we did."

Thoroughness of process

The participating managers also appreciated the system's guidance through a thorough planning process, for reasons of perception as well as of substance. As one said:

> "It gave us a lot more credibility within [the organisation], because we've got a lot of system-driven individuals. And it gave us more confidence that the information that we had and the future we were projecting was actually credible...It lent credibility to what we'd been saying for so long, which didn't have credibility because it was being said by a lot of marketing guys who were sucking their thumb. It's a structured approach, and when you do go through a structured approach, you're more confident of the trend, the direction that you're going in...Unless you know your market intimately, then really you're just acting on your impressions, and I think a lot of our impressions have proven to be quite wrong."

An example where previous use of gut feel was felt in retrospect to have been inadequate was pricing. The company looked to other factors to differentiate its offering, such as service, technical backup, and tailoring of the product. But the planning team also assessed carefully what premium these advantages allowed it to support. The credibility of their conclusions was thought to be important.

> "Unless we get those costs under control the future is going to be very bleak. Will EXMAR help you there? Well, yes it will, because when you look at CSFs, and you start looking at your costs against your competitors, and if in three years time we're going to go from a 2 to an 8, then the whole thing changes, so it actually gives you immediate feedback."

Time savings

One major difference cited between the previous paper-based planning and the computer-aided planning exercise was the managerial time taken:

> "It was like chalk and cheese. I would have to put a figure on how it cut down on the time, but it was very significant."

The time saving was expected to be greater for subsequent modification of the plan:

> "The thing is we have got it now on there, and all we need to do is go in and change whatever we want to...The painful bit is probably completed".

Planning with customers

The company tried using the system in a collaborative workshop with managers from one of its immediate customers, the weavers, knitters, converters and texturisers who process the raw yarn. This was thought to have been successful, and interviewees hoped to extend this practice. Interviewees reported three benefits of the exercise:

1. *Improved data through an external view*. An external perspective on the quality of the company's products and services was thought to improve the realism of the information being entered into the system, and hence the quality of the company's plan.
2. *Educating the customer*. In some areas, marketing managers felt they had a better understanding of the consumer's needs than did the immediate customer. Using the system as a framework for the discussion, they felt they had been able to help the customer with their marketing strategy. The system was also perceived as acting as a learning aid for the customers, by embodying a planning process: "It was very well accepted, because it got them to start thinking differently about criteria to run a business, why are they in the business and why do people buy from them." This was thought to be of indirect benefit to the organisation.
3. *Building the relationship with the customer/distributor*. Such exercises were valued as extensions to the service provided by the company. "Not only are we a supplier, but also we are a mine of information for them. It adds value to our product".

Success factors: Planning in times of change

The consensus was that although time for strategic thinking was very hard to come by in periods of change and instability, it was nevertheless important. Despite the perceived success of the initial planning exercise, a year later the plan had not yet been revisited to update it. Why was this? The interviews were held shortly before the 1994 South African elections, in an atmosphere of considerable uncertainty. This offered at least part of the answer, in the view of one manager.

> "We're still very short term issue focused...I think it's inevitable because South Africa as a country is going through such tremendous change and people find it very difficult to look further than April 27th [the general election date]...I was out of the country for two weeks, and the market conditions changed from when I left to when I got back."

The author put to the manager that some people might say there was no point trying to plan in that situation.

> "I don't agree with that. I still believe you've got to have a strategy. Maybe you've got to change the plan, but you've got to have a vision of where you want to go, you've got to know where the top of the mountain is. Your change maybe your thoughts as to how you're going to get there you know if you come against an obstacle you change your plans, but I think EXMAR definitely focuses you as to where the top of the mountain is."

Other than short-term pressures, other possible reasons why the plans had not yet been updated were training, ease of use, and the sheer hard work involved. See 'Increase marketing confidence and enthusiasm' in the Benefits table below, and the success factors relating to training, ease of use, and absence of excessive short-term pressures.

8.4.2 Benefits

Table 8-14: Case 3 benefits generated/modified

Save time compared with equivalent paper planning,, particularly on revisions	A time investment in learning systems is needed, unless a facilitator is used. Once this has been made, systems can save time compared with equivalent paper planning, due particularly to calculations and graphical display, especially when revising existing plans.
Improve plan credibility and confidence	The resulting plan is more credible than it would otherwise be, and its authors have more confidence in it.
Enable maintenance of a live marketing model, where plans form periodic snapshots	The system can form the repository for 'live' electronic plans, updated periodically, from which annual snapshots are taken for formal presentation.

Table 8-15: Case 3 support for benefits

Benefit	**Rat-ing**	**Notes, illustrative quotations**
Improve support for the planning process	+	Some comments that structure useful, eg: "Using EXMAR structures the whole process a lot better, and you go through the thinking process a lot more logically." Not a major theme, though, with limited corroboration from others
Enable maintenance of a live marketing model, where plans form annual snapshots	DK	There was a recognition that periodic updates were highly desirable, due to the rate of change in the industry: "Once a month we should do at least two of our market sectors...The ones that you decide not to put the effort in, if you keep updating them and putting the information in the system, you can keep reassessing them quite readily, so if things change you can look at them a bit harder". However, this vision was in the main still an intention rather than reality.

Aid use of marketing tools through calculations, graphical display, guidance on use	++	DPM presented a "powerful story". Easier than previous paper planning: "it was like chalk and cheese". Gut feel can thereby be modified: "Unless you know your market intimately, then really you're just acting on your impressions, and I think a lot of our impressions have been proven to be quite wrong." One result cited was modifications to resource allocation.
Aid identification of data requirements, improving accuracy and availability	+	Information collecting quoted as resulting from system use. One mechanism quoted was that the system's credibility encouraged data collection: "The work we did in EXMAR, actually measuring market sectors, have got that much credibility that the sales force are putting a lot of effort into quantifying their business".
Save time compared with equivalent paper planning, particularly on revisions	+	Facilitator involved in previous planning thought time savings were "very significant". The planning was not directly equivalent to previous paper-based exercise: for example, the system encouraged several people to agree subjective scores such as market attractiveness - this was necessary and useful, but "with a big group, to get consensus is a very time-consuming thing". Greater savings anticipated for plan revisions, but not yet obtained as system-based plans had not yet been revised.
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	+	Particular feature of this case was planning in groups with customers. One advantage comes under heading of 'improved mutual understanding': "we are a mine of information for them...It adds value to our product." It was also hoped that feedback the other way would be useful, "building a relationship with and having feedback from consumers". Less evidence on other aspects of group planning, eg equality of participation
Improve plan credibility & confidence	+	The system "gave us a lot more credibility" and "gave us more confidence". Reasons cited included the presence of "a lot of system driven individuals", who might (perhaps irrationally) give a plan produced with IT support more credence; the "structured approach"; and better information.
Aid individual and group learning about marketing planning	NA	Unlike many other cases, marketing planning had been introduced, including training, before the system was obtained. There were few comments about learning impacts. The 'marketing philosophy and approach' was not thought to have been influenced by the system: "I think it's complemented the change, I don't think it's made the change." (See success factors.) Learning benefits cited for customers, though: "it got them to start thinking differently about criteria to run a business".
Increase marketing planning confidence and enthusiasm	+/-	Few comments about marketing planning confidence (as opposed to confidence in a specific plan). Some senior managers were regarded as having increased enthusiasm for planning after seeing outputs, but whether this would have occurred with paper-based planning is not clear. Working in the other direction, marketing planning was felt to be hard work: "We've done it now, shucks, it was a hell of a job. A few weekends away - it really was, to get your mind round it. Once you've done that, you're feeling a bit threatened to revisit...you really felt drained". This was cited as one reason for not reviewing the data online regularly.

Key: see Table 8-1 on p167

8.4.3 Success factors

Table 8-16: Case 3 success factor generated

Absence of excessive short-term pressures	If short-term pressures are such that relevant managers do not have sufficient time and motivation for strategic planning, whether due to market conditions or other reasons, the system will not be used, or any system use will be cursory and of limited utility.

Table 8-17: Case 3 support for success factors

Success factor	**Presence/ influence**	**Notes, illustrative quotations**
Absence of excessive short-term pressures	**/+	The system's early use had not yet been followed up with updating of the plans. One reason cited was short-term pressures in the lead-up to South Africa's elections.
Presence of a system champion and sponsor	**/+	Marketing manager for the business unit acted as champion, while the marketing director "has gone along with it, but he's been supportive, but at a distance". It is possible that this arguably half-hearted support is one factor in the lack of a follow-up exercise, but by no means clear.
System perceived as empowering not controlling	DK/DK	No indications of compulsory use, and no evidence of negative reactions due to feeling controlled.
Sufficiently wide team definition	**/+	All system-aided planning was in a team context in order to gain consensus - "because there is no way you as an individual can change one of those scores". However, some exercises only involved sales and marketing, and not production. Not clear if this was a drawback.
Adequate training	*/+	System operated by one sales manager, who operated it on behalf of others as necessary. Had "very little" training, "which was part of the problem": re the trainer, "I think he learned as much from us as we did from him". Other managers weren't trained, which seemed to influence their attitudes: "I think it's familiarity, it's like any software, if you're not really confident with it, you really put it off"
Adequate facilitation	*/-	No facilitator was used - though one could regard the operator as an internal facilitator. Difficult to assess the impact of this, but it didn't seem to be a problem.
Coordination of system use with planning cycle	**/DK	System use was approximately tied in to the planning cycle, though there is no formal requirement for longer-term plans, so the resulting "strategy document" was subject to ad-hoc rather than formal review. Whether this influenced its impact is not clear.
Flexibility in planning processes	DK/DK	No evidence of insufficient flexibility in the procedures followed, or of dogmatic interpretation of marketing techniques
Garbage in, garbage out: avoiding manipulation	DK/DK	No indications that manipulation of system inputs was a problem
Ease of use	**/+	For the operator, "it's probably not as user friendly as it could be, but once I got into it it wasn't really a major problem." But others daunted by system - see Training above.
A degree of calculated imprecision	DK/DK	In some cases, precision felt to be important: "Before [the system was used] it wasn't important what market share we had".

Key: see Table 8-2 on p167

8.5 Case 4: An IT products and services group

8.5.1 Case description

Background

This information technology products and services group had recently become independent from its US parent. Inevitably, though, its business was still dominated by the distribution of hardware and software with the strong international brand of its former owner.

In common with many of the long-established mainframe-based suppliers, it found its markets becoming much more competitive than they had previously been. The need had always been for sales and support to a stable market, based largely on high-value mainframes, while it had always been assumed that the market would buy the products brought in from the US, without much need to examine the potential market size or local needs. Worldwide industry changes were being reflected in the local market, however, as mainframes occupied a decreasing proportion of the hardware market, as hardware itself became less important relative to software, and as the emphasis on de facto as well as de jure standards increased competition and brought down margins.

In response to this situation, the Director of Strategy and Business Development and his small department had the role of driving a process of achieving a greater market orientation. This had several aspects: moves to change company culture; changes in remuneration policies; structural changes; and the introduction of marketing planning.

The structural changes divided the previous monolithic organisation into 25 separate SBUs, each a limited company, owned by a holding company. These were mainly organised by product or service, on the rationale that with 2000 products announced every year, the complexity of serving markets through single account managers was now impractical. Customers also wanted integrated solutions requiring expertise in particular technological areas, and purchasing patterns were changing as some product ranges approached the status of commodities. One of the business units, however, provided overall account management to large accounts, working with the other business units as necessary.

Marketing planning and system introduction

One of the managers in the group strategy team was responsible for supporting the business units in the introduction of marketing planning. The intention was that each subsidiary would produce a strategic marketing plan, while plans would also be produced for each group of accounts. The marketing planning manager was available as a facilitator, and the EXMAR software was available to business units if they wished to use it.

The strongest reason for the introduction of the system was the lack of marketing experience in the newly created business units. In the marketing planning manager's view,

> "anything with a process is good for us right now...the value is to give us a process to follow".

The extent of the change required for the newly-formed business units to produce their own plans was highlighted by one marketing manager:

> "There's almost a god-like belief that somewhere in this amorphous mass, there's this staff group that's plotting the future direction and making the right investments. It amounted to everybody just executing, you just did what you had to do, on the basis that someone up there had a better view than you had."

It was also intended that the electronic format would enable plans to be integrated across business units and presented in an executive information system (EIS) to the board. Hence, the managing director "will be able to look at the portfolio and make decisions on where to put his investment." For this EIS, a "drill down" structure was important, as each SBU plan contained perhaps 20 product-markets: presenting all product-markets at once would be excessively complex, so the system would need to present each business unit, and allow the user to "drill down" to obtain the detail on a given business unit. The EXMAR version in use did not provide this facility, so it was intended to use an EIS package to integrate the EXMAR plans. This had not yet occurred at the time of the interviews, however.

While business units were required to produce marketing plans, use of the system was optional. In the few months since the system was introduced, eight business units had developed plans with system support.

Impacts of the system

Automated marketing tools: insights and communication

The system's incorporation of marketing tools was felt to have provided valuable insights to those using it, in the view of several interviewees. The marketing planning manager cited two examples which, in her judgement, had been influential as early "success stories", encouraging other business units to try using the system. In the first case, all the managers in a business unit assumed that financial services would be the most attractive market for a new product range, but the system's market attractiveness analysis convinced them that it was some way down the list. In the second case, the participants' "gut feel" had been that one particular development tool using old technology was "a cash cow on the way out". But when the market size, opportunity and so on were examined, it was found to be the most attractive market, very profitable, with little competition - albeit unfashionable due to its technology. The business unit manager claimed she would be twice as profitable as a result of this insight.

Tools were also felt to be useful for communicating insights once reached. For example, the managing director of a business unit thought that:

> "One of the most beneficial effects it had was to indicate at a group level, at a company, division and product level, where each of these things were positioned on, for example, the directional policy matrix. Previously there was this kind of nebulous thought that each of the companies even within our subgroup was at the same stage of maturity, or investment, or development, or however you want to express it, that we were all equal - and therefore the way in which we planned and invested in these companies were identical. And by doing that for our companies we understood that not only did we have products and different stages, we also had companies at different stages. And that gave me a better way of communicating with [the group MD]..It influenced greatly the way we each presented our plans this year."

Learning through doing: the system as a learning aid

Several managers cited learning benefits of using the system. The marketing manager for the large accounts division, for example, referred to the way in which computers had traditionally been sold on technical features, whereas the system's incorporation of SWOT analysis per market segment focused the discussion on needs.

> "Even if it's just a tool that facilitates the thought process, that'll be a big step forward. It starts to teach people - the thing that I see that's quite exciting - it starts to teach people that there's a reason for the products. That as a matter of fact that there's some business need out there that this thing might satisfy."

One impact of this learning seemed to be a clearer view of data requirements. The marketing planning manager stressed this:

> "I'd say it's opened up new lines of thought to people. So people have actually said, my goodness me, we have to segment our markets, and we don't know enough about it, and we don't know their size, and how are we going to get this information? So I guess the market research companies are going to do very well. We've got a market research user group, and it's growing. People are interested in pooling information...[For example, one SBU manager] realised how much he didn't know. He's got application packages that he's bringing to market, and he's not sure how attractive the market is, which he had never thought before. This is a great product, they said. Now they're saying does the market need this great product, and can we catch up - because they came late."

Many of the managers had previously been on an in-house marketing planning course, run by an marketing professor. One business unit manager suggested that system use brought the knowledge "to the front of the head":

> "What it has done is that it goes through the whole process from A through Z in a very short space of time - once you've got the information, that is. You start seeing where your product really is positioned, what needs to be done to move it to where you want it to be, and how you can differentiate between yourself and your competitor. In manufacturing for example, when somebody comes and asks me something, I'll say "Have you considered the following things yet?" And they'll ask me why, and I'll say because of this, this and this. So it's brought the knowledge sitting behind the head to the front of the head, and of course you continually think of it all the time."

Would the learning effect have been just as efficient if one just read a book? A sales manager addressed this question.

> "I don't think so. Because I had read the book before I did the tool. The tool starts showing you, by putting the plan together, what happens. Because it's a what-if, you can do some simulations if you really want to...You start changing some parameters, and suddenly you start seeing what happens to your product. That's the real big benefit to me. Marketing was always a bunch of whizz-kids sitting at a drawing-board working on advertising. It just brought it a bit closer and made you realise it's part and parcel of your whole business."

Opinions varied, though, on whether the system influenced fundamental attitudes towards marketing. One marketing manager said that "it has brought about that mindswing in terms of a more market focused approach." The marketing planning manager, though, said:

> "If they say profits come from markets, they all say the good outweighs the bad in EXMAR. If they haven't got that realisation and I can't sell them that realisation in a presentation then I know I'm going to have a bad meeting."

Multiple-level planning

The system was primarily used by the management team of each business unit to examine its marketing strategy, using the business unit's major product-markets as the units of analysis. In such a large organisation, one could also envisage planning with both larger and smaller units of analysis.

One group of business units reported to the same board member. They had produced a plan for the group of business units, in which the units of analysis were the individual businesses. They also produced plans for each business unit in turn, analysed by product-market. The manager of one of the business units reported that this second level of analysis was more detailed than her previous analyses, which had only included two product-markets. She found that the product-markets she was looking to enter were in a different position from those she was actually entering during the year.

> "That was the problem. The market is too big, it was too unfocused, and the product set is too complex, and it was difficult to find marketing approaches and messages, and even management mechanisms, for this big blob. And it helped us to take a smaller view. And that was good for us."

She also found the higher-level analysis useful: her views on the directional policy matrix showing different companies were quoted above in the discussion of marketing tools.

The system, then, was applied at two different levels. The system itself did not aggregate the information from one level to the other, however: data for each level was entered separately. The same business unit manager said that consolidation facilities would be extremely useful:

> "The biggest problem in our mind with the process was that it was very difficult to consolidate it all up again to get the big picture."

It seems that the system "helped us to take a smaller view" simply through the prompting for a list of product-markets at each level and the support for automation of the planning process through automated calculations, graphics drawing and so on, hence making it easier to plan to a higher level of detail in a given time.

No plan had yet been developed on EXMAR at corporate level, however. This seemed to relate to the lack of a corporate strategic plan. One marketing manager commented on this:

> "I don't think that [the MD] has got a great white plan in the sky, that says these are my revenue streams, this is how I'm going to subsidise this one to pay that one...which is a problem, because you might not make the investments you should."

A member of the central Strategy and Business Development staff offered another view:

> "What we're trying to do is get the present organisation into a structure where you can start doing these things. We're starting, literally a couple of weeks ago, at saying, let's look at the market place as we think it's going to evolve. But that sort of look is a hell of a long way from being able to use EXMAR, because first of all you've got to decide, are you in the same marketplace as AT&T, before you can even have that discussion."

Success factors

Ease of use

The marketing planning manager reported that she had received many "awful comments" about the system's technology. The brunt of the criticism was directed in two areas: the hardware requirements, including 8MB of RAM and a Postscript printer, were beyond those typically in use; and the user interface did not support Microsoft Windows - already well established by the date of this interview in 1993. This criticism, she felt, was increased by the factor that the company was a computer specialist, and hence its staff were technologically very aware.

The criticisms were qualitatively similar to those made in other organisations, but in general more strongly expressed. A marketing manager, for example, said:

> "One can see that the guys attempted to put some sort of GUI up there. But the thing is not intuitive. Unless you've practiced it, it's very difficult to use. So I would say that you have to pay attention to your presentation somewhat...If I'll use Windows, I'll use it every day. How often do you use that planning process? Once a month, probably. And when you go and revisit your plans, people forget. That's why the new product [in Windows] is vital."

This manager cited ease of use as one reason why he had not yet used the system. In the marketing planning manager's view, though, ease of use was not typically preventing system usage.

Appropriate choice of planning units and facilitation

Case 2 suggested that the appropriate definition of product-markets is both important and difficult, that facilitation can help with this step. The manager of one business unit related events that seemed to show a dysfunctional effect of facilitation. The business unit's planning exercise had been assisted by one of several EXMAR facilitators, internal and external, that were used by different parts of the organisation.

> "My objective with adopting EXMAR and giving it the chance was to say that the market for us is extremely competitive - and this is no news... - are there any different ways we can try and do business? And one of those different ways, we figured, was can we find a different way of looking at market segmentation, other than the normal looking at industry or whatever, which everybody does, it leads you to no new conclusions. Throughout EXMAR we were forced back into settling for an industry model, which in the end we thought may have limited some of the benefit we may have had out of the process."
>
> Interviewer: "You were forced by the system or by the facilitation?"
>
> "I think by the facilitation...So the facilitation was less good than it might have been."

Another participant in the same planning exercise concurred:

> "As a facilitator you have to be unbiased, and you cannot impose your own ideas as to how a market should be segmented. You have to listen to what people say."

As a result, a different facilitator was used for further planning. In similar vein, the Strategy and Business Development Director, reflecting on the feedback he had received from a number of planning exercises, commented:

"If you're going to facilitate effectively, you've got to let the people running the show believe it's theirs. And hopefully it is...You've got to allow what you consider to be misconceptions to go on, even if you know that they're wrong. You've just got to stand back and let it run, and say have you considered this etcetera. The one thing that won't work is this being anybody else's idea. If people come to the wrong conclusions, that's something you've got to live with. You can't solve that in methods facilitation."

Definition of planning teams

Case 2 suggested that where planning teams are narrowly defined, the system-aided planning exercise may be less useful. It seemed to be taken for granted in this organisation that the management team needed to plan together. One marketing manager discussed the rationale for this:

"I personally think that it's very important that as a team we go through the process, at least cyclically, to reinforce the focus on it. And that takes quite a considerable amount of time and effort, obviously. So because we're tightly resourced, it's actually bloody hard to get the five of us who are involved in this thing together for two days at a time - it's a problem."

Interviewer: "Why do you regard that as important?"

"Two things. One I think that it's important that we all perceive that the direction that's ultimately chosen is the right one. A lot of things like MAFs etc need to be agreed jointly. Because otherwise whatever numbers come out are perceived to be suspect. In the banking case, without all of us being involved, and being committed to saying yes, those are all the CSFs & MAFs that we want, that proof, if you like, that that was not an attractive market would not have been believed, because the gut feel was that it was...For credibility it has to be a combined process".

8.5.2 Benefits

Table 8-18: Case 4 benefits generated

Ease integration of functional perspectives	The electronic medium can facilitate the integration of the marketing plan with analyses from different functional perspectives to form a convenient and internally consistent aid to strategy debates.
Help to manage complexity of multiple-level plans	The system can help to manage the complexity of planning at more than one organisational level by ensuring consistency in planning, aiding comparison across SBUs; allowing a shared representation of the hierarchy of product-markets; and aggregating data from several business units to form the basis of a higher-level plan.

Table 8-19: Case 4 support for benefits

Benefit	Rat-ing	Notes, illustrative quotations
Improve support for the planning process	+/-	A number of positive comments, eg: "Partly because of my complete lack of background to the area, it gives a structure to it, such as what are the things you need to do to get from here to there, and what sort of priority would you give them?" However, there may be a trade-off between structure and flexibility: "What I liked about EXMAR was that it's a structured approach, it steps on quite nicely through the process, makes sure you cover all the dimensions of the planning process, but we did find it a little bit inflexible. Certainly in our mind it doesn't encourage the free flow of ideas, which I suppose sometimes is a good thing." Users may need to be aware of this danger: see 'Flexibility in planning processes' in Success Factors below. The system itself could also be more flexible: requests included removing the limit of 6 CSFs per market, and allowing CSF weights to change with time.
Enable maintenance of a live marketing model, where plans form annual snapshots	DK	A vision expressed by some interviewees, eg: "Do you think you will use EXMAR again?" "What we are trying to do is make sure that it's not again, but a continuing thing for us". As with the previous case, though, not as yet a reality in any of the business units studied.
Aid use of marketing tools through calculations, graphical display, guidance on use	+	Various instances cited where gut feel modified as a result of analysis using the system. Also, where previous views were confirmed, "there was a factual basis to argue and demonstrate the reality of that gut feel, and that's important - it's confirmation". But in no cases was there a clear comparison with prior use of the same tools on paper, hence only one +.
Aid identification of data requirements, improving accuracy and availability	+	Market research was occurring as a result of system use, in the view of the marketing planning manager, confirmed by two product managers. But for each of the relevant business units, this was the first marketing plan that had been developed, so limited comparison.
Save time compared with equivalent paper planning, particularly on revisions	DK	Difficult to assess as little prior paper planning, and inadequate information to compare those who used EXMAR with those who didn't. One business unit manager who had previously developed plans on paper "more than annually" did not quote time savings either as a system objective or as an outcome. Indeed, there were time losses in learning to use the system: "A lot of time was spent just trying to understand EXMAR terminology etc...I think there should be some - I don't want to call it training - there should be some introduction into the specific concepts of the process...Once we got ourselves on the same wavelength, I think it was a positive process...I think we have ended up with a better plan than we would have done without using EXMAR." The benefits cited were in other areas of thoroughness, greater consensus and communication. No evidence on revisions.

Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	+	The relevant comments emphasise the system's role in aiding communication of proposed strategies and their rationale. In the view of the marketing planning manager, the system acted as a catalyst "because the groups are coming together and acting as a family, and realising they can work together, which wasn't happening before." Communication can also be enhanced with those outside the planning team: "In dealing with advertising agencies and the press, it makes communication that much easier. Because you come out with very clear ideas of...how you're positioning yourself against the competition" As with other benefits, difficult to separate effect of system from facilitation etc.
Ease integration of functional perspectives	DK	The organisation intended to integrate EXMAR data with data from other functions, particularly financial data, in an EIS, using an EIS development tool. This had not yet been done at the time of the interviews, so cannot assess whether the system does indeed ease this integration of functional perspectives.
Improve plan credibility & confidence	+	Argument made that the transparency of the rationale for recommendations improved their credibility: "Why the analysis was useful was that could be used by us in the group to indicate that there was strong potential, but it also required investment, so the arguments that our directors could make into the holding company's directors were look, this proves strong potential but low profitability because it's a start-up...There was a factual basis to argue and demonstrate the reality of that gut feel, and that's important - it's confirmation."
Aid individual and group learning about marketing planning	+	System may not influence fundamental attitudes towards marketing - see new success factors. But common perception of more specific learning benefits.
Increase marketing planning confidence and enthusiasm	+/-	Some positive comments: "I must say that this for me has been one of the nicest parts of my job. I really enjoyed it, and I found it really stimulating and exciting." But the necessary work can also be daunting: the marketing planning manager said it has "horrified a lot of people about the amount of work we've got to do. Some people have backed off", but those who "think correctly" are using it, taking the view that it shows "what we have to fix up to get right".
Help to manage complexity of multiple-level plans	x	The system did not assist with aggregation of plans to a higher-level plan: this was identified as a problem by one business unit manager. The marketing planning manager intended to fill this gap with an EIS system.

Key: see Table 8-1 on p167

8.5.3 Success factors

Table 8-20: Case 4 success factors generated/modified

A market orientation, or the perception of the need for it	The organisation needs a market orientation, or at least the perception of the need to increase market orientation, for marketing planning to be accepted, whether computer-aided or not.
Appropriate planning units	The definition of the business unit and its component products and markets are crucial. Judgements required include the right level of detail for bottom-level segments and the order in which multi-level plans are developed. It is important not to follow an inappropriate organisational structure, eg a product-based one.
Sufficiently wide team definition	The planning team needs to be sufficiently wide to incorporate the perspectives of those with relevant market experience, and sufficiently senior to act on insights reached.

Table 8-21: Case 4 support for success factors

Success factor	**Presence/ influence**	**Notes, illustrative quotations**
A market orientation, or the perception of the need for it	**/+	According to some, appropriate attitudes must precede system introduction: "If they say profits come from markets, they all say the good outweighs the bad in EXMAR": otherwise, "I know I'm going to have a bad meeting". Other comments suggest that the system can influence these attitudes, eg: "it has brought about that mindswing in terms of a more market focused approach."
Absence of excessive short-term pressures	**/+	Most business units interviewed made some time to plan despite pressures. One marketing manager hadn't yet used system. He described how "The marketing planning became a back seat job...The whole company's built around a one-year focus. That's not only sell, that's install as well, so you don't even have a whole year to sell the damn thing. When you get to a horizon greater than one year...the reward plans aren't really geared towards it." Another had also used the system little: "While you're trying to keep your head above water, it's very difficult to take time out to say, once my head's out of the water, I'm going to concentrate on building a QEII. Right now, we're concentrating on not drowning. As always you wait until events drive you into a situation and you start reacting, and then at that time you're under pressure, so you're not doing it in a nice orderly fashion."
Presence of a system champion and sponsor	**/++	Sponsored by group managing director. When the champion, the marketing planning manager, was promoted to a directorship in a large business unit, the spread of the system seems to have slowed.
System perceived as empowering not controlling	***/+	Although plans are insisted on, whether the system is used to produce them is optional. The director responsible justified this: "Right now we are trying to empower people, decentralise, where it isn't easy to walk in and say do it this way...If we force it, we will do damage to the whole concept, and there's nothing wrong with the concept...You are actually introducing a style of thinking...and that takes time."

Sufficiently wide team definition	***/+	In most cases, the whole senior management team of a business unit was involved. In one case, the product set was determined before planning began. The planning questioned whether the product set was the right one, but no action was taken as it was felt this could not be changed. This could be regarded as an issue of timing, or as suggesting that the team was insufficiently senior to act on the insights reached.
Adequate training	**/+	Trainer "took me through the screens - that wasn't nearly enough. I'd say the training that I got of value was actually sitting through the facilitations with [a consultant] until I felt competent to do it." Wanted overview before starting on concepts.
Adequate facilitation	**/+	Several comments on one facilitator that "finds it very hard to stay neutral..He'll spend a lot of time trying to change peoples' minds, and he put their backs up something terrible...A facilitator should remain neutral on the strategy. It's tough if you know or suspect that people are making mistakes." A subsequent facilitation, where the facilitator restrained his role to process guidance, was regarded as more successful by participants. A further point made was that "whoever facilitates should not only have a good understanding of EXMAR, and of how it might be used, but also of the underlying theory and philosophies around the process itself."
Coordination of system use with planning cycle	**/+	System had mainly been used as part of the planning cycle. In one case, planning began rather late: "We started with a process much too close to having to deliver the next-year business plan". Although system use influenced the resulting one-year plan, a longer-term plan had not yet been written, although "the pieces for the longer-term plan are there".
Appropriate planning units	**/++	In most cases, the choice of products and markets was thought to have been appropriate - though this was regarded as a non-trivial step, and indeed one where the system had helped, according to some. In one case, at least, inappropriate definition of markets was thought to have restricted the utility of the output (see case description above).
Flexibility in planning processes	**/+	Few indications that the procedures followed were excessively rigid. An exception was the view of one business unit director that "it doesn't encourage the free flow of ideas, which I suppose sometimes is a good thing". She concluded that flexibility was important in complementing the system's analyses with other marketing tools as necessary: hence, a facilitator should be able to explain "what are the limitations within EXMAR, and how one can try and get around that by supplementing it with something else".
Garbage in, garbage out: avoiding manipulation	**/+	Fear of manipulation evident with one interviewee: "You can manipulate it and get the answers that you want...That's why it's dangerous." So it was important that the board understood what each person was doing. Where he had information missing, he had "just put in information, and the outcome, it's just absolute rubbish. And if I had to buy the result, I'd be in big trouble." Then he started "realising that it's actually your input that's wrong. Like any tool, if you don't have the right information, you don't get the right output..By using the product correctly you can benefit, there's no doubt about that."

Ease of use	*/+	Technical criticisms included the ease of use, and particularly the ease of learning for those used to Microsoft Windows. Mixed evidence on whether the ease of use had hindered the extent or utility of system use.
A degree of calculated imprecision	**/+	One marketing manager thought the system actually encouraged excessive exactitude. A learning process had occurred that exact numbers were not necessarily essential: "The system makes you place too much emphasis on the actual numbers that you're putting in, and very often you lose sight of what's important. Maybe it's because it was the first time, not having any of the numbers, getting totally hung up on markets and market size; maybe it's because it's a service industry, we are not market leaders, and our growth is not constrained by market size, it's constrained by the way we can grow our skill base".

Key: see Table 8-2 on p167

8.6 Case 5: A public-sector utility

8.6.1 Case description

Background

This public-sector utility had no immediate competitors, although the needs met by its product could be met in alternative ways. Until 1986 it had a consistent, substantial increase in sales. Since then, though, supply had outstripped demand, as the previously assumed linkage between GDP and sales have proved inaccurate, and as the economy performed less well than anticipated. In 1992, the year before the interviews took place, it had suffered its first sales drop in its history. The waiting list for connection to its service had reduced from two years to three months - more due to the slow-down, according to one marketing manager, than to internal improvements. Efficiency measures were, nevertheless, in evidence: over seven years the number of employees had been reduced by 35%.

Apart from the need to use up spare capacity, a further drive for change related to the political environment. By the year before the 1994 elections, the already deeply entrenched political changes had led to an increased perception of the importance of supply to the large proportion of the population who did not currently have access to the service.

To address these challenges, a culture change was being attempted, in the view of marketing staff at least, from a production orientation to a marketing orientation. Historically, no proactive work had been carried out to gain customers or increase sales. Now, salesmen had been appointed to sell the service in factories and mines, looking for opportunities where the alternative means of supplying the need were less cost-efficient, while the opportunities to be targeted were determined through a marketing planning procedure. A marketing manager reported that the idea of salesmen was still "just unreal, in the minds of many of today's managers", coming as they did from an engineering background in a virtual monopoly.

Change was also occurring structurally. In anticipation of the planned division of South Africa under the new constitution, the twelve regions into which the utility had been organised were regrouped into five 'distributors' early in 1993.

This organisation was chosen for a case study firstly as an example of DSS use in a utility, and secondly as an example of what seemed to be a failure, in which the system had been used but where use had stopped. It concerns the use of EXMAR by one region, termed region R, and the reasons why the system's use ceased when the region was amalgamated into one of the new distributors, which we will call distributor D.

Marketing planning

The marketing director had perceived the need for a marketing planning process, and had called in an international consultancy to help to define it. In 1992, this process was run within Head Office for the first time - but in the view of one regional marketing manager, with little consultation with the regions, or even requests for information, resulting in little commitment to the resulting plan.

Meanwhile, some of the regions developed their own marketing plans. Region R developed plans in 1991 and 1992 for two specific segments where opportunities were perceived: provision of the service to farm workers, and increased sales into tobacco farms. These were intended as pilots for development of more comprehensive marketing plans, but this was curtailed by the restructure, with only the farm workers' plan being completed and implemented.

Discussions between distributor D and the marketing director were thought to have been influential in revisions to the process for 1993, which included a structure of committees designed to ensure that information flowed up from below, and that consensus was obtained on what was to be done. By the time of the interviews in late 1993, the distributor's experience with the planning process to date had concentrated on the issue of "gaining commitment to plans and getting participants to take responsibility for implementation", through involvement of relevant managers in planning sessions. After early sessions facilitated by the consultancy, a marketing manager now acted as facilitator. The experience had also thrown up some further difficulties. One was the time involved in activities such as generation of graphics. Another was the difficulty of obtaining relevant information, for example on market size and share, currently based on imperfect secondary sources due to budget restrictions.

Introduction and use of the system

Returning to the situation before the restructure, the regions became aware of EXMAR through a Head Office marketing manager in 1991 - before the company had begun to define a common marketing planning process. Three of the regions decided to purchase the software. One of them was region R, where it was used to develop the farm workers' plan, and to begin work on the tobacco farmers' plan. Planning sessions occurred in a conference room with the PC monitor projected onto an OHP screen.

The farm workers' plan began with a desire to concentrate on some specific markets to develop the planning process and to gain experience with the software. Farming was selected due to the familiarity of the management team with it. Within the farming market, it was decided to investigate whether the service could be provided to farm workers.

> "On the farm you would have the farmer's house, and about a kilometre away, out of history, you would have the community that worked for him, in shacks that he built for them, little houses - anything from 5 to 100."

The marketing manager described a common internal reaction to the idea of providing the service to them:

> "I said, 'What have we got in the domestic market that we could do?' 'All the farms have got [the service] - except, of course, the blokes that work there, but nobody would want to [provide the service to] those'. And I said, 'why not?' 'No, it costs a lot of money, it's never been done'. And then as we started to get more into it, we found out, yes, there is a market."

Information was not available on such questions as how many houses there were per farm, how many rooms per house, and how much the farm workers were spending on alternative means of supplying their needs. This information was collected using a questionnaire and interviews. The farmers also needed to be consulted, as their permission was needed to provide the supply across their land. It was found that most farmers were willing to cooperate, and that the service could be provided for a lower cost than the farm workers were currently paying for alternatives, and with much higher convenience. It was found that different options needed to be developed for different market segments, which were defined by the number of houses per farm: providing the service to the larger farms was commercially viable, while for smaller farms, a mechanism was worked out whereby the farmer would share in the cost of the initial service provision. An incentive was provided to the new customers, in the form of free appliances that could use the service.

The resulting plan showed that it was economically viable to provide the service to farm workers, and incorporated an action plan for achieving it. In the first year, the planned targets were exceeded by 60%. On the marketing manager's wall was an internal award he had gained for his role in coordinating the plan. To what extent were the ideas already formed before the EXMAR-aided planning exercise?

> "None. That's a definite...Today the benefit to us is we have the most domestic connections in the country. I'm not saying it was just because of our plan, but it got the commitment from everybody. This made the management team committed to that specific plan. You can see, from the way it's structured and so on, it showed that we had done our homework, that we knew what we were going to tackle. A lot of people had talked about it, but there was no scheduling, there was no planning - if someone said but why do you think people will take it, nobody could say, well they're already using about 60 Rand [per month on their relevant needs], we think we could come in at about 40 Rand. None of that had been done. So EXMAR definitely created that...If you say, did EXMAR drive that, a lot of people will say, no, we would have done it in any case. Yes, maybe five years later. That's my opinion."

While this plan was being implemented, work then began on a second plan, relating to the conversion of tobacco farms from an alternative means of meeting their needs. This work, however, was curtailed by the restructure. The marketing manager found himself now as marketing manager for one of three regional areas within the 'distributor', with particular responsibility for customer support areas such as special tariffs and contracts.

The overall marketing manager for the distributor asked for the EXMAR software, on the grounds that any strategic marketing planning should be done centrally for the distributor as a whole:

> "If we centralise marketing, it should be done here...I can't allow a sales office to develop a strategic marketing plan, because I will move in one direction and they will move in another."

The region's marketing manager saw things differently:

> "Somewhere along the line you've got to break it up. I believe if you are going to break the distributor into three areas, there's no way they are going to develop the plans centrally. That was my experience with EXMAR. The plans I got to work were the ones that I took down to the moments of truth - the actual contact with customers...It was the first time that managers from so many backgrounds sat and faced a marketing plan. That's what made me fall in love with EXMAR at that stage. So I hope you can understand how I feel I've been robbed. I just hope this is the last restructure, because it stuffs this kind of thing around. You need people who are committed to marketing plans."

Since the restructure, the system had not, however, been used centrally by the distributor. The marketing manager cited two reasons. The first related to definition of the planning team. The external facilitator who had been used by Region R had suggested a cross-functional planning team including the marketing manager's colleagues and superior, in order to "get people's perspective on CSFs and so on.". But:

> "my boss said 'I don't want the detail, I just want results'. That's why I say we haven't got a marketing orientation yet. At that stage, the company wasn't ready and open for it. Our management's understanding of marketing was the biggest barrier to it."

Hence, the marketing manager "wanted to install a proper marketing focus first". His second reason related to data availability.

> "The information wasn't available in the form that EXMAR wanted it. And people never embarked on a process to get the information - they would rather dump the system. I think they should have gone and got the data...I started to get information together."

He had budgeted to buy the hardware to use the system, and planned to use it the following year. He regarded the system as a tool that could assist with parts of the currently paper-based planning process.

> "We do a lot of things the same but we don't use the same terminology. And that's why I believe they can be married."

One specific problem he was having was with the diversity of software support that was currently necessary to produce a plan. Separate, general-purpose office automation software was used for doing drawings, performing calculations, and writing the plan.

> "With this thing you've got the tool to take more information, still within the same context, and eventually produce a strategic marketing plan. And I believe EXMAR can do it."

Impact of the system

Returning to the use of the system within region R for the farm workers' plan, two main respects were cited in which the system was thought to have affected the planning process.

Communication through a shared representation

The first related to communication amongst the management team. As collaborative planning had not been attempted previously without computer support, it is difficult to disentangle the system's effect. In the marketing manager's view, at least, the system provided an effective and motivational focus for the discussion:

> "What I found was that when we started identifying markets and CSFs was a great motivator to get people together. All of a sudden we were doing an assignment together and getting their opinions. What I learned from that was that a lot of the managers didn't know what their business was about. They were all concerned with their micro bits of the business and had never taken a step back and looked at the macro level. It was a great exercise, I really enjoyed it - and so did the managers, they really learned so much about their markets...By using this kind of system, when you can talk together on the board. Just to talk as we are now, if he's not a keen marketer kind of bloke, you can see his eyes glaze over and you've lost it."

Data requirements

The second related to identifying data requirements for planning.

> "When we went through, I realised that we had not done our research...We appointed a consultant, who did a report for us. We gave him the different markets, and we asked him to look at our competitors, we asked him to try to find out what kind of market share we held, and what the potential was in new markets. Once we had that information together, we could start putting in inputs...The research wasn't leading EXMAR, EXMAR was leading the research, funnily enough."

Factors for success

See 'Introduction and use of the system' above for discussion of the potential success factors of sufficiently wide team definition, and the appropriate choice of business unit to plan for. Regarding the former, it is interesting that the marketing manager of distributor D seemed to be under the misapprehension that in region R, "they used one person to drive the system", without the involvement of managers outside marketing. It is not known whether his limited knowledge of the planning that had taken place had influenced his view that planning should only occur centrally for the distributor as a whole. But he shared the view of the former region R's marketing manager in stating:

> "I see EXMAR being operated by one person, but not by one person in a corner. Perceptually that's why it didn't work in [another region]".

8.6.2 Benefits

Additional and modified benefits arising from case

None.

Table 8-22: Case 5 support for benefits

Benefit	Rating	Notes, illustrative quotations
Improve support for the planning process	DK	Insufficient information to assess. One participant, responsible for market research: "This system makes it so easy, it simplifies the whole process and the format." But no comparison with paper planning.
Enable maintenance of a live marketing model, where plans form annual snapshots	SF	In the absence of sponsorship from the distributor head office, system use ceased before this became a possibility

Aid use of marketing tools through calculations, graphical display, guidance	+	Calculations and graphics thought to assist with interactive use of marketing tools with planning team
Aid identification of data requirements, improving accuracy and availability	+	System thought to have aided with identifying data requirements. Market research manager for region: "It allowed you to identify what information you needed to come out to a plan. It gave it all to you...It definitely influences the information you collect. If you didn't have EXMAR, you would collect information but it wouldn't necessarily be the information to take you to your end goal." But no prior equivalent paper-based process to compare. Perhaps system is perceived as less easy to leave blank than a paper form - marketing planner in distributor: "EXMAR - and this is a positive thing - it forces you to go out into the market and identify your critical success factors from the customers' point of view."
Save time compared with equivalent paper planning, particularly on revisions	DK	Hardly mentioned as an issue by the users of the system, in terms of why the system was used or what effect it had. Time savings represented one motivation for potential use of the system in the future by the distributor marketing manager.
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	+	Marketing manager who acted as champion was strongly of the view that the system had helped to support team-based planning, through providing a common framework for discussions. Difficult to rule out hypothesis that this was due to the team approach plus facilitation, hence only one +.
Ease integration of functional perspectives	DK	No plans known to integrate marketing plans with information from other functions
Improve plan credibility & confidence	+	"This made the management team committed to that specific plan...You can see, from the way it's structured and so on, it showed that we had done our homework...I had commitment from the staff - the district managers - because they were part of putting it together."
Aid individual and group learning about marketing planning	+	Champion's view: theory previously learned at business school applied with system's aid. "Because I have been able to put a lot of that theory into practice now...that's got to be the best kind of learning tool that there is." Market research manager: "Definitely when the management team were involved it helped to direct them in a marketing orientation."
Increase marketing planning confidence and enthusiasm	+	"I really enjoyed it - and so did the managers." Since ceasing to use software, "I have felt more comfortable discussing marketing plans and issues with people".
Help to manage complexity of multiple-level plans	NA	Plans only developed at one level

Key: see Table 8-1 on p167

8.6.3 Success factors

New and modified success factors

None

Table 8-23: Case 5 support for success factors

Success factor	Presence/ influence	Notes, illustrative quotations
A market orientation, or the perception of the need for it	**/+	Distributor marketing manager cited its absence as one reason for not attempting use of system yet. On the other hand, one participant in region was of view that "it helped to direct them [participants] in a marketing orientation.". There was, at least, the perception of the need for a market orientation by the system champion.
Absence of excessive short-term pressures	**/DK	No indications that short-term pressures were influential in preventing further system use
Presence of a system champion and sponsor	**/++	Under old structure, the head office marketing manager was supportive, if not actively acting as a sponsor. Under new structure, opposition to system use from distributor marketing manager (whether 'correct' or not) prevented its further use.
System perceived as empowering not controlling	***/o	System perceived as empowering by region - no compulsory use.
Sufficiently wide team definition	***/+	Believed to be a success factor by participants. No comparison with individual planning to enable a ++.
Adequate training	***/o	Champion and system operator received "about 3 days" of training, in addition to external facilitation for first few sessions. Lack of problems reported with operating system suggests that this was successful
Adequate facilitation	DK/DK	No indications that facilitation received was inadequate, but under-explored in interviews
Coordination of system use with planning cycle	***/o	System use was consistent with planning cycle. No problems noted relating to the timing of planning
Appropriate planning units	***/+	Subjectively, it seems that choice of business units to plan for were appropriate, as were product/market definitions - the latter being subsets of farms on criteria relevant to the purchase situation. Champion of the view that these were important decisions.
Flexibility in planning processes	DK/DK	No indications of problems with excessively rigid planning process
Garbage in, garbage out: avoiding manipulation	DK/DK	No problems noted with manipulation of the system to achieve particular results
Ease of use	**/o	In perception of one user, system "makes it so easy". But would like in Windows. Not mentioned as barrier to usage by the non-users in the distributor.
A degree of calculated imprecision	DK/DK	The only comments about the system's role in prompting for data were positive. This may relate to the poverty of data previously available: perhaps as data improves, this success factor may be encountered if endeavours are made to provide exact information.

Key: see Table 8-2 on p167

8.7 Case 6: An engineering company

8.7.1 Case description

Background

This engineering firm formed part of a larger South African engineering group. With a few hundred employees, a high proportion of its revenue came from one product line, in which the firm was a significant world player. The several years of the current managing director's tenure had been broadly successful, perhaps contributing to his seemingly substantial autonomy in running the business.

Like several of the other organisations studied, though, the economic environment was changing. Substantial export incentives based on the amount of local raw materials in the product were about to come to an end, and changing product requirements were requiring more material to be imported at higher cost. A number of new producers had appeared worldwide in the previous year, exacerbating a significant world over-capacity. Even the local market, which the company had previously dominated, was now more competitive. These changes led to the widespread perception that the firm was not fully competitive on the international market, and that costs would need to be cut.

As well as the major product-line, a number of related product lines also contributed to the organisation's revenue. One example was the supply of equipment to the South African wine industry. Each major product line was under the control of a business unit manager, who was held responsible for the business in that area, to the extent that in the view of one member of the management team, the managing director:

> "supports a boxed situation. When people are responsible for a product group, he's saying they don't have to talk to anyone else."

According to another interviewee, this led to communication difficulties.

> "One of the real problems in this company is communicating...we get fed all kinds of unreasonable requests as we see it...We would be much better having ongoing strategic planning sessions, where everybody understood what they were trying to do."

One of the organisation's perceived strengths was its in-house design capability. As well as enabling the firm to meet special requirements, this enabled swift product changes to address the shifting requirements for the standard products that formed the bulk of the revenue. Another perceived strength was high quality, though this was thought to have been eroded recently. These strengths were thought, however, to be no substitute for low prices in the main product line, in which world prices were precisely determined with little variation between suppliers and much buying on price. A high volume, as well as being necessary to achieve the firm's market share objectives, was important in order to use the high capacity - thought to be the largest in the world - and to cover the large overheads that this capacity and the company's design skills implied. The situation was summarised by one director:

> "We've been successful up to date, but not as successful as we ought to have been...Over the years, we've made a number of very serious blunders...We are probably at a watershed now."

Introduction of the system and of marketing planning

The managing director's style, to quote one interviewee, was:

> "very ad-hoc. He has a good feel for the markets, and has a very good ability to see a gap and take it".

In group discussions,

> "he's very dominant...He gets bored immediately in that sort of meeting."

A three-year plan was produced for the holding company, but by the managing director in isolation:

> "He goes to his home in the mountains and bashes it out in two days, and that's it, it gets presented up the line. That's no good, that's a load of rubbish. Obviously it has to be the result of some thought and agreement."

Not surprisingly, perhaps, obtaining the EXMAR system was not the idea of the managing director. The previous managing director, now promoted to chairman of the holding company, obtained the system and asked his successor to use it. The distributor arrived to demonstrate the system, but the MD reportedly:

> "arrived with his portable phone and disappeared after ten minutes...It was actually a disaster."

As a result, according to one interviewee,

> "I'm not convinced that [the MD] knows what we mean when we try to define market attractiveness and when we define critical success factors."

The marketing director was nevertheless enthusiastic about the system:

> "I really like the structured approach, because otherwise you're going by the seat of your pants."

As part of his function of "coordinating marketing effort", he hoped to use the system to work with business units in order to develop marketing plans, and break down the barriers that he perceived between functions.

The system was initially used, with the distributor facilitating, in a two-day planning exercise for the wine industry business unit, on the basis that this was a market where adequate information was thought to be available. Other than the business unit director, other functions such as design and marketing were represented by their directors. The MD was presented the results of the exercise. As far as he was concerned, the results of the process told him nothing new:

> "We fed in what we knew, and the software jiggled it around and gave us the answers that we knew. I suppose it's predictable."

He nevertheless allowed the marketing director to conduct a further exercise with the company's main product line. The business unit director post was temporarily vacant, however, and the information was being provided on paper proformas by the MD at his insistence, on the grounds that he was the most knowledgeable person about the product line. A colleague was concerned about this development:

> "Because he's putting the input in, he's going to say, 'we're getting out what I put in'. The process that we're going through is wrong. [The wine industry planning] was not bad: we had some group discussions. All the other areas we're not having group discussions."

Impacts of the system

Communication: development of a shared strategy

The three board members present in the first two-day planning exercise regarded this kind of group planning activity as useful:

> "For me, the real benefit is to actually have these discussions"

> "I think there's a lot of value in going through a structured process where everyone comes to some agreement on what makes an industry work and what we should be doing."

> "I think everyone in the division should be participating, together with the workshops. At the moment it's a very us and them situation. We bring enquiries back from customers, and at times we don't get much cooperation from the workshops..."

A business unit director reflected on the role of the system during the exercise:

> "Our eyes have been opened to a number of issues. We have got to give the customer what he wants. Our price has to be market related, and we must try and engineer our costs down. We have also written that we need to offer a fuller service to the market, not just the [raw product]. We are looking at tying up with other companies, so we can offer a full package...We had ideas of what we wanted to do, but through EXMAR we got a better perception of how we should do it and how we can monitor it. The beauty of EXMAR is also that you can play around with scenarios, and you get results very quickly."

The managing director, though, did not perceive a need for better communication amongst managers:

> "I think it does spread knowledge. [But] The product lines here are pretty well segmented, and they're run on the basis of small businesses. They will know 99% of their business...The guy that's building [one product line] - it has very little benefit to tell him what's happening in [another product line]."

One interviewee, however, believed that the managing director was in fact influenced by what was said to him in group discussions, even though at the time he claimed that it was all known before:

> "When [a colleague] and I had a discussion with him about two or three weeks ago, there were a lot of points we came up with that he regurgitated about a week later. I don't mind that."

Information needs

As with the benefits of group communication, the impact of the system and the associated planning exercise on information needs were disputed between the managing director and the other interviewees. In the managing director's view, the relevant information was already available:

> "The information is there. People make decisions on that information. EXMAR was put in to force people to go through a strategic planning exercise, rather than taking the easy short cut of picking up the information and taking a rational decision."

Critical success factors, for example, are:

> "..going to be the same for every product. First is price. Quality is a given: either you're above the quality, or you're not. Next is delivery, then there's backup service, then the up-front service that you give...If you have that, you'll be the magic supplier. And you can trade some off for others: in the business we're in, you can trade off price for delivery. Again, that we know already...It doesn't take a brain surgeon to work it out."

> Interviewer: "And do you think you know how you stack up against the competitors on those, or do you need feedback from them?"

"Yes, I think we do know."

Interviewer: "If you asked your clients, do you think you would get any surprises?"

"No."

The other interviewees disagreed:

"No doubt there's merit in forcing you to talk to your clients, and structuring it... My personal view is its [this business unit's] future looks pretty grim, in terms of the way that we've traditionally handled it. It means a complete shift in terms of the products that we offer to the market.. I'm sceptical that we can define five or six factors that apply to all of our products...We have spent money in sending workshop guys overseas, but it's an ad hoc thing. When you need to buy the loyalty of the guys for another four years, you send them overseas."

"We have to ask our clients. We think we know but I guess we don't really know"

"What came out was that the information was relatively good but on a small section of the market."

Interviewer: "What would you say to the suggestion that senior management already know the critical success factors in its markets and so on?"

"I don't believe we do have answers as yet. We have some. [This company] has been a product focused company, and not a market focused company. Our products have also been specific to certain customers..."

Factors for success

There were differing opinions, then, on the need for formal planning in the organisation, and in particular on the benefits of group planning sessions and information collecting activities. Irrespective of who is right on these issues, a question which falls beyond our scope, the case does shed light on some conditions which hinder the prospects for the system being beneficial, assuming that a decision to use it is taken. We will discuss top management support, sufficiently wide involvement, and the issue of making system use compulsory.

Top management support and definition of the planning team

One interviewee felt that the lukewarm top management support meant that he could not assemble the planning team he thought to be necessary:

"You can see he's pretty negative about what we have done...The executives follow his lead: if they see he's not enthusiastic, don't expect any enthusiasm from them."

The planning team for the planning exercise in progress for the main product line consisted solely of the managing director. One observer commented:

"We're not differentiating between markets in any way whatsoever. I venture to suggest that there are some differences...[I believe] that the structure is the right structure, and that ultimately it will produce something that's worthwhile. The real difficulty is that when the inputs are coming in from one source, then the outputs will reflect that."

Another interviewee agreed that top management support was a difficulty:

"My only problem is that it's going too slowly."

Interviewer: "Why, in your perception?"

"Can I switch this off?"

After a discussion without the tape recorder, the conversation continued:

Interviewer: "You have said EXMAR isn't being driven top down. How do you envisage managing that fact?"

"If we can prove to ourselves that it works, and make it work, and get results from it, it may change the attitude."

Empowering not controlling

The managing director's lukewarm support could be regarded as a consequence of his being told to use the system by his holding company. We have seen that this was tending to lead to superficial planning which yielded little of value. A business unit director also felt that compulsory attendance at the first planning session had not helped:

"A few were very enthusiastic about it. Some didn't bother to attend. I think it was because people were told to attend - they were told 'I want it working in three months' time' - and then there wasn't commitment from the top. I admire [the facilitator] for putting up with people walking in and out."

8.7.2 Benefits

Additional and modified benefits arising from case

None

Table 8-24: Case 6 support for benefits

Benefit	Rating	Notes, illustrative quotations
Improve support for the planning process	DK	No previous paper planning process, and EXMAR only partially implemented, so difficult to assess
Enable maintenance of a live marketing model	NA	Too early in system usage to assess. No mention of this as an objective.
Aid use of marketing tools through calculations, graphical display, guidance on use	DK	No direct comparison with previous experience within the company. A business unit director: "In my previous company, I attended a number of strategic planning seminars and workshops. Everyone leaves very enthusiastically after the seminar, but nothing happens. It's a lot of manual work, there's no computer support. This time, something has happened, but it's happening too slowly."
Aid identification of data requirements, improving accuracy and availability	DK	A business unit director anticipated benefits: "It has a structured method of approaching customers, getting feedback from customers, so all that is certainly going to assist us...EXMAR is a tool that would make our lives a lot easier to build up an information system and to monitor, and use to make decisions" But managing director did not.
Save time compared with equivalent paper planning, particularly on revisions	DK	The only previous paper planning was by MD in isolation, so comparison difficult. Not mentioned as an objective.
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	DK	Participants in group planning exercise thought discussion was valuable in terms of mutual understanding. Managing director believed that "it does spread knowledge" but that this was not necessary. As group discussions of strategy were not common, difficult to isolate impact of the system from the impact of the planning process.

Ease integration of functional perspectives	NA	No attempts known to integrate marketing strategy with viewpoints of other functions (although other functions were represented in planning session)
Improve plan credibility & confidence	DK	Perhaps a hoped-for benefit: "it forces you to go through the fundamentals so that you have some faith in what it tells you." "I think there's a lot of value in going through a structured process...something you can substantiate by the work you've put in." No clear impact on credibility of the first plan developed with the system's support
Aid individual and group learning about marketing planning	DK	"The only thing that came out quite strongly was the importance of customer focus - it's essential to get the opinions of our clients on certain things...those who had been through the EXMAR process realise that to build up to the directional policy matrix it's essential to get how the market views you."
Increase marketing planning confidence and enthusiasm	SF	Marketing director "very enthusiastic about the structured approach" that underlies system, but in the absence of clear top management support, the emotional impact can in general be described as conflict rather than enthusiasm. Some determination, though: "We will get it going. We must get it going." "I will plug on in the belief that it is the right structure"
Help to manage complexity of multiple-level plans	NA	Not applied to multiple levels of the business as yet.

Key: see Table 8-1 on p167

8.7.3 Success factors

Table 8-25: Case 6 success factors modified

Sufficiently wide team definition	The planning team needs to be sufficiently wide to incorporate the perspectives of those with relevant market experience, and sufficiently senior to act on insights reached. <u>Obtaining cross-functional or director-level input on paper is not generally as successful as active involvement.</u>

Table 8-26: Case 6 support for success factors

Success factor	Presence/ influence	Notes, illustrative quotations
A market orientation, or the perception of the need for it	**/+	While the managing director endeavoured to satisfy customers' demands, he was thought by some to have an exaggerated view of his knowledge of their requirements and of the competitive environment. There were suggestions also that internal communication inadequacies led to less responsiveness to customer needs than was desirable. The difference of opinion on the need for information seemed related to the managing director's assessment of the system's utility, as without collection of external data, the system simply reflected his own views.
Absence of excessive short-term pressures	DK/DK	No indications that short-term pressures were preventing system use or restricting its utility.
Presence of a system champion and sponsor	**/++	Marketing director acted as champion, but reluctant and limited approval from managing director who could not be described as a sponsor. This led directly to insufficiently wide team definition.

System perceived as empowering not controlling	**/++	Both the managing director and, in turn, some of his managers used the system due to mandatory requirement from holding company: this seems to have contributed to cursory planning. Some managers, though, felt empowered by the system.
Sufficiently wide team definition	*/++	In the absence of external data, the use of a planning team would at least allow the possibility of insights to be gained from one another. But the MD's decision to provide all input to the second planning exercise himself guaranteed, in the view of one interviewee, that the exercise would simply confirm what he already believed.
Adequate training	**/+	The MD's absence from the demonstration and facilitated planning session led to him misunderstanding system concepts, in the view of one colleague.
Adequate facilitation	DK/DK	No criticisms of facilitation: "[Name] as a facilitator I find to be a person that put the message across very clearly and in a simple manner. It certainly made the whole process very simple...I couldn't really fault him. Perhaps all he did wrong was not to insist that somebody from the top should be there."
Coordination of system use with planning cycle	DK/DK	Not explored in interviews.
Appropriate planning units	***/o	The scope of the first planning exercise and the segmentation used were not disputed and did not seem inappropriate. One director thought that the main product line, the subject of the second exercise, " might be more difficult than the other areas, because of the way they are sold. There's all sorts of wheeling and dealing that happens because it's offshore money."
Flexibility in planning processes	DK/DK	No indications of excessively rigid processes
Garbage in, garbage out: avoiding manipulation	DK/DK	No suggestions that the system might be manipulated.
Ease of use	**/o	Some things that "annoy the hell out of me", such as the difficulty in editing screens when they are printed out, and the need for an expensive Postscript printer. Ease of learning criticised: "It's a struggle when you first start using it." No suggestions that these issues were significant determinants of the system's utility.
A degree of calculated imprecision	DK/DK	No indications of excessively exact attempts to gather information.

Key: see Table 8-2 on p167

8.8 Summary: benefits

8.8.1 Propositions arising from cases

Table 8-27 summarises the propositions regarding system benefits derived inductively from the cases. Where a proposition was modified after its initial formulation, the text from the latest modification is used.

Table 8-27: Benefit propositions arising from cases

Improve support for planning process	The system can provide a consistent, logical process to follow, of particular value to users inexperienced in marketing planning. Navigation facilities, status feedback and online help can result in better process support than equivalent paper-based systems.
Enable maintenance of a live marketing model, where plans form periodic snapshots	The system can form the repository for "live" electronic plans, updated periodically, from which annual snapshots are taken for formal presentation.
Aid use of marketing tools through calculations, graphical display, guidance on use	Marketing tools can be more easily used with appropriate system support, due to calculations and graphical display, reuse of data between techniques, and guidance on their application. Hence in limited time, tools are more likely to be used. This can update the users' intuition on their markets and their place within them.
Aid identification of data requirements, improving accuracy & availability	Systems can assist with identification of critical data requirements. This can help target market research and specify marketing information systems, as well as clarifying assumptions where data is absent. In time this can lead to better availability of accurate data.
Save time compared with equivalent paper planning, particularly on revisions	A time investment in learning systems is needed, unless a facilitator is used. Once this has been made, systems can save time compared with equivalent paper planning, due particularly to calculations and graphical display, especially when revising existing plans.
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	DSS support for fast iteration facilitates collaborative workshops. Incorporation of a planning process provides a readily agreed agenda. These can result in better focused discussions, better mutual understanding and greater consensus about the strategies that emerge. The system can depersonalise disagreements, leading to more equal participation.
Ease integration of functional perspectives	The electronic medium can facilitate the integration of the marketing plan with analyses from different functional perspectives to form a convenient and internally consistent aid to strategy debates.
Improve plan credibility and confidence	The resulting plan is more credible than it would otherwise be, and its authors have more confidence in it.
Aid individual and group learning about marketing planning	Through planning with the system, users learn to apply the process and techniques it includes, knowledge they can apply in future planning, whether DSS-aided or not.
Increase marketing planning confidence and enthusiasm	For many managers, the learning effect of systems adds to their confidence in their marketing planning skills, and their enthusiasm for marketing strategy activities.
Help to manage complexity of multiple-level plans	The system can help to manage the complexity of planning at more than one organisational level by ensuring consistency in planning, aiding comparison across SBUs; allowing a shared representation of the hierarchy of product-markets; and aggregating data from several business units to form the basis of a higher-level plan.

8.8.2 Support for propositions

Table 8-28 summarises the extent to which the cases support the propositions. The benefits are grouped according to the group of marketing planning barriers most likely to be impacted by the benefit (see chapter 2). Blank cells indicate that the hypothesised benefit was generated from a later case. "Ease integration of functional perspectives", for example, was generated from the analysis of case 4. For the key to ratings see Table 8-1 on page 167.

Benefits supported by cases

Within this group of benefits, at least one case provided support for the proposition (rated as ++), while no case provided contradictory evidence.

Support group planning. The system can focus group planning sessions around the structured process it incorporates (cases 1 and 5), and can enable the views expressed and the data provided to be quickly reflected in a common format provided by the screen display, typically projected using an OHP. The system can thereby aid communication between participants. The evidence in case 1 is strengthened by comparison with previous paper planning. Case 3 suggests that this benefit may apply to collaborative planning with immediate customers, while case 4 suggests that the common representation provided by the system can help with communication of proposed strategies, as well as discussion of the preceding analysis of the current situation.

Aid use of marketing tools. Use of analytical marketing tools is easier with computer support than on paper, due to calculations, graphical display and guidance on the use and interpretation of tools (cases 2 and 3). In addition, the efficiency benefits of re-use of data between different tools were shown by case 2: once entered, data can be readily re-used in different analyses. Cases 1, 4 and 5 are also consistent with the proposition, though inconclusive.

Benefits with limited support

Within this group, while the research is consistent with the hypothesised benefit, rival hypotheses cannot be ruled out.

Aid individual and group learning about marketing planning. Interviewees in cases 1, 2, 4 and 5 believed the system to be a learning aid for staff inexperienced in marketing planning. However, the possibility that the cited benefits were in fact due to the accompanying introduction of a planning process or the presence of a facilitator could not be ruled out. In case 3, where staff were already educated and experienced in paper-based marketing planning, learning benefits were not cited, except for customers who were involved in planning sessions; similarly, the MBA-educated system champion in case 1 felt the system had taught him nothing. Opinions differed on whether the system complemented other learning methods such as reading, or replaced them (e.g. cases 1, 2 and 4), an interviewee in case 2 for example regarding prior reading as essential in order to understand "where it's coming from". There were likewise differing views on whether the system itself influenced fundamental attitudes or just had more technical and specific learning benefits, an interviewee in case 6 for example claiming an effect on "customer focus", while in case 4 a "market orientation" was regarded by some as an essential prerequisite.

Table 8-28: Support for propositions - benefits

Benefit	Case 1	Case 2	Case 3
Roles people play Support group planning, focusing debate & improving consensus	++ Structure & "what-if" facility helped coordinate sessions	NA Group planning occurred off-line, with results then keyed in	+ When planning with immediate customers, helps with mutual understanding
Ease integration of functional perspectives			
Cognitive Aid use of marketing tools via calculations, graphics, guidance	+ Tools helped "see where we were going"	++ Calculation, graphical display, guidance cited	++ Easier than paper. Modifies gut feel & resource allocation
Aid individual and group learning about marketing planning	+ Thought to be effective learning tool for inexperienced	+ Theory understood better having been applied with system	NA Thorough prior paper planning & training
Systems/procedures Enable live mkting model with periodic snapshots for plans			DK Regular updates desired but in the main not yet realised
Help to manage complexity of multi-level plans			
Improve plan credibility and confidence			+ Staff background lends credence to IT-supported plans
Improve support for planning process	++ Favourable comparison with paper planning	++ System almost forced good practice - "formal discipline"	+ Some comments that system structures process better
Resources Save time, particularly on revisions	+ Input validation & ease of iteration claimed to save time	+ Specific time savings on tool usage, result more analysis	+ "Very significant" savings but not direct comparison vs paper
Organisational environment/culture Increase marketing planning confidence and enthusiasm		+ Feedback of group views in printouts thought motivational	+/- Outputs increased enthusiasm but process hard work
Data Identify data require-ments, improving accuracy, availability	+ Database restructure attributed to system	+ Market research resulted from use - but could be process	+ System credibility quoted as motivating data collection

Benefit	Case 4	Case 5	Case 6
Roles people play Support group planning, focusing debate & improving consensus	+ System's role in aiding communication of strategies stressed	+ Cited as clear benefit by champion, but could be due to process & facilitation	DK Discussion mostly thought valuable but role of system unclear
Ease integration of functional perspectives	DK Aim of integrating output with finance data in EIS	DK No plans known to integrate with data from other functions	NA No attempts known to integrate with other functions
Cognitive Aid use of marketing tools via calculations, graphics, guidance	+ Updates "gut feel", but no clear comparison vs paper	+ Calculations, graphics thought to aid interactive tool use	DK No direct comparison with previous experience
Aid individual and group learning about marketing planning	+ Learning benefits perceived but not in basic attitudes	+ Putting theory into practice with tool reinforces learning	DK Effect on "customer focus" claimed, not by MD
Systems/procedures Enable live mkting model with periodic snapshots for plans	DK Continuing updates intended by some but not realised yet	SF In absence of sponsor, system use ceased before updates	DK Too early to assess. No mention of this as an objective
Help to manage complexity of multi-level plans	x Aggregation an unmet requirement: intention to use EIS	NA Plans only developed at one level	NA Not applied to multiple levels of the business as yet
Improve plan credibility and confidence	+ Transparency of rationale claimed to improve credibility	+ Commitment of team to plan claimed due to involvement	DK No clear impact on credibility. Hoped-for benefit
Improve support for planning process	+/- Structures process but danger of cost in flexibility	DK Insufficient information to assess	DK Difficult as no prior paper planning & limited system use
Resources Save time, particularly on revisions	DK Difficult to compare with parallel paper planning	DK A motivation for possible future use, but no gains quoted	DK Only prior planning was by MD: comparison hard.
Organisational environment/culture Increase marketing planning confidence and enthusiasm	+/- Yes for some, but some "horrified" by amount of work	+ Champion more confident due to learning impact	SF Without sponsor, effect is conflict not enthusiasm
Data Identify data requirements, improving accuracy, availability	+ Market research attributed to system, but could be process	+ System seems less easy to leave blank than paper form	DK Benefits anticipated by some but not by MD

Benefits with limited support (continued)

Improve plan credibility and confidence. The system was claimed to improve the credibility of the resulting plan in cases 3, 4 and 5. Reasons quoted were that the rationale for proposed strategies is more thoroughly argued and better presented than previously (cases 3, 4 and 5), and that system-facilitated group planning sessions lead to greater commitment due to wider involvement (case 5). It seems plausible, though, that these effects could have been obtained without computer support. A further 'irrational' factor cited in case 3 is the credibility of IT-supported plans in a technologically based company with many "system-driven individuals".

Save time, particularly on revisions. Time savings were cited in cases 1, 2 and 3, due to input validation, calculations, graphical display and the ease of iteration, but the comparison with previous paper planning was difficult as the comparison was not direct. In case 3, for example, while the facilitator thought that savings were "very significant", introduction of the system had been accompanied by wider involvement in planning, which required time to build consensus. The system also needed to be learnt before any savings could be made (cases 1 and 4). Greater time savings were anticipated, but not yet realised, when plans were revised (case 3).

Aid identification of data requirements. Market research (cases 2 and 4) and database restructuring activities (case 1) seem to have been caused by system-aided planning exercises. But the causal mechanism seems to have been simply the prompting for information on the screen, suggesting that a directly equivalent paper procedure would have the same effect. In case 3, a different mechanism was cited: that the system's credibility inspired staff to make more efforts in data collection. Case 5 also raised the possibility that a system may be perceived as less easy to leave blank than a paper form, thus "forcing" users to collect information. The related drawback of this 'irrational' effect, that users may seek unnecessary accuracy, is discussed under 'success factors' below.

Benefits with mixed support

Here, the evidence from the cases is partly positive and partly negative.

Improve support for planning process. The system provides a degree, if not of "compulsion" (case 1), then at least of strong encouragement (case 2), to complete a number of standardised steps, although the ordering of the steps is fluid. This process support, provided via navigation facilities, status feedback and online help, helps to ensure completeness of the process (case 4), and is particularly valued by users inexperienced in planning (case 4). However, case 4 raised the danger that the system might thereby encourage insufficient flexibility in the process followed. This is further discussed under the success factor "Flexibility in planning processes" below.

Increase marketing planning confidence and enthusiasm. The learning effect of the system may increase the confidence of users subsequently (case 5), and feeding back the views of participants with a smart, graphical system output may be motivational (case 2). But the system's encouragement of a thorough process can result in planning being harder work than previously, leaving some actual or potential users daunted by the prospect (cases 3 and 4). Case 6 suggests that in the absence of strong top management support, the effect may better be described as conflict than as enthusiasm.

Benefits where cases provide little evidence

Here, the cases raise the benefit as a hypothesis, but provide little evidence as to whether the benefit is, or may be, obtained by system users.

Ease integration of functional perspectives. This hypothesis was raised by case 4, where the organisation intended to integrate EXMAR data with data from other functions, particularly financial data, in an executive information system, using an EIS development tool. This had not yet been done at the time of the interviews, though, so it is not possible to assess whether the system does indeed ease this integration of functional perspectives.

Enable live marketing model. Cases 3 and 4 raised the vision of using the system as a repository for "live" electronic plans, updated periodically, from which annual snapshots are taken for formal presentation. Although the system's perceived ease of iteration was expected to aid this vision, it was not as yet realised in any of the cases, as little revision of plans had as yet occurred.

Benefits not supported

Here, the cases raise the benefit as a hypothesis, but provide evidence that the benefit has not been obtained despite conditions where it has an opportunity to be present.

Help to manage complexity of multiple-level plans. In case 4, the aggregation of plans from each SBU into a higher-level plan was a desire that was not met by the system. The company intended to use a separate system for this purpose.

8.8.3 Exploration of causality

The discussion of system benefits, within individual cases and in the summary above, has included discussion of the mechanisms by which the hypothesised benefits are achieved. In Figure 8-1 we summarise diagrammatically this relationship between system features and the aspects of planning that are affected by the features. The list of features is based on that used in our description of EXMAR (section 6.4, **Nature of system support**); the impacts are selected from the theoretical framework presented in section 3.7, with various adaptations. For simplicity we omit repetition of the strength of support for benefits from the brief discussion that follows.

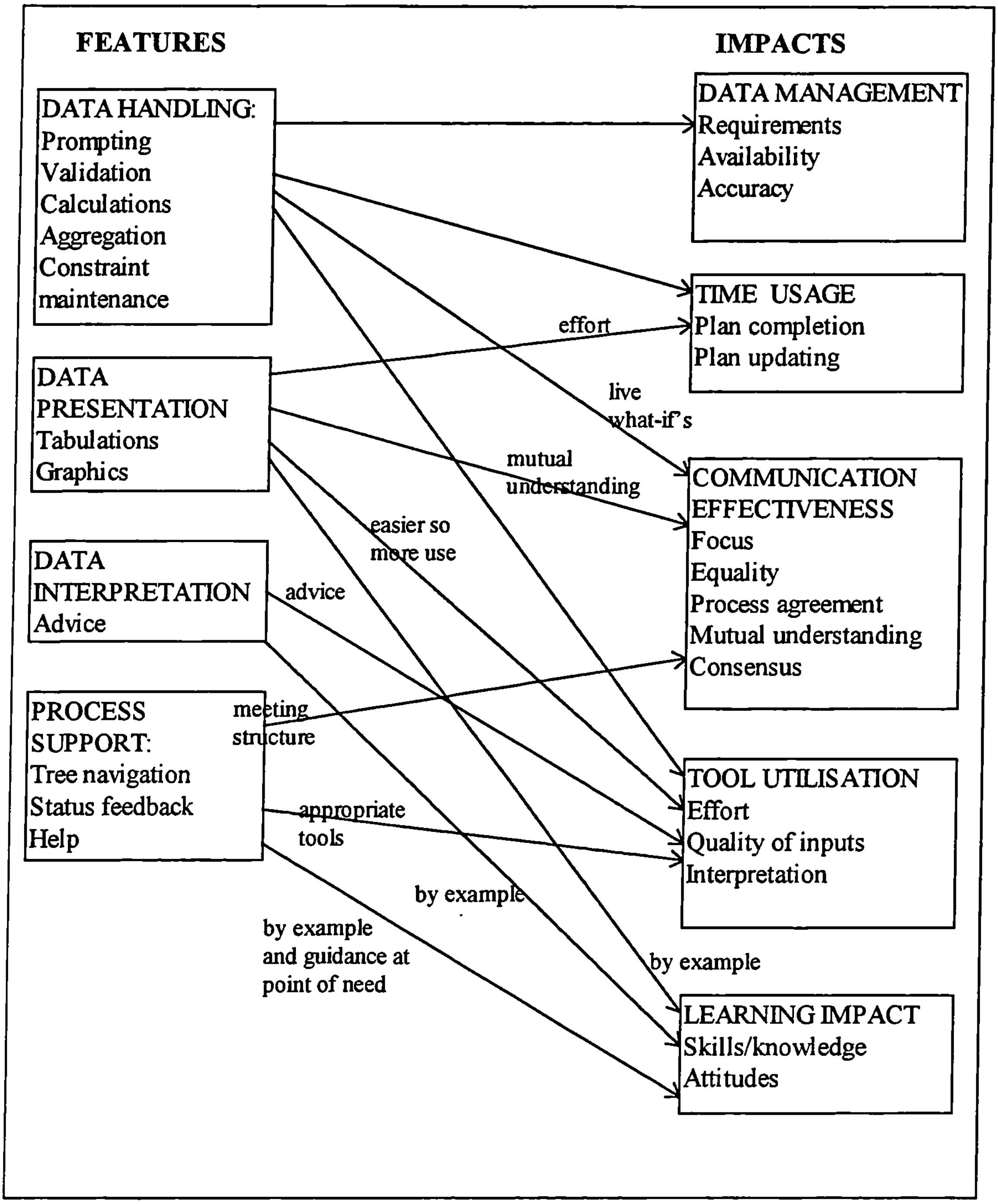
The system's data handling facilities most obviously affect data management. Prompting for data can affect awareness of data requirements. This may in turn affect data availability. The system's validation of data entry, and maintenance of constraints between numbers entered such as the relationship between market size, market share and revenue, can improve data accuracy. Data handling facilities can also save time, and can aid in group communication sessions through the facility to re-enter data items and rapidly see the response on dependent data items or graphical displays. Finally, data handling facilities can aid the use of marketing tools through reduced effort and improved quality of the inputs.

Data presentation, whether in the form of graphical displays or retabulations of input data in a different format, can save time when this presentation is desired as part of the plan, and where the display corresponds to a 'marketing tool' such as a portfolio matrix, can reduce the effort required in the tool's use. The presentation of the user's inputs in a standardised form such as a portfolio matrix, a product life cycle or gap analysis can also have a learning effect. Graphical presentations may aid with mutual understanding within a group.

Data interpretation assistance in the form of advice can help with the interpretation of marketing tools, and can also have a learning effect.

Support for a planning process can help to structure planning meetings. It can also help to select an appropriate tool for the relevant stage of the process. As with other aspects of the system, it can have a learning impact by example, and through the convenient availability of 'textbook' guidance relevant to the step being performed.

Figure 8-1: Major relationships between features and process/learning variables



8.9 Summary: success factors

8.9.1 Propositions arising from cases

Table 8-29 summarises the propositions regarding successes derived inductively from the cases. Where a proposition was modified after its initial formulation, the text from the latest modification is used.

Table 8-29: Success factor propositions arising from cases

A market orientation, or the perception of the need for it	The organisation needs a market orientation, or at least the perception of the need to increase market orientation, for marketing planning to be accepted, whether computer-aided or not.
Absence of excessive short-term pressures	If short-term pressures are such that relevant managers do not have sufficient time and motivation for strategic planning, whether due to short-term remuneration policies, market conditions or other reasons, any system use is cursory and of limited utility
Presence of a system champion and sponsor	Two important roles are a champion to drive the process of system introduction, and a senior level sponsor to provide a supportive environment.
System perceived as empowering not controlling	A system that is seen as empowering will gain better-quality results than one which is seen as controlling.
Sufficiently wide team definition	The planning team needs to be sufficiently wide to incorporate the perspectives of those with relevant market experience, and sufficiently senior to act on insights reached. Obtaining cross-functional or director-level input on paper is not generally as successful as active involvement.
Adequate training	Training is needed both in how to use the system, and in how to apply underlying concepts. Facilitation may partially substitute for training.
Adequate facilitation	A facilitator can complement the system in tasks such as market segmentation, and can help to manage time and enhance the learning process for inexperienced users. Good facilitators are knowledgeable about marketing theory and cautious with advice.
Coordination of system use with planning cycle	Where formal planning processes are strong, system use outside them may restrict the extent to which the strategy is influenced by the planning exercise.
Appropriate planning units	The definition of the business unit and its component products and markets are crucial. Judgements required include the right level of detail for bottom-level segments and the order in which multi-level plans are developed. It is important not to follow an inappropriate organisational structure, eg a product-based one.
Flexibility in planning processes	Procedures, whether on paper or incorporated in a system, should be followed flexibly to avoid hampering creativity. For example, inexperienced users can exhibit a "new convert effect", assuming that the marketing technique they have just learned about on the system is the answer to all problems, and interpreting it dogmatically. Given that a single model is a simplifying perspective on reality, other perspectives may be needed to gain a balanced picture. Users may at first be mechanistic
Garbage in, garbage out: avoiding manipulation	The system's outputs are determined by the user's inputs. Until this is recognised, users may doubt the tool, and those in receipt of outputs may be subject to manipulation for political reasons.
Ease of use	Ease of use, and particularly, ease of learning, help to motivate users, and to reduce the difficulties when staff and roles change.
A degree of calculated imprecision	Although good-quality inputs are important, obtaining exact information may be a time-consuming diversion.

8.9.2 Support for propositions

Table 8-30 summarises the extent to which the cases support the propositions. The factors are ordered in approximate order of support for the proposition, starting with the most strongly supported proposition. Blank cells indicate that the hypothesised success factor was generated from a later case. Each entry begins with the two ratings for factor presence and factor influence, separated by a "/". See the key in **Table 8-2** for further details.

Table 8-30: Support for propositions - success factors

Success factor	Case 1	Case 2	Case 3
Presence of system champion & sponsor	***/+ MD sponsor, HR director champion	***/+ When MD (both roles) deflected, planning slowed	**/+ Half-hearted support from mkt. dir. may have slowed
Ease of use	**/++ Usability flaws prevented use of some facilities	**/o No criticisms made, but most use was by facilitator	**/+ Some daunted by system - seems linked to training
Sufficiently wide team definition		**/+ Plans with wider involvement found more useful	**/+ Planning in teams. Production absent: role unclear
System perceived as empowering rather than controlling		***/+ Feeling that "machine is working for them" helpful	DK/DK Little evidence
Appropriate planning units			
Coordination of system use with planning cycle	**/+ Use after objectives had been set restricted utility	**/o Formal plans not strong; ad-hoc use still influential	**/DK Roughly tied with planning cycle. Importance unclear
Adequate training	*/+ Poor training hampered, but OK with facilitator.	***/+ Computer-literate users were adequately trained	*/+ Little training. This put potential users off
Market orientation, or perception of need for it			
Garbage in, garbage out: avoiding manipulation	**/+ Need to avoid manipulation felt strongly	***/o No problems seen of manipulation or fear of it	DK/DK No suggestions that manipulation an issue
Flexibility in planning processes	**/+ Mechanistic, "box thinking" a danger	***/o No signs of inflexible procedures or dogmatic analysis	DK/DK No evidence
Absence of excessive short-term pressures			**/+ Short-term pressures blamed for lack of plan updating
A degree of calculated imprecision		**/+ Early attempts at exactitude used much time	DK/DK Precision felt important in some cases
Adequate facilitation	***/+ Facilitator helped process & reduced learning need	**/++ Facilitator avoided misunderstandings	*/- Absence of facilitator didn't seem a problem

Success factor	Case 4	Case 5	Case 6
Presence of system champion & sponsor	**/++ Spread of usage slowed when champion moved	**/++ Change in structure removed sponsor, stopping use	**/++ MD reluctant, led to insufficiently wide team definition
Ease of use	*/++ Strong technical criticisms re Windows etc	**/o Windows requested, but not major barrier	**/o Ease of learning criticised, but didn't influence usage
Sufficiently wide team definition	***/+ In one SBU, perhaps team insufficiently senior	***/+ Thought to be a success factor by participants	*/++ Inputs solely from MD ensured no new insights
System perceived as empowering rather than controlling	***/+ Deliberately optional system usage	***/o Perceived as empowering by region	**/++ Mandatory use contributed to cursory planning
Appropriate planning units	**/++ Poor market definition restricted utility of one plan	***/+ Champion thought these decisions important	***/o Segmentation not disputed & seemed appropriate
Coordination of system use with planning cycle	**/+ Planning in advance of one-year cycle felt desirable	***/o System use consistent with planning cycle	DK/DK Not explored
Adequate training	**/+ Best training was "sitting through the facilitations"	***/o Training seemed adequate	**/+ MD's absence from briefings led to misunderstandings
Market orientation, or perception of need for it	**/+ Those who "say profits come from markets" receptive	**/+ Its absence cited as reason for lack of use by distributor	**/+ Diverse views on responsiveness to customer needs
Garbage in, garbage out: avoiding manipulation	**/+ "Dangerous" so board needs to understand system	DK/DK No problems of manipulation noted	DK/DK No discussion
Flexibility in planning processes	**/+ Facilitator could complement system's analyses	DK/DK No signs of excessively rigid process	DK/DK No discussion
Absence of excessive short-term pressures	**/+ 1-year focus & tough conditions maybe reduced use	DK/DK Short-term pressures didn't seem a factor	DK/DK Not quoted as a factor
A degree of calculated imprecision	**/+ Easy to get "hung up" on exact numbers	DK/DK Not explored	DK/DK Not explored
Adequate facilitation	**/+ Need for facilitator neutrality on strategy	DK/DK Little information	DK/DK Some positive remarks re facilitator

Success factors supported by cases

Within this group of factors, at least one case provided clear support for the factor's influence on the system's success, while no case provided contradictory evidence.

Presence of system champion and sponsor. The importance of senior-level support is shown in case 6 by the effects of its absence, and in case 5 where a change in structure removed the previous sponsor, preventing further system use despite lower-level enthusiasm. This is typically complemented by a manager driving the introduction process, who may pioneer its use and encourage colleagues to follow suit: in case 4, for example, the system's spread slowed when the champion moved into a new role. See Table 8-31.

The sponsor seems to provide support, resources and an environment conducive to the system's use, their essential characteristic (according to the system champions at least) being a belief in the importance of marketing planning (case 6), this being accompanied by a sympathy with use of supporting software, of which the sponsor may (case 2) or may not (case 4) have intimate knowledge.

Table 8-31: Senior management support in EXMAR cases

Case	Champion	Sponsor	Notes
1	HR Director	Managing Director	Human Resources director championed in order to develop the skills of his staff
2	Managing Director	Managing Director	MD spent much time on strategy. In time recruited staff post with functions including system champion
3	Marketing executives	Marketing manager	Seeking sponsorship from Managing Director based on early results
4	Marketing planning manager	Managing Director	Champion obtained sponsorship before purchase, then acted as internal facilitator. Use slowed on sideways move of champion
5a	Marketing manager	Head office marketing manager; then none	In "distributor D": Successful and influential use in limited domain, then use stopped
5b	None	None	In "region R": Bought but never tried. Planning roles and procedures in flux.
6	Marketing manager	None	Lobbying for sponsorship, frustration, impact on perceptions of management team but not translated into strategy changes as yet

Ease of use. The system was widely criticised as difficult to learn (cases 1, 3, 4, 6), though not universally (cases 2, 5). This seemed to be one factor affecting system usage (cases 1, 4), but not an overriding one, the system's weaknesses being worked around by many. Related issues were the degree of training and the use of a facilitator, both of which could reduce the perceived difficulties posed by the user interface.

Sufficiently wide team definition. The importance of involving a sufficiently wide team was emphasised by cases 3 and 5; case 4 suggested that the team should also be sufficiently senior. In case 2, those plans developed with wider involvement were found to be more useful. Case 6 showed the problems of planning in isolation, and in particular of providing inputs on paper rather than in an interactive session.

Appropriate planning units. Although the definition of business units, products and markets seemed appropriate for most plans in case 4, the utility of one plan seemed to be significantly restricted by inappropriate market definition. While no similar problems were known in cases 5 and 6, the decisions taken were regarded as important for system success in case 5.

System perceived as empowering not controlling. Beneficial effects on users' attitudes were reported in case 2 when they realised that "the machine is working for them". In case 4, system usage was deliberately optional as the intended benefits related to cultural change as much as better central information. In contrast, the mandatory use in case 6 was a factor in the cursory and probably futile planning being undertaken.

Success factors with limited support

Within this group, while the research is consistent with the hypothesised success factor, rival hypotheses cannot be ruled out. Often this is because of the difficulty of isolating the effect of the factor from the effect of other possible success factors that may have caused the success or otherwise of the system.

Co-ordination of system use with planning cycle. Where a formal planning cycle is well entrenched, as in case 1, system use outside the cycle may have restricted influence on strategy. Case 2 showed, though, that where strategy formation is less formal, the timing may be less critical.

Adequate training. Poor training seems to affect the extent of system use (cases 1 and 3). The close relationship between training and facilitation is shown by case 1, where use of a facilitator sidestepped problems with inadequate training, and by case 4, where the internal facilitator felt she had been trained mainly through observing an experienced user running facilitated sessions. The need for training is also clearly influenced by the system's ease of use.

A market orientation, or at least the perception of a need for it. The term "market orientation" was introduced in this proposition in order to cover a number of comments, some of which we review here in order to make our use of this much-used term more specific. The system champion in case 4 commented that those who did not "say profits come from markets" were not receptive to the system, while on the other hand a marketing manager thought that the system had "brought about that mindswing in terms of a more market focused approach", and another thought that the system "starts to teach people that...there's some business need out there that this thing might satisfy." In case 5, a marketing manager regarded the organisation as not yet having a "marketing orientation" or "marketing focus", citing as evidence his manager's rejection of the notion of a cross-functional planning team on the grounds that the marketing department should produce the marketing plan, and stating this as a reason why the use of the system would be premature. In case 6, the lack of collaborative planning was regarded by a board member as a cause of a lack of responsiveness to enquiries from customers. There was also a difference of opinion on whether information about clients' needs was adequate, or whether the system had the "merit" of "forcing you to talk to your clients", this difference seeming to underlie the different views on the system's utility. The term "market focused" was again used in this case, contrasted by an interviewee with the company's "product focused" legacy.

These comments have in common certain fundamental attitudes and related patterns of organisational behaviour which may form prerequisites to the receptiveness of the organisation to the system. The comments were categorised as follows:

1. General claims of the relevance of "marketing orientation" or a "marketing focus" to the system's success.
2. A belief in the importance of attention to markets as a determinant of business success. This is characterised by the comment concerning "profits come from markets".
3. The importance of collaboration and horizontal communication in ensuring a responsiveness to customers' needs.
4. A responsiveness to customers' needs and the related need to collect information on what they are.

The comments in category 1 suggested our use of "market orientation" as a native category (Chapman and Buckley 1994), but are not sufficiently specific to shed further light on what is meant by the term. The remaining comments were therefore compared against Kohli and Jaworski's (1990) review of the construct of market orientation, and in particular to their definition derived from field interviews:

> "Market orientation is the organizationwide *generation* of market intelligence pertaining to current and future customer needs, *dissemination* of the intelligence across departments, and organizationwide *responsiveness* to it" (Kohli and Jaworski 1990)

Category 4 corresponds to two of Kohli and Jaworski's three aspects of market orientation, intelligence gathering concerning customer needs and responsiveness to them. Their third aspect of dissemination corresponds to category 3. However, the respondents' comments relate to attitudes rather than necessarily to a current reality in the organisation. This is emphasised by category 2, which is most closely related in Kohli and Jaworski's paper to an antecedent of market orientation, "senior management factors" concerning a "marketing state of mind" and its communication.

We conclude that the use of 'market orientation' according to Kohli and Jaworski's definition, complemented by our proposition's qualification concerning the perception of the need for market orientation, covers the data from the cases.

The second issue concerns the strength of support for the claim that market orientation is a prerequisite for system success. On this point, the cases are inconclusive, in that some of the data (e.g. case 6) suggests that it is, while there are other claims that use of the system may modify attitudes in the direction of a higher market orientation.

Garbage in, garbage out: avoiding manipulation. The need to avoid manipulation of the system to achieve a result desired for political or other motives was expressed by many interviewees in cases 1 and 4, though only one interviewee cited an example where manipulation was thought to have actually occurred (case 1). It was important that those in receipt of system outputs understood the subjective nature of some of the data, such as the position of a product-market on the DPM (case 4).

Flexibility in planning processes. The dangers of mechanistic, "box thinking" (case 1), or of the system's process hampering "the free flow of ideas" (case 4), could be countered through advice from a facilitator about technique interpretation and complementary analytical techniques.

Absence of excessive short-term pressures. The need for rapid tactical responses to changing conditions in the lead-up to South Africa's 1994 elections was cited as one reason why plans had not yet been updated in case 3. Tough market conditions were also cited as holding back system usage in a business unit in case 4, as was a one-year focus in the control and reward systems.

A degree of calculated imprecision. Users may feel that information requested on a computer must be exact (case 4), leading to a search for exactitude that may be inappropriate (case 2), at least in some cases (case 3). The relaxation of the precision sought part of the way through the planning in case 2 was felt to be a correct decision both by the managing director and by the researcher.

Success factor with mixed support

Here, the evidence from the cases is mixed.

Adequate facilitation Successful use without a separate facilitator in case 3 shows that the presence of a facilitator is at most optional. However, where present, a facilitator can reduce the learning requirement on other staff (case 1), and avoid misunderstandings of the system and the underlying process (case 2). Cases 1 and 4 suggest that the facilitator needs to stay neutral on the organisation's strategy.

Part 5: Exploration of Generality of Findings

9. Case Studies: Planning Systems for Multiple Product-Markets

9.1 Introduction

9.1.1 Structure of chapter

This chapter explores the extent to which the propositions generated in the previous chapter apply to a wider range of systems, through four case studies, each dealing with a different system of the type we identified as 'planning systems for multiple product-markets' in section 3.5. Cases relating to other types of system are described in the next chapter, which completes this part of the thesis.

The structure is similar to that of the previous chapter. The following sections (9.2 to 9.5) each present one case study. Each section begins with a case description, which summarises the use and impact of the system in the organisation, without reference to hypotheses. This is followed by a summary of the evidence from the case for the propositions that were generated in the EXMAR multiple-case study relating to system benefits and success factors. The final sections, 9.6 and 9.7, integrate the findings from the case studies, covering benefits and success factors respectively. The research method has been explained in section 5.9.

An abbreviated version of the findings of this chapter is given in the Journal of Marketing Management paper in Appendix D (Wilson and McDonald 1996).

9.1.2 Controlling for rival hypotheses

The benefits assessment includes an assessment of the fit of rival hypotheses to the data. Although an individual judgement has been made for each benefit in each case, this judgement is easier in those cases where control for the rival hypothesis is available.

Table 9-1 shows for each case the extent to which a comparable paper planning exercise is available to contrast with system-aided planning. See the introduction to the previous chapter (section 8.1.3 on p168) for a list of rival hypotheses for which this table summarises the control available.

Table 9-1: Controlling for rival hypotheses

	Case A	Case B	Case C	Case D
System use Facilitation	Internal	No	No	Yes
Group planning	Yes	No	Central use: yes Remote use: no	Yes
Learning support	None mentioned	Only online help	Mainly written planning manuals	Process consultancy
Paper comparison When	Previous	Subsequent	Some previous, some parallel	Simultaneous (one planning session not supported by system)
Facilitation	Yes	Yes, internal	No	No
Group planning	Yes	Yes	Centrally: yes Remotely: no	Yes
Forms-based planning process	Yes	Partial	Previous: no Parallel: yes	Yes
Learning support	Courses; marketers well educated	None mentioned	Mainly written planning manuals	No
Notes	Comparison with DPM process prototyped on paper; prior to that, less direct comparison	Unusually, group planning & facilitation success factors were more present in absence of system	Some comparison with previous planning & aspects of planning not automated	Some comparison with session where system not used

9.1.3 Interviewee list

Table 9-2 lists the interviews carried out for the exploration of generality of findings (covered by this chapter and the next). The letter prefix to the interview code is used to refer to the case in this thesis, so for example interviews A1 to A4 refer to case A. Cases A to D are described in this chapter, cases E to H in the next.

Table 9-2: Interview list, exploration of generality of findings

Code	Case description	Interviewee title
A1	R&D portfolio planning, international pharmaceuticals	Strategic planning manager
A2		Market research manager
A3		Product strategy manager
A4		Analyst/programmer
B1	Marketing planning, animal health	VP, Strategic Marketing and European Marketing Manager
B2		Director, Strategic Management
C1	Marketing planning, international ops, pharmaceuticals	Marketing director
C2		Business development manager
C3		Chairman of consultancy
C4		Analyst/programmer for consultancy
C5		Chairman of consultancy & Analyst/programmer
D1	Strategy formation in meat products company	Financial controller & company secretary
D2		Marketing director & marketing manager
E1	Marketing EIS in food products company	General manager, responsible for two brands
E2		Product manager
E3		Product manager
F1	Econometric modelling, food conglomerate	Modelling manager
F2		Representative of software supplier
G1	Econometric modelling, drinks company	Marketing planning manager
G2		Marketing planning manager & marketing planning executive
H1	Planning, speciality chemicals	Group Strategic Planning Manager

9.2 Case A: R&D in a pharmaceuticals company

9.2.1 Case description

The attrition rate of new product developments in the pharmaceutical industry is high, development timescales are long and the R&D investment in a single product can be very large. Not surprisingly, the international marketing group of this pharmaceuticals multinational has changed its focus quite dramatically over the last few years, from concentrating on promotions and sales support for existing products, to spending much of its effort on providing a commercial input to research and development.

The R&D portfolio is overseen by a board level new product development (NPD) committee, which holds a two-day review twice a year. Until recently, the committee was comprised mainly of senior technical staff. Then, in the recollection of the strategic planning manager,

> "we were given a seat at the table. That put us on the spot a little bit. How should we represent our views? There were a whole raft of things that we wanted to get summarised: the key issues, doubtless changing customers, what were the main issues in the therapy areas."

After some investigation, the marketing group decided the directional policy matrix was the appropriate focus to their input to the committee.

Initially the use of the DPM was prototyped on paper, with basic software support using a spreadsheet. A consultant experienced in use of the DPM was enlisted to help to refine the methodology. The local company serving the largest market was closely involved in defining factors and weights. Scoring criteria were defined to standardise the scoring.

A software system was then developed to automate the use of the tool, performing calculations and displaying the matrix. The system also integrated this market-focused summary with various other charts providing technical and financial perspectives, providing an integrated portfolio planning system for the NPD committee. These included a 'development pipeline' chart of the projected release date of new products against their anticipated business strength; an R&D costing system to facilitate budgeting and control; a long-term forecast for existing and new products; and a chart summarising manufacturing risk under the two dimensions of the risks in successfully formulating the drug, and the risks involved in moving from the laboratory to bulk drug production. These are shown in Figure 9-1.

After two and a half years of development and use, the marketing managers were in a position to reflect on the system's utility, aided by an internal survey of those in receipt of its outputs. One cited impact of the system was greater consensus. The strategic planning manager said:

> "The portfolio review is more formalised in that we get transatlantic cross functional teams together to put the final version in a form that we are happy with. The teams do their bit first. They come to a meeting with an agreed view so you don't get the usual internecine bickering."

But could this collection of data as an input to the DPM not be done equally well on paper?

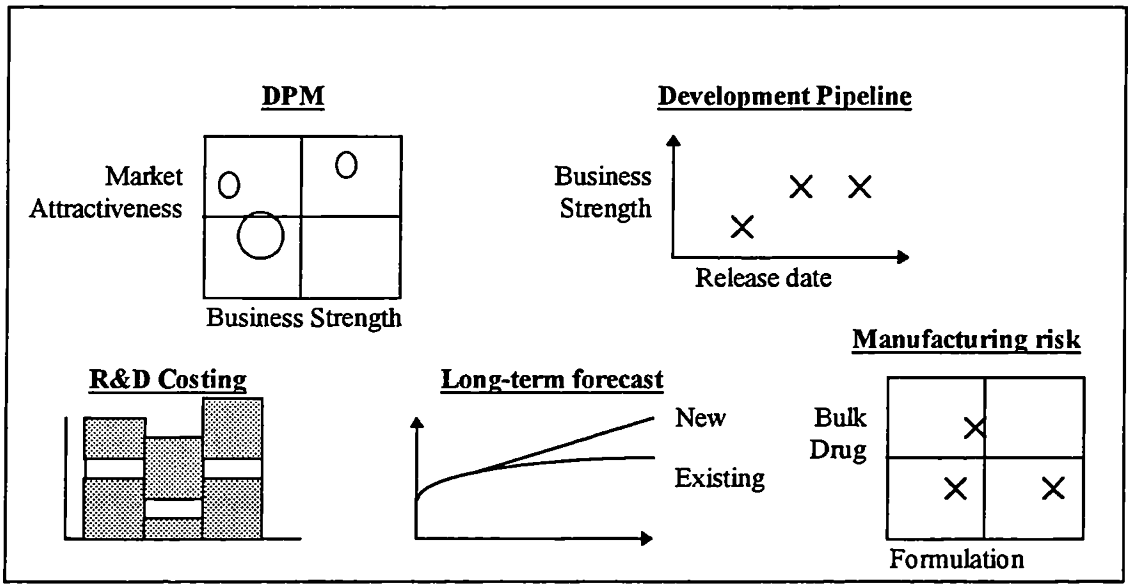
"We did a Delphi for the factor weights. It was a successful way of gaining consensus and defending the weights that resulted. Factor scoring, however, is difficult without the benefit of a facilitator. For that, you really need something that's instant and on-line."

This perceived need was partly because the system made life easier for the facilitator:

"The beauty of that is that you do it once. I've done it on paper and it's tough - you come back with mounds of paper."

But it was also because with software support, ideas were explored as they occurred, either before the meeting or during it, and managers would build confidence in the model

Figure 9-1: R&D planning system in pharmaceuticals company



as they saw how their views would influence the matrix.

Another perceived advantage of software support was in moving away from one-off planning towards the concept of a continuously updated marketing model of the new product portfolio. Whenever and wherever a planning exercise was held for a part of the portfolio, the updated data could be consolidated into the central system's database. Before each review, a snapshot would be taken, "and then they can play with those data - it's an evolution." This building of the model over time could also apply to qualitative data. Previously,

"we were making decisions but we weren't recording how we made them or the assumptions behind them. Our corporate memory was zero".

The software prompted for "real words on the system right there with all the data", to record the rationale for the numbers entered. The prompting for data resulted in data collection activities, which over time were improving the quality of the model. A market research manager reported that the company had joined a syndicated study collecting information on a range of disease areas, as an input to the DPM.

The international marketing team had worked hard to obtain the commitment of the organisation's managers in its major countries, through involving them in the development process and the data input. As well as the benefits that might be gained by the countries themselves, this was necessary in order to obtain good quality data - "It's not the culture of this company to insist - and anyway you can't, truthfully." An exception, in the view of one manager at least, was Japan, where "the culture is such that if someone at HQ says we want you to do this, they do." For providing inputs to the DPM, therefore, "they were the first and most effective organisation." The notion that the quality of Japanese input was less dependent on their conviction of the value of the exercise than that for other countries was not, however, corroborated by interviews with Japanese managers.

9.2.2 Benefits

For the key to the 'Rating' column see **Table 8-1** on p167.

Table 9-3: Case A benefits

Benefit	**Rating**	**Notes, illustrative quotations**
Improve support for planning process	NA	The system doesn't explicitly include process support
Enable a live marketing model	++	The DPM model, and the other functional perspectives, are updated periodically for the NPD committee review meetings. The model can also act as a corporate memory: "We were making decisions but we weren't recording how we made them". Also being considered "at a project level looking at options".
Aid use of marketing tools through calculations, graphical display, guidance on use	++	The DPM is better supported on computer than on paper. Paper alternatives have been tried: "We did a Delphi for the weights... Factor scoring...is difficult without the benefit of a facilitator. For that, you really need something that's instant and on-line." Technique interrelationships are also managed: the DPM and a matrix of business strength against time share data on business strength
Aid identification of data requirements, resulting in improved information accuracy and availability	+	System provides information for decision-making: "structuring the information, encouraging them to make clear, crisp decisions based on the right information". Data gathering may result from the system: "it triggers operational activities because we ask them how sure they are." Eg market research commissioned
Save time, particularly on revisions	+	Main comments concerned time savings for facilitator. Numbers can be changed during the session: "The beauty of that is you do it once. I've done it on paper and it's tough"
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	++	"The portfolio review is more formalised in that we get transatlantic teams together to put the final version in a form that we are happy with. The teams do their bit first. They come to a meeting with an agreed view so you don't get the usual internecine bickering" This consensus building is helped by the on-line exploration of ideas
Ease integration of functional perspectives	++	The DPM is integrated with models from other perspectives: R&D (a risk matrix) and financial (an R&D costing system, and a long-term financial forecast).
Improve plan credibility and confidence	+	As a result of the consensus arising from live what-if's, greater credibility cited for planning outputs: "they were beginning to believe that, first, the output was sensible, met their gut feel which it did".

Aid individual and group learning about marketing planning	DK	Marketing manager re system for board: "The real use is culture change. We were appointed to make them think about the portfolio". Little data directly about marketing planning learning.
Increase marketing planning confidence and enthusiasm	DK	Little direct comment
Help manage complexity of multi-level plans	NA	The planning for which the system is used is essentially on one level: the consideration of potential products.

Key: see **Table 8-1** on p167.

9.2.3 Success Factors

The two hypothesised success factors shown in Table 9-4 relating to the software development method used are in addition to those hypothesised success factors defined in the EXMAR multiple-case study in the previous chapter. As an exception to our normal approach in the previous chapter, they do not arise directly from this case: rather, they arise from the experience of developing EXMAR, described in chapters 5 and 6. As the software development method used for each of the EXMAR cases was, of course, the same, we have left consideration of these success factors until this chapter, in which the varying development methods can be compared, rather than including them in the previous chapter. The impact of EXMAR's development approach is included in the assessment of the support for these factors in case D.

The case's support for all success factors is shown in Table 9-5. For the key to the Factor Presence/Factor Influence columns see **Table 8-2** on p167.

Table 9-4: Case A success factors generated

Development expert driven as well as user driven	While the involvement of potential system users in software development helps to ensure relevance, usability and organisational fit, involvement of a marketing planning expert or experts is also important in order to maximise the benefits of the inclusion of marketing theory in the system design, and to aid the system's role in propagating 'best practice'.
Use prototyping or otherwise allow for iteration	As the theory of marketing planning is imperfectly defined and validated, and the means of support for marketing planning through software are multifarious and only partially explored, prototyping or otherwise iterating as part of the software development is likely to be necessary in order to arrive at a useful and usable system.

Table 9-5: Case A support for success factors

Success factor	**Factor presence**	**Factor influence**	**Notes, illustrative quotations**
A market orientation, or the perception of the need for it	**	+	System was conceived partly to help change the culture. This mixed market orientation doesn't appear to have prevented the system from adding value. The system followed a greater role for marketing in NPD.
Absence of excessive short-term pressures	DK	DK	No direct indications of excessive short-term pressures.
Presence of a system champion and sponsor	**	+	Championed at senior management but not board level. Marketing director on board level NPD committee presumed influential in system's use in that setting, but not confirmed.

System perceived as empowering not controlling	**	+	Although champion ensured that users "do it to a standard rather than giving them total freedom", buy-in of users obtained starting with development process. "It's not the culture of this company to insist - and anyway you can't, truthfully." [HW144]Japan cited as exception
Sufficiently wide team definition	***	+	Teams doing the scoring "are cross functional groups, medical, research, development, commercial, marketing research...If it's seen as a commercial tool only it doesn't get credibility across."
Adequate training	***	o	A limited number of facilitators do most system use.
Adequate facilitation	***	o	Facilitator used, but no direct comparisons to enable an assessment of the importance of this
Coordination of system use with planning cycle	***	+	Use is tied in with formal NPD review process. It is little used outside this process as yet - the process' influence probably one reason
Appropriate planning units	**	++	Mismatch between planning units used for marketing and financial aspects of system, causing problems: one director described comparisons as "impossible"
Flexibility in planning processes	DK	DK	No signs of insufficient flexibility
Garbage in, garbage out: avoiding manipulation	***	+	Manipulation avoided through rigorous scoring criteria, in an accompanying paper manual. "That was quite important, we felt, in getting discipline, because they can cheat it like hell and will. The game's always about getting resource."
Ease of use	***	o	Attractive, Windows-based system: no criticisms of user interface made. Used mainly by facilitators. Difficult to assess impact of ease of use on utility.
A degree of calculated imprecision	**	+	A balance sought on judgemental analyses between excessively subjective numbers (see 'garbage in, garbage out' above) and arguing about excessive detail. "We spend too much time working out whether the weights should be 30 or 31%." After initial consultation, therefore, "We don't give them any opportunity to discuss the weighting...It caused a bit of a shoo with people who liked to play with it but now they've accepted that.." The marketing information representative on scoring teams endeavours, though, to provide an external, research-based perspective where available and to improve on available information over time.
Development expert driven as well as user driven	***	o	Some input from external expert on portfolio models - influential in detail of system. Difficult to assess the impact of this on system effectiveness. Developers working under direct user control: this was cited as advantageous.
Use prototyping or otherwise allow for iteration	**	--	Some parts of system prototyped. Others seemingly effective despite lack of iteration (though some difficulties with data model)

Key: see **Table 8-2** on p167.

9.3 Case B: Marketing planning in an animal health company

9.3.1 Case description

One of the world's leading animal health companies had grown by acquisition. A regional managing director from one taken-over company was appointed as Vice President, Strategic Marketing. He and his European marketing manager, also new to the organisation, were initially

> "in a state of shock as to where we were starting from. We didn't have people that understood strategy, we didn't have people that understood marketing, we didn't have people that knew the customers."

Their first move was to ask a consultancy to audit the company's marketing. The result was a set of marketing planning procedures, and a project to develop a software system to automate some of the planning.

The software was developed over a few months in time for the next planning cycle. The system incorporated a hierarchy of regions, countries, markets and segments. Within these units of analysis, the system prompted for data on market size and sales, customer-facing and competitor-facing success factors per market, needs and opportunities, looking about 10 years ahead. The system performed calculations, aggregating data from the segment level to the market, country and regional levels, and included a version of the GE/McKinsey matrix, although the graphics were limited to allocating markets to one of nine cells.

Within a few more months, the software was delivered to twenty-eight countries, and data was collected and consolidated centrally. This was reportedly a painful process for the data providers:

> "The software that was developed had a tremendous number of bugs in it...it was an absolute nightmare...We spent time ironing out the bugs, we were persecuted by the countries saying this isn't working."

Nevertheless, for the central planners,

> "we used that information to build up a very nice picture...For the first time ever we found out where we were going...We had a much better sense of needs, we had a much better sense of who our customer was. And we started to see what our priorities would be. From that point of view strategists in the company...were very happy that we had succeeded."

For the countries, though, working with such flawed software

> "was like having a bad illness, and we hope it doesn't come back."

The strategic marketing team, however, were never able to revise the software to remove its bugs. Within weeks of the completion of the initial planning exercise, a major consultancy was appointed to undertake a full strategic review of the organisation. Two of the marketing managers who had been closely involved with the system were seconded to the consultancy's team to assist with the review. The GE/McKinsey matrix was just what the consultancy had in mind. The market and product hierarchies that had been laboriously defined for the computer system formed an appropriate starting-point: "We had a view of the world, which really saved us a tremendous amount of time". The data itself was collected again on paper. According to a marketing manager, the consultants:

> "refused to look at the software...I don't know why, we used a lot of the information, we did a lot of the thinking...The system never got recognised".

The consultants were not, however, interviewed to explore their version of events. At any rate, two years on, significant reductions had been made in the workforce, and the system had not been used. The European marketing manager, now promoted to director level, felt he had learnt several lessons, and had modified his approach accordingly. Apart from using software before it had been properly debugged - the software having been developed in short timescales and "on a shoestring" - he felt that a big mistake had been made in providing so little assistance and feedback to the country managers who provided information.

> "We never really had time to do any follow-up work...We just kept going back for more information, and for a company that had a lot of illness attached to it we were just continuing to ask questions rather than provide answers."

There was no facilitation available for users of the system, and little training. The software itself did not maximise the value that could be given to the data providers:

> "the biggest weakness of our software was that it drew no pictures, you punched in numbers and the printouts you got were extremely boring."

This manager now acted as the facilitator for team-based strategy formation exercises, each focusing on one product-market. The managers with whom he dealt were now

> "not seen as providers of information, but as providers of ideas and thinking".

He had not tried using the software again. At the time of the author's second visit to the organisation, he was in the process of putting the data collected during the strategic review into an off-the-shelf executive information system, and asking managers to update it. Although this did not include marketing analyses such as portfolio matrices, it had the advantages relative to the bespoke system of being reliable, easy to use and flexible. It was also based on Microsoft Windows, allowing integration with other packages. The trade-off, for him, was simple:

> "It is easier for me to set the EIS up now than to go back and try to fix this goddamn thing."

He felt he could fill in the marketing gaps himself through his facilitation. Having been involved from the system's conception, this survivor through a turbulent period summarised the history of the project succinctly.

> "The concept was fantastic, the execution was diabolical and the follow-through was non-existent."

9.3.2 Benefits

Table 9-6: Case B benefits

Benefit	Rating	Notes, illustrative quotations
Improve support for planning process	+ and -	Software usefully forced decisions on product/market definitions, critical success factors etc. But some feeling that system over-structured, hampering creativity.
Enable a live marketing model	SF	The poor software quality prevented any re-use

Aid use of marketing tools through calculations, graphical display, guidance on use	+	Line managers had little feedback from system. But central strategists did: "for the first time ever we found out where we were going..We had a much better sense of needs, we had a much better sense of who our customer was." Aided by system in combining data from many managers in DPM analysis etc
Aid identification of data requirements, resulting in improved information accuracy and availability	+	"It highlighted tremendous deficiencies in data". But possibility that a paper manual would have had a similar effect
Save time, particularly on revisions	SF	The system only used for one iteration. The poor quality meant it was hard to use. Difficult to assess whether saved time - may well not have
Support group planning, focusing debate and improving consensus	NA	Not used in group setting.
Ease integration of functional perspectives	DK	No integration tried as far as is known.
Improve plan credibility and confidence	DK	Strategists had credibility with consultants as a result of planning exercise: not clear whether the system influenced this
Aid individual and group learning about marketing planning	x	No learning occurred, system champion claimed - unlike the team situation (when the system wasn't used):. "They carry on thinking the way they were before. While the beauty of the team situation is that certain thinking won't be accepted by people in the team". Suggests learning is at the very least more effective when used by a group and/or with facilitation.
Increase marketing planning confidence and enthusiasm	SF	No indication system did so, but view stated that a better system would have: "The thing that has stopped me from writing marketing plans and delaying for weeks and months, is you think 'I don't know what to put in the plan and if I write these things, I'm going to end up missing something, and some marketing director is going to think I'm stupid because I missed it'...Whereas you get a computer system is and what you're seeing is a level playing field."
Help manage complexity of multi-level plans	++	System helped to consolidate information and to represent the structure of the company's markets. "We had a view of the world, which really saved us a tremendous amount of time."

Key: see **Table 8-1**.

9.3.3 Success factors

Table 9-7: Case B success factors

Success factor	Factor presence	Factor influence	Notes, illustrative quotations
A market orientation, or the perception of the need for it	*	+	Limited backing from board perhaps related to market focus: strategic marketing VP "went to Philip Kotler and he thought, let's start teach the company marketing. So I suppose that was mistake number one."
Absence of excessive short-term pressures	**	o	No evidence that short-term pressures contributed to system not being used
Presence of a system champion and sponsor	**	+	When sponsor went system stopped being used. Though other factors (eg system robustness)

Empowering rather than controlling users	*	++	Centrally, it was useful to have insisted on information. But no attempt at user buy-in made, eg feedback of results, resulting in little commitment. Subsequent more interactive paper exercise gained buy-in: "They are not seen as providers of information, but as providers of ideas..."
Sufficiently wide team definition	*	++	Narrowly-defined strategy team could influence global strategy, but opportunity lost to use system outputs for local initiatives - as subsequent team planning exercises did
Adequate training	*	+	Facilitator felt inadequately trained: "They spent a day and a half teaching me how to use this thing, and my charge rate is reasonably high. And the guy who came to fix my fridge uses this thing and they spent two weeks teaching him how to use it!"
Adequate facilitation	*	+	Not used with facilitator; system had no learning impact. A link seems likely
Coordination of system use with planning cycle	**	o	Used exclusively in planning cycle: no basis for assessment of importance.
Appropriate planning units	**	++	The definition of product/market hierarchies was by and large successful, & useful in its own right. Eg when consultants came in, "we had a view of the world, which really saved us a tremendous amount of time". Also allowed consolidation. Problems found with countries in which centrally defined product/market definitions inappropriate: "it caused horrendous problems".
Flexibility in planning processes	*	+	"One of the disadvantages of starting with a computer or even a paper-based system...is that you are starting with a boundary and saying 'I want you to confine your thinking within this boundary' ". Need to allow creative thinking was strongly felt.
Garbage in, garbage out: avoiding manipulation	DK	DK	Inadequate discussion
Ease of use	*	++	Ease of use poor mainly due to lack of robustness. Unfavourable comments also made by comparison with Windows programs. A significant cause of demotivation amongst users, though did not entirely prevent benefits to those in receipt of the data.
A degree of calculated imprecision	**	o	A trade-off now perceived (in paper planning) between the accuracy of the data gathered and the time needed by operational managers to gather it, so major changes only to data sought. The team used as a check on data precision: "One of the things that happens if you've got good teamwork is that excessive subjective influences are dampened."
Development 'expert driven' as well as 'user driven'	**	+	Well-known academic checked help text. But some design features inconsistent with marketing theory: eg CSF analysis carried out per customer segment rather than per product group-customer segment combination, causing problems. Expert involvement in specification might well have prevented this.
Use prototyping or otherwise allow for iteration	*	+	No scope for iteration in system design due to "shoestring" budget and tight timescales. This probably contributed to lack of robustness; iteration may also have ironed out problems in design

Key: see **Table 8-2**.

9.4 Case C: International Operations of pharmaceuticals company

The Director, International Operations of this pharmaceutical company was responsible for sales into over 100 countries outside Europe, North America and Japan. He wanted a means to provide a rational basis for resource allocation between countries, based on a shared model of future market potential.

> "It came about because I was very concerned about the allocation of resources in marketing, which I felt were always massively orientated towards previous practice, with executives in general tending to do a bit more of what they had done before."

Having travelled widely, he regarded himself as able:

> "to compare mentally what we were doing in South Korea with what we were doing in Argentina. But that was an individual, personalised thing...What I was seeking to achieve was at the very least a common way of looking at key aspects of the business on the part of the senior management team as a whole."

A marketing consultancy recommended the use of the Directional Policy Matrix for this purpose, and developed a system to automate its use. The system prompted for scores for each country on a set of common critical success factors and market attractiveness factors. These factors gave the Operations Director the forward orientation he wanted.

> "In choosing the factors and weightings you could put far more emphasis on the future development of the market than the historical development - the way that price controls were going in a territory, the way that intellectual property was going, the likely movements of per capita income, and so on."

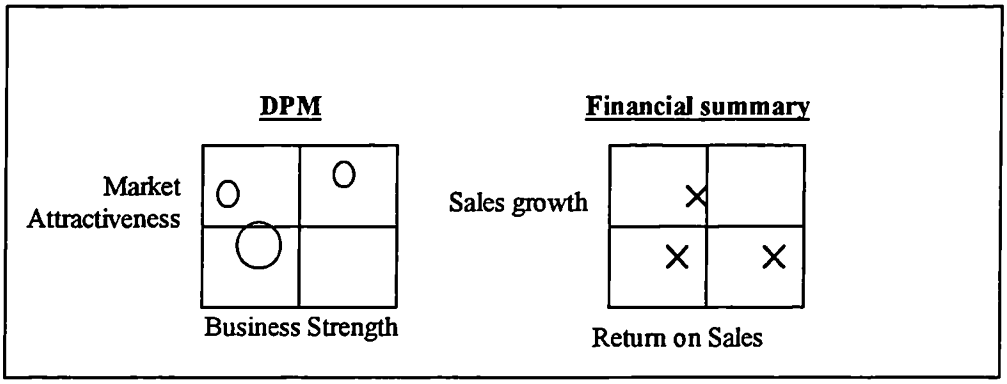
Rigorous scoring criteria were developed to ensure that scores were made on the same basis. Reasons for the score, sources of data and other notes could be recorded in words. A matrix could then be displayed for a region of the world, or any other selection of countries, for any year. Scenarios could be created with differing scores. A financial matrix provided a contrasting view, showing each country in terms of the company's key objectives of return on sales and compound annual growth rate. A set of paper-based planning procedures complemented the system by prompting for other marketing planning information. See Figure 9-2.

After a tour round the world to demonstrate a prototype version of the system, the system was distributed to coincide with the planning cycle, and regional managers were asked to fill in the data. Diskettes were sent back to Head Office, where the system automatically combined them together into an integrated database from which any countries could be selected for comparison.

The Operations Director then used the system in board meetings and meetings of his senior management team when particular issues or areas were discussed.

> "The use of software, with its ability to handle multi-component analysis very quickly, which managers aren't always good at, enabled them to see the business in different ways, and to ask questions on a what-if basis that could be instantly inputted and shown. And they could say 'I don't think that factor is weighted correctly', and they could change the scoring and see what happened to the overall competitive market trends, and just get the feeling of what was important. This, I think, really did change people's minds, because they could see the impact of doing things differently on likely results five years out much more easily than they could before."

Figure 9-2: Contrasting marketing and financial perspectives in pharmaceuticals



In his view, the result was a:

> "consistent vision and a shared understanding of what's important. So when you had £100m to go around and you needed £500m to do what everybody wanted to do, it made those conversations much more sensible."

A useful side-effect was enhanced credibility:

> "Here was a way of demonstrating unequivocally the professionalism with which future markets were being assessed, and therefore aiding the credibility of those operations, so I had less difficulty in getting the overall funding allocation that I wanted."

The process of system development and implementation had not been entirely smooth, however. The consultancy and the company agreed that mistakes had been made. The first problem was that the prototyping approach to systems development resulted in a first version that, while functionally well-matched to the company's needs, was slow and unreliable. The consultancy were "extremely good, I must say, at following it up", and a system rewrite corrected these problems, but not until the regional and country managers had battled with software bugs in the first year, at some cost to the system's reputation. Did the consultancy think the software had been rolled out too soon?

> "It might have been. The problem was that we were driven by the planning cycle. The company was facing urgent investment decisions."

Some steps had been taken to lighten the burden on operating managers: the data was now updated by an HQ staff member, who requested information as necessary from the relevant country, while the accompanying paper planning procedures had been slimmed down from their initial detail, regarded with hindsight as "too great and irrelevant".

The second, related problem related to gaining prior commitment to the system's philosophy from operational managers. The consultant reported:

> "We achieved the first goal of any of these sorts of innovations, which was that we got the top management buy-in. But we probably underestimated the importance of *senior* management buy-in. And we probably with hindsight should have spent more time - we spent a lot of time but it still wasn't enough - with senior management, on making sure they understood why strategic marketing planning was necessary, what were the key issues involved in strategic marketing planning, and why the DPM was an appropriate tool, and the implications of it being computerised. Because it became very clear that actually, even senior management understand relatively little about the broader aspects of strategic planning outside their own immediate areas

of responsibility. I don't think we ever got into the hearts, minds and souls of the operating managers. That's the most concerning thing. Perhaps it takes longer."

The result was varying degrees of enthusiasm and system use depending on the managers concerned.

Although the system's regional success was patchy, then, its utility centrally was claimed to be clear, though at some cost in development money and time. While some said that the software saved time due to automated calculations, ease of iteration and so on, could it not be argued that the time it took to deal with software development and use outweighed these savings? The International Director, who had now become Group Marketing Director, said:

"I have no patience at all for the second view. What that tells me is that they are not dealing with very complicated markets. If you've got, as in my case, over 100 markets, with huge product ranges, multi pricing, multi currencies, multi differentials in growth or decline rates, apart from all the other factors that we've got in there of a political or economic nature, there's no way you are going to be able to handle that in a pen-driven way...And the second point I would make is that you only need one flash of illumination out of a what-if simulation to be worth all the time that you've spent. Furthermore, all you needed was one solid agreement on the part of the key regional managers to really do differently as a result of considering what factors really mattered, and you're miles ahead."

9.4.1 Benefits

Table 9-8: Case C benefits

Benefit	Rating	Notes, illustrative quotations
Improve support for planning process	NA	System was not directly structured around a planning process: rather, system was complemented by paper planning process
Enable a live marketing model	+	Ad-hoc planning exercises started last available plan, updated as necessary.
Aid use of marketing tools through calculations, graphical display, guidance on use	++	The system "made for more rational comparisons between, say, Argentina and South Korea", "so it proved dramatically useful in...drawing comparisons across a range of different kinds of markets which people didn't individually have experience of", making resource allocation "much more sensible"
Aid identification of data requirements, improving accuracy and availability	DK	Little direct comment on data requirements. Information accuracy thought to be improved due to lack of errors
Save time, particularly on revisions	+	Marketing director re the view that time costs outweigh savings: "I have no patience at all for the second view.. What that tells me is that they are not dealing with very complicated markets. If you've got, as in my case, over 100 markets...there's no way you are going to be able to handle that in a pen driven way"
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	++	Impact of ease of iteration in boardroom debate: "This, I think, really did change people's minds...they could play with it, and they could...change the scoring and see what happened..." This resulted in "a consistent vision and a shared understanding"
Ease integration of functional perspectives	++	System incorporated financial cross-check of DPM analysis, with matrix of CAGR against ROS.

Improve plan credibility and confidence	+	With board, "here was a way of demonstrating unequivocally the professionalism with which future markets were being addressed...It enabled them to...ask questions on a what-if basis that could be instantly inputted and shown"
Aid individual and group learning about marketing planning	DK	Claim that system forms part of "international transfer of best practice", but "The problem is persuading managers to change their way of thinking and working"
Increase marketing planning confidence and enthusiasm	DK	Little direct evidence
Help manage complexity of multi-level plans	++	Assisted at head office level with cross-SBU resource allocation.

Key: see **Table 8-1**.

9.4.2 Success factors

Table 9-9: Case C success factors

Success factor	**Factor pres-ence**	**Factor influ-ence**	**Notes, illustrative quotations**
A market orientation, or the perception of the need for it	**	o	Relative degrees of acceptance of system explained by other factors, including software robustness and appropriateness of detail requested
Absence of excessive short-term pressures	**	+	The time available for development before the planning cycle was a factor in the rushed first release
Presence of a system champion and sponsor	**	++	Champion more active in Head Office, where take-up and impact much stronger; sideways move of champion reduced usage in previous business unit
System perceived as empowering	**	++	Head Office users felt empowered, regional users did not. Impact of latter was poor data
Sufficiently wide team definition	**	+	The team use in Head Office was probably a factor in its greater success there than in regions, where not necessarily used by teams
Adequate training	*	+	Little training of regional users. Training in concepts certainly missed: "Because it became very clear that actually, even senior management understand relatively little about the broader aspects of strategic planning". This contributed to mixed quality of results
Adequate facilitation	*	-	Board and other Head Office use appeared successful without facilitator. One could describe marketing director as facilitator, though not an impartial one
Coordination of system use with planning cycle	**	--	Ad-hoc use effective when directors involved.
Appropriate planning units	***	o	Planning occurred on basis of zones and countries, both easily defined: no problems noted
Flexibility in planning processes	**	+	The initially rigid procedures for regional planning unhelpful both for plan quality and for system reputation
Garbage in, garbage out: avoiding manipulation	**	+	Scoring criteria designed to avoid manipulation

Ease of use	**	++	"The first years' experience was coloured by the fact that the program was not on Windows and it was hard." The second software iteration was easier to use and, more importantly, more robust. Ease of use perceived to have affected managers' enthusiasm.
Degree of calculated imprecision	**	+	In first planning exercise, the quantity of information sought contributed to poor quality inputs. Subsequently, the bulk was reduced, with "..new instructions, saying 'Don't worry about the details, for God's sake - just concentrate on the biggies.' We got quite good marketing plans back". Nevertheless, the need was perceived to avoid guesswork. For example, the system's lack of automated support for the constraint 'size x share = revenue' caused extra work and encouraged guesswork: "When you're filling in 30 figures and it's midnight and you don't know them you start guessing them".
Use prototyping or otherwise allow for iteration	*	+	Iteration wasn't allowed for and proved necessary. It's arguable whether iteration would have been necessary had fuller debugging occurred
Development should be 'expert driven' as well as 'user driven'	***	+	A highly experienced consultant and visiting professor at a leading business school specified the system, working with the users. In terms of specification, the system was right first time.

Key: see **Table 8-2**

9.5 Case D: Strategy formation in a meat products company

9.5.1 Case description

> "Most companies talk about the re-organisation they had. We have one every eighteen months, so it's very hard to look at what's happening in the business."

This financial controller was explaining some of the background to a marketing planning exercise that was still in progress. Although the organisation essentially sold meat sourced from one animal in one country, it had until recently operated as four trading divisions, for fresh meat, cooked meat, canned meat and other products. Each division had its own sales force and its own strategy. Now the divisions had been combined, and the new management team felt the need to revisit the priorities for the business. In the financial controller's view,

> "Part of the problem in the past has been sub-optimisation - four organisations going away and optimising themselves, not necessarily to the benefit of the business as a whole."

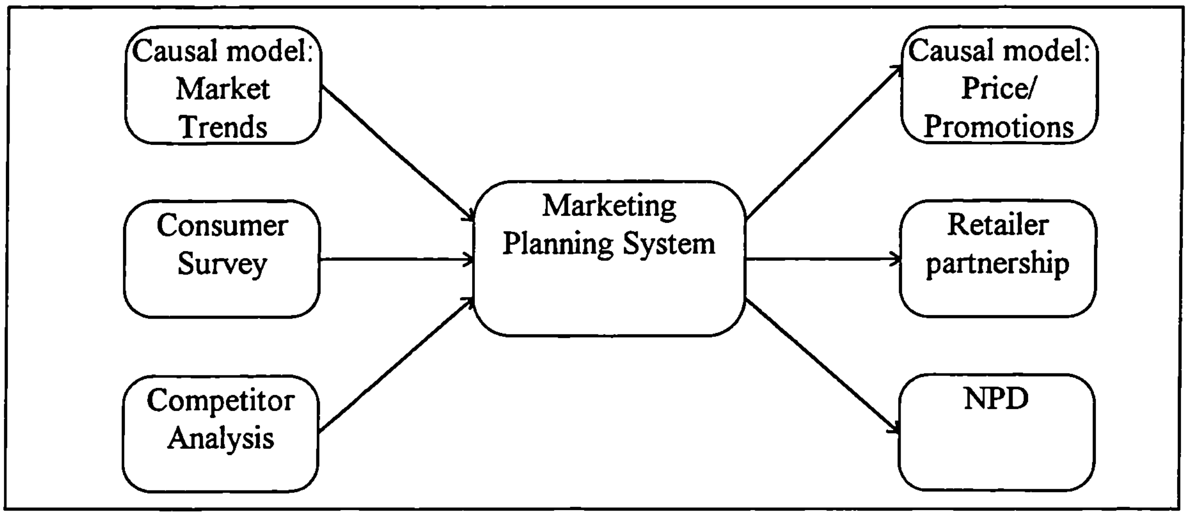
The need for priorities also applied to the marketing team specifically. The small team had acquired extra responsibilities with no major change to their resources.

A funding offer from the government of the country supplying the meat provided the opportunity to obtain some external consultancy. The resulting project began with econometric modelling for some of the key markets. The factors driving market size and market share were explored through modelling of the last few years' data, using a bespoke system developed using the programming facilities of a spreadsheet package.

The modelling found the sensitivity of size and share to variables such as price, promotions, advertising, consumer spending and adverse health publicity - this last measured by the number of government press releases concerning BSE.

The company then sought a means of integrating the data that had been gathered as a basis for strategy definition. The lead consultant suggested using the EXMAR marketing planning system for this purpose. The author was then brought in to the project as a system facilitator, with formal interviews following some months later. The marketing team went through the system's initial stages of defining products and markets, conducting an audit of the current situation, and forecasting what the situation would be at the end of the planning period on current trends, if no remedial action was taken. The work focused on SWOT analysis and the Directional Policy Matrix, building up a current picture and a forecast picture. Although information was taken from all available sources, including the econometric models, competitor analysis, and consumer survey data, their integration was achieved by judgement and consensus. See Figure 9-3.

Figure 9-3: Strategy formation in meat products company



Over most of a day's meeting, the board then reviewed and refined this initial model, to check particularly on areas where the marketing team had less experience. However, as the consultants and the staff who knew how to operate the system were not available, this exercise was conducted by writing by hand on OHP slides, which had been prepared from data taken from the system.

The next step would be to define marketing objectives and strategies where the forecast scenario was not acceptable. It was intended that the marketing team would draft these, based on overall guidance from the board. Some initial work had already been done using the system. The marketing director anticipated that the resulting plan would be more believable and acceptable as a result of the board's involvement in the earlier stages.

> "Because of the work that's been done with the rest of the members of the team, they will have the confidence that whatever strategy that we come with will be a realistic one."

He claimed that the planning work had already had some operational impacts, resulting for example in a price increase in one area. For the marketing director, a key advantage of the process that was being followed was the involvement of the whole management team.

> "The problem with the written plan is that it becomes the ownership of the marketing department, and we have to hope that everyone else in the company would read the marketing plan. My concern is that it wouldn't always get read by other parts of the company. Where the models have helped is that we have actually used them in conjunction with all members of the management team. So the managing director is involved, the production director is involved, NPD is involved and so on. I think it unlikely that that would have happened with our old system of us sitting down and writing."

But the same manual process could be followed without software assistance, and indeed the board reviewed some data without the system. Did the software make any difference? The financial controller cited the educational value of the instant graphical display incorporated into the system.

> "If you see the computer one first, you can understand the paper one afterwards. But if you try to do it the other way round, it's conceptually much harder. The MD has an MBA, as I do, but the rest of the guys may not have seen it in concept, or they have seen Boston but not the DPM, so it's quite hard to work from the numbers upwards. It's much easier to work backwards from the pictures."

The marketing director also felt that while the board's review of factor scores had not suffered excessively from the lack of software support, this support would be important for strategy definition.

> "Having worked manually through current and forecast figures, I can definitely see the value of the computer to go on and look at strategy. Because it would be impossible - we'd constantly have to break the meeting for [the marketing manager] to do the manual work while we go to the bar, and we would all be napping. That is the problem - if we had said let's invest £100,000 in another variety packing machine - what effect will that have? You would see it then and there. And that would be extremely useful."

Having worked with the hard data of an econometric model, did the managers not feel that the judgemental modelling of analyses such as the DPM was flawed by its subjectivity? The marketing director argued that the numbers entered, although judgemental, were based a wealth of external data brought to the table by the management team, which was combined through discussion. The marketing manager concurred:

> "But that's the way people manage companies. At the end of the day all decision making is based around a team of people. So if you can do something to make that more focused and more effective in terms of everybody looking at things in the same way and considering the same parameters - there's a lot of value."

9.5.2 Benefits

Table 9-10: Case D benefits

Benefit	Rating	Notes, illustrative quotations
Improve support for planning process	+	Marketing manager: "I think it helps having some framework there", with result that this year's planning is "more structured".
Enable live marketing model	NA	System not in use for this to have become an issue: still building up initial model

Aid use of marketing tools through calculations, graphical display, guidance on use	+	DPM and market attractiveness analysis: "it very quickly came out...that there are certain areas in which we should not be focusing much at all. Now perhaps we would have been doing those anyway, but certainly they came much more into focus after having those results." Also in another market, "one thing that came out was a price increase...And that went through." However, tools can be used on paper - but computer preferred for ease, particularly in strategy definition
Aid identification of data requirements, resulting in improved accuracy and availability	DK	Little data gathering occurred as a result of system use - though various data gathering activities were in place anyway (including econometric modelling, competitor analysis)
Save time, particularly on revisions	DK	No time benefits evident for debates leading to data input. Benefits reported for strategy setting, but no control vs paper process. Benefits mainly anticipated rather than realised
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	+	Process provides agenda. Without a system, "the discussion gets pulled in every conceivable angle...The value of this is that you have a very precise task to do". Part of process was also tried on paper, but wouldn't work for strategy formation: "it would be impossible - we'd constantly have to break the meeting for Fiona to do the manual work while we go to the bar"
Ease integration of functional perspectives	DK	No attempt made to integrate marketing plan data with other functions as yet
Improve plan credibility and confidence	DK	"Because of the work that's been done with the rest of the members of the team, they will have the confidence that whatever strategy that we come with will be a realistic one". But could be process rather than system
Aid individual and group learning about marketing planning	+	Claimed to help with understanding of tools. "If you see the computer one first, you can understand the paper one afterwards"
Increase marketing planning confidence and enthusiasm	+	Sales and Marketing Director: "It's also quite motivating". Few other comments noted
Manage complexity of multi-level plans	DK	Planning occurred on two levels: SBUs and newly defined segments within them. Little reason to suppose the system was crucial for this

Key: see **Table 8-1**.

9.5.3 Success factors

Table 9-11: Case D success factors

Success factor	**Factor presence**	**Factor influence**	**Notes, illustrative quotations**
A market orientation, or the perception of the need for it	**	+	The perceived need for better data and procedures seem to have helped create the conditions for the system to be used seriously & benefits gained
Absence of excessive short-term pressures	**	+	After restructure, "everyone was given 50% more to do...and it's just gone on the back burner. The debris is now beginning to settle"
Presence of a system champion and sponsor	**	+	Championed & perhaps initially sponsored by financial controller. Sales and marketing director could now be regarded as a sponsor for EXMAR, influencing its greater use so far than EDMA, the causal modelling system. Role of MD not clear.

System perceived as empowering not controlling	***	o	No enforced usage. Positive attitudes are consistent with notion that this is right approach, but don't provide evidence as such
Sufficiently wide team definition	***	+	Used first with broadly-based marketing team and secondly with board. Broad group decision making benefits reported.
Adequate training	**	o	Some training in EXMAR given. May not explain limited use when facilitator not present - ease of use is another explanation
Adequate facilitation	**	o	First exercise was facilitated, paper-based board exercise was not. This did not appear to affect effectiveness. One could regard financial controller, an MBA who was present in the first exercise, as facilitator.
Coordination of system use with planning cycle	**	+	First use was synchronised with a funding bid rather than planning cycle: this seems to have been one factor in its lower impact
Appropriate planning units	***	o	No problems observed
Flexibility in planning processes	***	o	Planning exercises concentrated on formal models included in system. No indication that this caused unbalanced picture of business
Garbage in, garbage out: avoiding manipulation	DK	DK	No indication of a perception of the dangers of manipulation
Ease of use	*	+	In facilitated sessions held to date, not an issue. Considering future use, ease of use considered a drawback: "if I was to sit down in front of the board in a strategy meeting, I could probably do it a lot easier on that [MatMar, an alternative package supporting specific techniques]". This related to the comparatively broad system scope: "there's a danger of frightening them off" with much functionality in a single package.
A degree of calculated imprecision	***	+	Facilitator encouraged approximations on market size etc, and judgemental analyses based on judgement of those close to market, informed where possible by econometric analysis and other data sources. Interviewees were content with this compromise. Subjectivity "is dissipated to some extent when you broaden the data gathering." "No-one's got a crystal ball, but there's always got to be judgement somewhere."
Use prototyping or otherwise allow for iteration	**	+	System in use was a second-generation prototype. Its limitations contributed to limited use, particularly ease of use
Development 'expert driven' as well as 'user driven'	***	o	Expert and user driven, so consistent with this factor, but no basis for comparison

Key: see **Table 8-2.**

9.6 Summary: Benefits

As we have discussed, the EXMAR multiple-case study generated a number of propositions regarding benefits that may be gained by users of decision support systems for marketing planning. Table 9-12 summarises the extent to which the four case studies we have examined support these propositions. The benefits are grouped according to the group of marketing planning barriers most likely to be impacted by the benefit (as described in chapter 2).

Benefits supported by cases

Within this group of benefits, at least one case provided clear support for the benefit, while no case provided contradictory evidence.

Support use of marketing tools. Systems can aid in the use of marketing tools such as portfolio matrices through automated calculations, graphical display and on-line guidance on the tools' inputs, assumptions and interpretation. In cases A and C, a comparison with previous paper-based planning strengthened the evidence. Case D, where system use is at an earlier stage, was less clear-cut, suggesting that while tools can be used on paper, this is more difficult, particularly when iteration is at a premium.

Support group planning. With the exception of case B, where the system was not used by a group, the systems facilitated collaborative planning workshops through the support for fast iteration, and through providing a common focus and agenda for the meeting.

Enable live marketing model. Cases A and C confirmed the notion that a system can form the repository for "live" electronic plans, updated periodically, from which annual snapshots are taken for formal presentation. This vision, representing a significant change from paper-based planning, is not as yet fully realised in any of the organisations studied, however.

Ease integration of functional perspectives. The hypothesis that the electronic format can assist the integration of marketing models with data from other functions was supported by cases A and C. The other cases provided no evidence on this issue.

Manage the complexity of multiple-level planning. In cases B and C, the system assisted with multiple levels of planning, through consolidation of data and, in case C, through the provision of facilities to cut the data in different ways according to the analysis required. While case D involved two planning levels, there was no clear reason to suppose that the system's role in managing the limited complexity involved was an important one. The system can also maintain consistent product-market definitions (case B; also illustrated by its partial absence in case A), and ensure a consistency in planning approaches across business units (cases A, B, C) that can be of value to central users of plans irrespective of whether electronic consolidation of plans is available.

Table 9-12: Support for hypothesised benefits

Benefit	Case A	Case B	Case C	Case D
Roles people play Support group planning, focusing debate & improving consensus	++ Consensus building is helped by the on-line exploration of ideas	NA Not used by group	++ Live what-if's gave "a consistent vision and a shared understanding"	+ Without system, "discussion gets pulled in every conceivable angle"
Ease integration of functional perspectives	++ DSS integrates R&D, financial, marketing info	DK No integration tried as far as is known	++ Integrates finance, mkting.	DK No attempt to integrate known as yet
Cognitive Aid use of marketing tools through calculations, graphical display, guidance on use	++ Tool use better than on paper. Technique interrelationships also managed	+ Aided central strategists in combining data from many managers in DPM analysis etc	++ Paper use of tools viewed as impractical: previous company experience cited	+ Tools can be used on paper, but computer preferred for ease, particularly in strategy defn.
Aid individual and group learning about marketing planning	DK An aim, at least. Mktg mgr: "Real use is culture change"	x Champion claimed no learning occurred - lack of facilitator?	DK Aim of "transfer of best practice" but hard to assess	+ Claimed to help with understanding of tools
Systems/procedures Enable live mkting model with periodic snapshots for plans	++ System updated periodically for NPD reviews	SF Software quality prevented any reuse	+ Ad-hoc exercises started with last available plan	NA Not in use for long enough to apply
Help to manage complexity of multi-level plans	NA System used at one level	++ Consolidation gave"view of world"	++ Assisted cross-SBU resource alloc.	DK Two levels, system's role unclear
Improve plan credibility and confidence	+ Greater consensus said to increase credibility of outputs	DK Strategists' credibility with consultants may have been helped	+ Use of system of itself improved credibility of planning outputs	DK Confidence prob improved, but could be process rather than system
Improve support for planning process	NA System doesn't include explicit process	+ and - Encouraged prod/mkt defns, but structure could hamper creativity	NA System organised round specific tools rather than an explicit process	+ "It helps having some framework" so this year's planning "more structured"
Resources Save time, particularly on revisions	+ Main comments concerned time savings for facilitator	SF Software quality poor, so hard to use. No revisions	+ Clear belief time saved. Limited basis for comparison	DK Mainly anticipated rather than realised savings
Organisational environment/culture Increase marketing planning confidence and enthusiasm	DK Little direct comment	SF View stated that better system would help confidence	DK Little direct evidence	+ Mkting dir:"It's also quite motivating"
Data Identify critical data requirements, improving accuracy, availability	+ Market research commissioned; qualitative data more available	+"Highlighted tremendous deficiencies in data". But paper manual might have too	DK Little direct comment	DK Data gathering happening anyway. System not known to have caused more

Key: see **Table 8-1** on p167

Benefits with limited support

Within this group, while the research is consistent with the hypothesised benefit, rival hypotheses cannot be ruled out. Often this is because of the difficulty of isolating the effect of the system from the effect of the process that is frequently introduced simultaneously.

Improve plan credibility and confidence. Managers in cases A and C felt the system had improved the credibility of the resulting strategies, partly as a result of greater consensus, and partly because the use of a system, perhaps irrationally, gave an impression of professionalism and thoroughness. Cases B and D were inconclusive.

Save time, particularly on revisions. In case A, time savings were cited for the facilitator. In case C, the volume of work involved in analyses without computer support was cited as impractical. In case B, the degree of unreliability and poor training may account for the absence of reported time savings.

Identify critical data requirements. Although two cases (A and B) discussed data gathering as a result of system use, it is difficult to be sure whether this would have equally occurred with equivalent paper-based procedures.

Increase marketing planning confidence and enthusiasm. There were some comments in case D indicating a greater enthusiasm for marketing planning resulting from the sense of progress when inputs could be quickly viewed graphically. In case B, this benefit was expected from systems but not gained from the flawed system developed.

Benefits with mixed support

Here, the support for the hypothesised benefit is partly positive and partly negative.

Aid individual and group learning about marketing planning. The spread of "best practice" was a system objective in three of the cases (A, C and D). However, only in case D was evidence available of specific areas in which the system had had a learning impact. In case B, where the system was used without facilitation, the system champion felt that no learning had occurred. This suggests firstly that one learning step, the commitment to the importance of marketing planning, is not achieved by the system itself (see Success Factors below), and secondly that the presence of a facilitator may be crucial for gaining learning benefits. If so, future research will need to assess more conclusively whether the combination of facilitator and system is more effective for teaching than the facilitator alone.

Structure the planning process. In case B, although the structure encouraged organisation-wide market definitions, there was some feeling that the system could hamper creativity: "One of the disadvantages of starting with a computer or even with a paper-based system is that...you are saying 'I want you to confine your thinking within this boundary' ". This emphasises the success factor of "flexibility in planning processes", discussed below. It opens the possibility, however, that although the same dangers apply to paper-based systems, the presence of a computer may exacerbate the danger of blindly following the analyses recommended without stepping outside them where relevant.

9.7 Summary: Success factors

Table 9-13 summarises the extent to which the case studies support the hypothesised success factors for successful application of decision support systems in this domain. The factors are ordered in approximate order of support for the proposition, starting with the most strongly supported proposition. Each entry begins with the two ratings for factor presence and factor influence, separated by a "/". See the key in **Table 8-2** for further details.

Success factors supported by cases

Within this group of factors, at least one case provided clear support for the factor's influence on the system's success, while no case provided contradictory evidence.

Presence of system champion and sponsor. The changes in sponsorship are illuminating. In case B, the system ceased being used when its sponsor left the company - though the system's poor robustness may have been an equally important factor. A sideways move of the sponsor in case C reduced the system's use in his previous area of responsibility.

Sufficiently wide team definition. In case B and parts of case C, users were seen as data providers and did not use the system in a team context. Their enthusiasm contrasted sharply with other parts of case C, and cases A and D, who used the system in inter-disciplinary teams, and stressed group benefits.

Ease of use. In cases B and C, the difficulty of using the first system version harmed the enthusiasm of remote system users, with adverse effects for central planners' efforts to gain good data. In both cases, the problems were largely, but not exclusively, to do with software robustness. The difficulties caused were less when a facilitator was present, even when the software was flawed (central use in case C, case D).

System perceived as empowering. A related flaw in case B and regional users in case C was that users did not all feel involved or empowered. By contrast, managers in case A talked of "buy-in" from users. Case A showed that control can still be exercised provided accompanied by efforts to obtain user commitment.

Appropriate planning units. No case had consistent problems with inappropriate definition of products and markets, but where isolated problems occurred (A and B), they significantly reduced the value of part or the whole of the system for relevant users.

Table 9-13: Support for hypothesised success factors

Success factor	Case A	Case B	Case C	Case D
Presence of system champion & sponsor	**/+ Championed middle mgt level, sponsored director	**/+ When sponsor went, use stopped - though other factors	**/++ Champion's move reduced use	**/+ Champ.=fin. controller/mkt mgr, sponsor = mkt dir.
Sufficiently wide team definition	***/+ Cross-functional teams scoring	*/++ Opportunity lost for local initiatives	**/+ Team use in HQ probably helped its greater success	***/+ Used in teams (marketing/board). Group ben's stressed
Ease of use	***/o No criticisms of ease of use: hard to assess importance	*/++ Poor mainly due to bugs. A cause of demotivation	**/++ First version hard to use & bugs, harming enthusiasm	*/+ Considered a drawback for future use
System perceived as empowering rather than controlling	***/+ Control matched by effort to gain buy-in	*/++ No attempt at user buy-in made, so little commitment	**/++ Regional users didn't feel empowered so poor data	***/o No enforced use. Can't really deduce importance
Appropriate planning units	**/++ Finance/ marketing mismatch of prod-mkt defns a problem	**/++ Rare cases where poor "caused horrendous problem"	***/o Planning units (zones/countries) easily defined	***/o No problems observed
Market orientation, or perception of need for it	**/+ System followed greater role for marketing in NPD	*/+ Limited funding perhaps related to market focus	**/o Degree of system acceptance explained by other factors	**/+ Perceived need for better data/ procedures probably helped
A degree of calculated imprecision	**/+ Balance sought on subjectivity vs unnecessary detail	**/o Team can help to dampen excessive subjectivity	**/+ Within reduced data bulk, need to avoid guesswork	***/+ Informed approximations well received
Adequate training	***/o Facilitators do most system use	*/+ Even UK trainer inadequately trained	*/+ Limited training in regions may have hindered results	**/o Ease of use better explanation for limits to use
Garbage in, garbage out: avoiding manipulation	***/+ Rigorous scoring criteria avoid manipulation	DK/DK Inadequate discussion	**/+ Scoring criteria designed to avoid manipulation	DK/DK No indica-tions that manipul-ation a problem
Flexibility in planning processes	DK/DK No signs of insufficient flexibility	*/+ Need to allow creative thinking strongly felt	**/+ Initial rigid procedures harmed exercise reputation	***/o Concentrated on system's formal models - no problem
Absence of excessive short-term pressures	DK/DK No indic-ations that this a problem	**/o No evidence that this a significant factor	**/+ Time an issue in rushed first release	**/+ After restruct-ure, system went on "back burner"
Development should be "expert driven" as well as "user driven"	***/o Input from expert - difficult to assess impact	**/+ Expert might have prevented theoretical flaws	***/+ Experienced consultant specified - spec right 1st time	***/o Expert & user driven but no basis for comparison
Use prototyping or otherwise allow for iteration	**/-- Parts prototyped - rest effective despite lack of iteration	*/+ Iteration would probably have helped reduce bugs	*/+ Iteration not planned for but proved necessary	**/+ Limitations of proto system probably reduced system use
Adequate facilitation	***/o Facilitators always used. No direct comparisons	*/+ Link with lack of learning impact seems likely	*/- HQ use OK with-out. MktDir could be called facilitator	**/o Board exercise unfacilitated (though system not used)
Coordination of system use with planning cycle	***/+ Use outside NPD reviews not taken off to date	**/o Used in planning cycle; can't assess importance	**/-- Ad-hoc use effective, as directors involved	**/+ 1st use outside cycle-prob a factor in lower impact

Key: see **Table 8-2** on p167.

Success factors with limited support

Within this group, while the research is consistent with the hypothesised success factor, rival hypotheses cannot be ruled out. Often this is because of the difficulty of isolating the effect of the factor from the effect of other possible success factors that may have caused the success or otherwise of the system.

A market orientation, or at least the perception of a need for it. In all cases, the system was introduced as part of a process designed to increase market orientation. The limited funding in case B may have reflected a lack of wider support for this process in the company.

A degree of calculated imprecision. A balance was sought by system champions in cases A, C and D between excessive subjectivity and an unnecessary concentration on data accuracy. In case C, this formed one of the changes from the experience of the first attempt at system-aided planning.

Adequate training. Training was cited as a difficulty in cases B and C. Although it may have been a limiting factor in case D, weaknesses in the user interface design of the prototype are probably a better explanation.

Garbage in, garbage out: avoiding manipulation. The need to avoid manipulation of outputs in systems based on management judgement was recognised in cases A and C, where rigorous scoring criteria were used to reduce the subjectivity of inputs.

Flexibility in planning processes. The danger that a marketing planning system, whether computerised or paper-based, could hamper creativity was expressed in case B. Perhaps the lack of a facilitator was one factor in this, as one role of facilitators found in previous research was to broaden out the discussion where the formalisms contained in the system were not appropriate to the topic in question. In case C, initially excessively rigid planning procedures were usefully loosened.

Absence of excessive short-term pressures One factor causing the flawed first release in case C was the urgent need to take decisions. In case D, system use went on the "back burner" for a time following a restructure: "the debris is now beginning to settle".

"Expert-driven" as well as "user-driven" development Some respects in which the system in case B did not match marketing theory may have been prevented by greater involvement from external experts. By contrast, case C's external input ensured a specification that was "right first time" - though the implementation took longer to get right.

Success factors with mixed support

Here, the proposition may need revision, as the evidence from the cases is mixed.

Use prototyping or otherwise allow for iteration Case A provided the first example that has been seen of a successful development without the need for iteration - parts of the system being developed in one cycle. However, some of the most complex parts (involving portfolio matrices) were developed with more iteration. Other cases supported the success factor. This suggests that while this factor forms a sensible heuristic in bespoke developments, it is not necessarily essential.

Adequate facilitation Successful use without a separate facilitator in case C provides a counter-example, the marketing director both running the session and putting forward a particular view on the session's substance. The difficulties that remote users had in case B suggest that the presence of an experienced user, at least, is important, even if that of an impartial facilitator is optional.

Co-ordination of system use with planning cycle. Although use within the planning cycle appeared more influential in cases A and D, the opposite applied in case C, where director involvement ensured that ad-hoc use was still effective. Clearly, then, this factor depends on circumstances, including the nature of the ad-hoc use, and the role of formal planning in the organisation.

10. Case Studies: Other System Types

10.1 Introduction

In the previous chapter, we examined the impact of systems in the first category of the typology we defined in chapter 3: planning systems for multiple product-markets. We will now consider the cases relating to other types of system:

- Case E: a data consolidation & display system (section 10.2)
- Cases F and G: causal modelling system examples (sections 10.3 and 10.4). (Case D also included use of a causal modelling system, although this was not its main focus.)
- Case H: a planning system for one product/business unit (section 10.5).

The final sections of the chapter provide comparisons across system types. Section 10.6 compares the benefits and success factors from the types of system examined in this chapter. Section 10.7 provides a related discussion of the different approaches to market modelling incorporated in the different system types examined.

10.2 Case E: Marketing EIS in food products company

10.2.1 Case description

Background

This food products company was the market leader in one product area in the UK, with two major brands. Some parts of the product area were in long-term decline, and although the overall market size was still growing slightly, profitability was being squeezed. Although the product area could be divided into three or four sectors, cannibalisation was always an issue. With fairly homogeneous profit margins between products, the focus tended to be on volume to support the company's fixed costs, particularly in production capacity.

The company had a classical system of brand marketing, with product managers for each part of the product range under the brand, reporting to a general manager responsible for the brand. Their responsibilities included drawing up annual marketing plans, co-ordinating pricing, promotions and new product development, monitoring performance against budget, and liaising with production and sales.

Voluminous amounts of information were needed to fulfil this role. Sales information was complemented by panel data, which provided market size and share estimates, and by store-based data. Before the computer system was introduced, the product managers were forced to spend large amounts of time analysing data. The general manager related an experience four years previously:

> "I had to spend an inordinate amount of time - something in the order of 2 days - just to find out what our sales performance had been over the last decade on this particular product. To show that this business was in steady decline and that what they had been experiencing recently wasn't a blip or a skew. For me to spend two days just to get the data before you get the insight was absurd."

Inevitably, one result was that many analyses were not carried out. A product manager quoted an example:

> "We didn't really understand when we saw a competitor introducing a new product what the impact was. Or if we did it was six months down the line rather than at an earlier stage when we could actually do something about it."

Introduction of the system

For the general manager, this experience was formative in commissioning a computer system.

> "When I was involved in writing the proposal, it was all about saying of the three days it took to construct the board presentation on this, only one day was sitting down, thinking about it and mulling over the consequences. I'd much prefer that to be two days sitting, thinking and one day capturing the data."

A further motivation was to ensure value for money in promotional spending - here expressed by a product manager:

> "We were spending a huge amount on promotions and no-one really knew if they were making any money nor how much...Things are getting more and more complicated and if we don't understand what is going on, then we haven't a hope."

After an IT manager had co-ordinated the requirements from different departments and surveyed the available systems, an executive information system, IRI DataServer (reviewed in McDonald, Wilson and Hewson 1996), was purchased and tailored to the company's needs. It included hierarchies of products, customers and time periods, and allowed sales to be viewed by any combination of account, product, depot and time. It also included consumer panel data. Information could be obtained graphically or in tabulated form, either on the screen or on paper reports. Extensive facilities were available for selecting the information required, and then viewing further data in order to explore phenomena of interest. For example, one could pick out some products from a sector and drill into those products by account; or one could compare all the products introduced in the last three years against those that were introduced in the last ten years.

Terminals were available for all the product managers, who received a degree of training - though perhaps not enough.

> "We sat down for a couple of hours and tried to understand what was on the system and how to use it. I don't think really people got the training that they needed. There are still several people in the department that don't know how to manipulate the data within the system. They know how to turn it on and how to call of a few reports that they set up in the past. But there are a lot of people who still struggle to actually manipulate it. The system is very easy. But you've got to know a few little tricks and a few short cuts. And you need to understand how the markets and accounts are structured."

System usage, as a result, seemed somewhat dependent on computer experience and confidence.

Impacts of the system

All the product managers, however, relied on the system extensively, both for reporting and for ad-hoc analyses. One, who by his own admission was as yet "desperately slow" on the system, related how previously, "you couldn't easily add it up by groups, nor could you drill down by account...Products are babies. If you don't look after it, it will die. So you need to be on top of it in terms of facts, figures, and what the accounts are doing."

The system was consistently perceived as having achieved the objective of providing faster access to data.

"They only have to spend a small amount of time at the terminal getting some data. Clearly there is easy access to insight. Whereas previously that was impossible. It was literally a case of calculator, pen and paper or some Lotus spreadsheet where you had to key in the data."

Could the objective have been achieved by employing clerical staff to manipulate the data? The general manager thought not. As a product manager looked at one piece of information, that would suggest another to look at: the search could not be specified in advance.

"If you had a clerical person sitting here, clearly because it's an iterative process they're not going to take that piece of learning and modify their investigation from there on. Whereas a product manager attuned to the business issue is going to respond to that latest piece of learning."

One cited impact of the greater speed of analysis was the carrying out of more analyses - for example, of how advertising had performed, what the impact of a competitive move had been, or of the effectiveness of a promotion.

"Because it was so difficult and people were so rushed, nobody even attempted to do it. And therefore, we didn't really understand to the degree that we understand now - and we can still improve that - how efficient our promotional spend was."

As a result, decisions were better rather than necessarily faster:

"Somebody would come up with a promotional idea and say we can get 6 times uplift. So we'd order packaging for 6 times uplift. We're now in a position where we can say did we really get 6 times uplift the last time we did it? Why and in which accounts? How much space in store did we get for the promotion? And it starts to allow us to be more objective and to take better decisions because we are dealing with real information rather than just people's views on what happened. I do think it's helped with the quality of decision making. In terms of speed, I think it's helped with the speed because it's slowed things down. People now say rather than 'let's run away and do the promotion again', 'let's sit back and analyse it'."

One product manager talked in terms of the power that the extra access to information had provided, both for internal and external dealings. He quoted an example:

"We can say to Tesco's, your promotion last month gave you six times uplift. Shouldn't we be doing it again?"

Other examples were to chase account managers if a product was below target in an account, and to provide feedback to the factory.

As well as these tactical uses, the system was felt to be providing data for planning purposes. Moving annual totals were used to look at longer term trends, to remove some of the volatility from promotions:

"When you've got this sort of volatility it hides the actual trend. You can't see where it's going. You do an MAT on it and all of a sudden you can see the turning points and the actual trends."

System restrictions and complementary systems

Some restrictions reduced the system's utility for planning, however. Firstly, the absence of on-line promotional data led to difficulties in understanding the past as a basis for predicting the future:

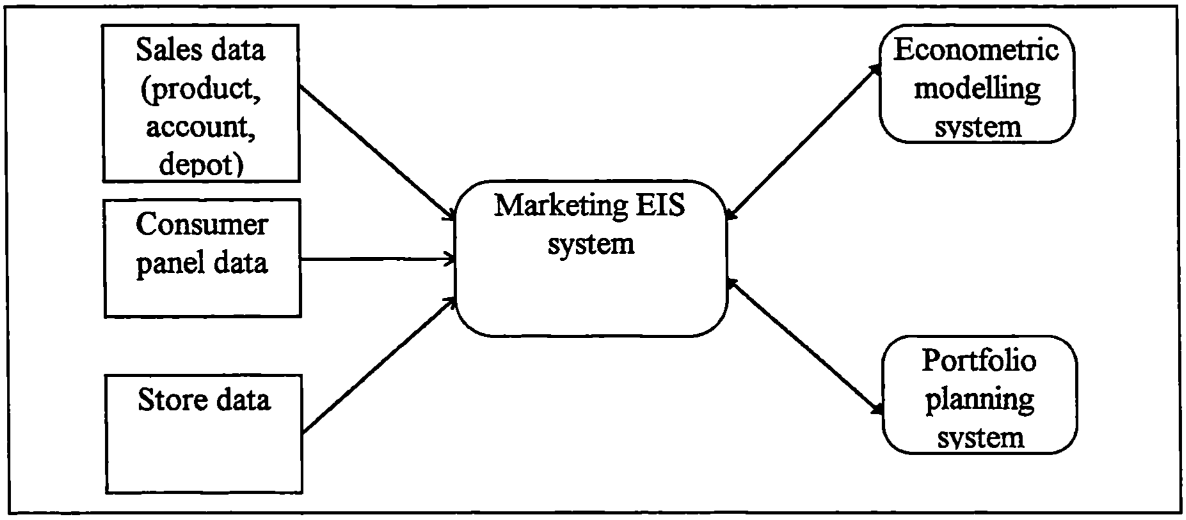
"We have promotional planners but they don't tend to be filed well - so if you're looking back in time it's difficult to find out what went on - nor particularly accurate. You'll find one and the dates won't correspond to the weeks you've had the uplift because something's changed and no one's updated the plan."

Secondly, in the absence of econometric modelling facilities, forecasts could only take account of the effect of promotions in a judgemental way. The general manager planned to change this (see Figure 10-1):

"We're going to have to get into a tool that's able to grab data from a previous promotional activity and say when you had these elements behaving previously and if you replicate those in the future, you will get this performance range. And it's that modelling of behaviour which we don't have. And we don't at this stage have the human or the software capability to capture that. This software is looking to do that."

This was not, however, expected to be easy, as promotions included difficult-to-quantify aspects such as the degree of support given to the promotion by the store in how the product was placed on the shelf.

Figure 10-1: Marketing data usage in food products company



Other problems with planning concerned organisational procedures. The assumptions underlying forecasts were not felt to be adequately recorded, while the short time period in which budgets were set restricted the extent to which analyses could be carried out on the system to ensure that the budgets were appropriate. The result, in the view of some product managers, was that the commitment to budgets was lower than it might be.

The general manager perceived the need to complement the system with portfolio analysis to help with overall strategy - though he anticipated that this would be used by himself rather than the product managers. Although there was a considerable degree of consumer switching between parts of the portfolio,

"we try and portfolio manage when we can, by focusing for example on meal-time occasions...that is very different from something like a snack. ..One element of my job is managing the mix - swinging the mix towards more profitable products is clearly an issue."

He had recently obtained a simple portfolio matrix package, Portfolio Manager (reviewed in McDonald, Wilson and Hewson 1996), though it had not yet been used. He intended to feed data from the system into the package.

"I'm looking to embrace portfolio management in the day to day process of planning by taking the burden off the individual. The big concern of portfolio management is that you get a series of data that is then presented inaccurately - particularly if you're doing a BCG or something like that. People do it by getting a 5, 10 and 50p coin out of their pocket - and, God forbid, people draw conclusions on that. At the end of the day just about any business does it to some level - sometimes on the back of a fag packet, sometimes more astute, and I'm trying to take it to an area where at least it's accurate."

10.2.2 Benefits

A comparison of the hypothesised benefit propositions against the case data showed that most did not apply, due to the very different purpose and impact of the system to that of the multiple product-market planning systems considered in the previous chapter. Table 10-1 selects those which did make sense in the context of this case, with a reworded benefit description.

As the propositions needed substantial amendment in the light of the case, and as no other cases are available in the same category of the system typology, these benefits should be regarded as tentative hypotheses, and the list as not necessarily exhaustive.

Table 10-1: Case E benefits

Benefit	Description	Assessment
Save time on information retrieval	A time investment in learning systems is needed. Once this has been made, systems can save time compared with equivalent information retrieval from paper reports, whether for ad-hoc analysis, planning or control purposes	++ Numerous direct comparisons with previous experience
Improve information availability and accuracy	Because the system can select and consolidate the information required on a number of dimensions, information is in practice available that would otherwise not be, except by laborious error-prone manual analysis	++ Previously, with many analyses, "Because it involved going through great books of data and adding columns,...nobody even attempted to do it". Accuracy on forecasts, however, improved little
Update managers' intuition through graphical display and iterative specification of required data	Graphical display can enable patterns to be assessed more effectively than numbers alone. The iterative search through data whereby the causes of one pattern can be sought through a fresh data request can assist with exploration of patterns of interest.	+ System provides "easy access to insight". But benefits of graphical display disputed by one product manager who was as happy with numbers- though system training probably a factor
Improve decision justification, credibility and confidence	Resulting decisions on marketing strategy or tactics are often better justified and more credible, and the decision-makers have more confidence in them.	++ Credibility/confidence with boss, sales, production, customers cited.

Key: see Table 8-1 on p167

10.2.3 Success Factors

Similarly, a revised list of success factors is shown in Table 10-2. Again, they should be regarded as tentative hypotheses for systems in this category.

Table 10-2: Case E success factors

Success factor	Description	Assessment
Adequate training	Adequate training is needed in how to use the system.	**/++ Short training meant some users became afraid of system & were slow to learn; higher managers similarly affected by "fear factor" in view of some
Sufficiently wide system availability	To obtain maximum benefits from the multiple levels of analysis and dimensions included in a system, the system needs to be available for all relevant functions and levels, including sales as well as marketing	**/+ Account managers without system for resource reasons; some store-level potential benefits cited that could not currently be gained. General manager conducted higher-level analyses than product managers
Coordination of system use with planning cycle	For better information availability to impact positively the quality of forecasts and budgets included in plans, planning procedures need to allow for the system's role	**/+ Budgeting occurred too fast for analysis using system, and political factors cited as resulting on occasions in budgets with little buy-in from managers
Appropriate analysis units	The definition of relevant units of analysis, such as product and market hierarchies, are important to ensure that relevant analyses can be carried out	**/o No signs of difficulties in the definition of analysis units

Key: see Table 8-2 on p167

10.3 Case F: Causal modelling in a food conglomerate

10.3.1 Case description

Background

This food conglomerate had been built up by a series of acquisitions over the last decade. Ranging from drinks to chocolate, its European business now had a business unit per country, "managed with a frightening degree of autonomy". In many respects the culture inevitably was not fully unified, given the diverse historical strands: "We are working in a culture which isn't quite a culture yet, it's still 30 or 40 different cultures".

The planning process was one mechanism that the European and world headquarters staff had to unify the diverse approaches, and to enable review across business units. A unified format of annual plans included forecasts of the market, the company's share and profit, with associated marketing plans for achieving them.

One area in which business units were claimed to differ was in the approach to marketing information. In the States, econometric modelling was reportedly deeply embedded:

"When a marketing manager is presenting, he may also have to present modelling proof - not just 'in order to get at that share I need this price gap', he will also need somewhere in the appendix the modelling that's gone into that."

The European vice-president responsible for marketing information wished to build up similar expertise in Europe. This was not a trivial exercise:

"We need not just the capability to produce the stuff, we need educated management to ask for it and know what to look for."

He therefore appointed a modelling expert to be the champion for modelling in Europe, providing assistance in modelling to the countries, and building up their own expertise. The champion explained the difficulties of the task:

"They tend not to have specialists - some of them don't have research departments, let alone modelling specialists within them. That means we have to have a network, and we have to improve the capability of anyone who is capable of modelling. We have enough experience that with modelling, a little knowledge isn't just dangerous, it's fatal. So we try to keep the modelling in the hands of those who we halfway trust."

Purchase and use of system

It would take time, however, to build up the modelling skills in each country, so for the time being there was a bottleneck. He looked for a computer system that would help to ease this.

"Whatever system you choose has got to give great productivity gains to those rare animals that you're entrusting to it. The need is to very quickly be able to find the limits of the information in a dataset."

This implied simplicity rather than richness of facilities: "The real productivity savings come from stopping them wasting their time for another week." It also implied graphical presentation: "If the software brings with it some reasonable graphics, you can almost see the thing working."

Another factor in the choice was to allow non-linear relationships to be modelled. A neural network-based modelling package, 4Thought, met both criteria. But were non-linear relationships not harder for managers to understand than traditional linear regression?

"People are quite relaxed about shapes of curves. They can see that as you get close to some barrier price the continuity will break, that there will be a point beyond which the damage will be done. People can get their minds around that, and they can get their minds round something that comes back and presents them with response curves and things like that."

To date, the main purpose of the system was to model the factors driving market size and share in key markets, in order to inform decisions on changes to the marketing mix. The secondary purpose was forecasting on the basis of the model, though "we haven't started from forecasting as the primary role - we have started from understanding the primary levers". The champion would assist a country with building models in some important markets, and work towards a situation where the country could continue unaided itself.

"I have a missionary role, to get the business units to believe so much in the importance of modelling that they spend some headcount on it."

Several countries had so far recruited their own modelling person.

Some aspects of modelling he found best tackled by a different approach. Structural modelling in order to determine the best definitions of market segments was achieved using a separate methodology. Following this, the 4Thought system could be used on the resulting market segments.

Example of use

In one particular country, the company was the market leader in one category. Its main umbrella brand had a premium sub-brand P, and a second sub-brand which was positioned as a healthier alternative, H. The H brand was priced higher than the premium brand, and its sales had withered since its launch three years previously. The business choices included cutting its price, increasing its advertising, and replacing it with a line extension to the premium brand.

The modelling champion was called in to help to model the market share of H. He set up a model with weekly data drawn from a consumer panel going back a number of years, with an alternative model based on monthly data - the basis on which media data was available. The variables included promotions, the average price of H, its price gap with P, its price gap with various competitors, media spend, and seasonality - unexpectedly a significant factor in the share model, probably due to promotions patterns of various of the competitors, who promoted heavily at certain times of the year.

This resulted in a curve that showed what the share of H would be on various pricing strategies, showing a relatively modest share gain if the price of H was lowered to that of P. It also showed that the effect of some complementary advertising would be to halve the price cut required to achieve a given share. A further pattern thrown up accidentally was that promotions were occurring when H was priced high, rather than being used to highlight a low price.

One thing the model could not do was model the effect of price cuts on competitors' prices. This was modelled using a separate methodology and separate software support.

The champion's resulting report to the country managers still left a number of decisions to be taken.

> "It leaves them with all the choices. Then they will tell me what they have decided to do. That's fine. What we have given them is the means of making a smarter decision than letting the loudest-mouthed product manager win."

The model was also left behind for the country managers to use for forecasting purposes, and to provide a continuous check on whether the factors driving the market were remaining the same.

> "I loaded them up a much simpler model for forecasting their market. They are doing their business plan for next year. They need to be able to predict in simple terms...I have instructed them to ring if the actual is outside the error margin by a factor of 3 or more. Models don't break, the reality walks away from them, and you need to find out when that is as quickly as possible and work out why."

Choosing when to apply the system

Company culture

In some cases, data was not available to build econometric models. The company culture did not appear to support the use of judgemental alternatives such as portfolio matrices. "Our company culture would reject that. If we didn't have the data, our next step would be survey, through the brand price trade-off methodology. Failing that, we would say to some guy, make a decision. If this was a minor brand where the risk to the business was fairly small, we'd say let's just do it. If it's wrong maybe we can rescue it next year. The interesting thing is to compare ourselves with [x], who are our biggest global competitor. We will go modelling first, survey next, make a bloody decision. [x], we think, goes decision, if any doubt do a survey, and what's all this modelling nonsense?"

Level of applicability

Modelling had so far been used within categories rather than for cross-category resource allocation at corporate level. This was not just due to the technical difficulties involved: political and organisational considerations were also considered to be relevant.

"We are trying in the States to do cross-category portfolio work. You can optimise your spend within a category. If I had a million dollars for a category, I would know how to spend it. So in theory we could add them all up and say, 'Which of you guys is going to get this million?' You have to recognise that you can starve a category if you let the arithmetic go wild...The guy in European head office might say 'it seems to us you shouldn't have more than the following in funds, and we're going to give it to this country'. Now that's politically an enormous step."

Match with intuition

To what extent were the system's outputs accepted only when they were concordant with the managers' intuition?

"Many of our clients are cherry-pickers. If we do a body of modelling that conforms - it doesn't have to exactly confirm, but if it's close enough to what they were thinking, they are off and running with it. If we do something that they're uncomfortable with, it will become an ongoing discussion point. We say if a modelling conclusion looks wrong, there's a good chance it is."

10.3.2 Benefits

As with case E, a comparison of the hypothesised benefits against the case data showed that most did not apply. Table 10-3 selects those which did make sense in the context of this case, with a reworded benefit description as well as a rating.

Table 10-3: Case F benefits

Benefit	Description	Assessment
Update managers' intuition through causal modelling of factors driving a variable of interest	Causal modelling of variables such as market size and share update the users' intuition, which can improve tactical and strategic decisions	+ Examples quoted of improved understanding of relative effects of advertising, price and promotion. Also more strategic decisions re brand extensions. Counter-intuitive results either accepted or become "ongoing discussion point" - decisions are not taken unless intuition is convinced

Improve decision justification, credibility and confidence	Resulting decisions are often better justified and more credible, and the decision-makers have more confidence in them	+ "Modelling proof" for recommendations may be sought.
Enable aspects of live marketing model	The system can form the repository for "live" models of important markets, checked continuously and updated by exception when market conditions change, rather than at regular intervals to fit with planning procedures.	+ Expert beginning to 'leave models behind' with internal client, where he is contacted when new data falls outside predictions. Models can then be updated when "reality walks away from them".

Key: see Table 8-1 on p167

10.3.3 Success Factors

Similarly, a revised list of success factors is shown in Table 10-4.

Table 10-4: Case F success factors

Success factor	Description	Assessment
Culture supportive of causal modelling	The organisational culture needs to accept causal models as a basis for decision-making. This implies a degree of understanding, and freedom from excessive political or other constraints on decisions	**/+ At product/product group level, modelling appears to be accepted. At higher levels, possibly unacceptable as well as difficult: "that's politically an enormous step". Need to educate those in receipt of results identified.
Availability of expertise in modelling	The definition of models and their interpretation is sufficiently skilled to need specialist training that goes beyond how to use the system. This implies use of experts in modelling, whether internal or external.	***/+ In-house expert attempting skills transfer to establish modelling expertise in each country. Some comparison with cases where users with less expertise have tried modelling: "We've watched what the brand manager who's found the regression package on Lotus can do"
Appropriate definition of market segments	The appropriate definition of market segments is critical to obtain meaningful results. While models may suggest flaws in segmentation, correction may need other data sources such as consumer research.	***/+ Structure modelling used to gain "a better feel for what the competitive sets are" before econometric models built. Otherwise, segments follow production criteria - "in terms of the ingredients, the way thing is made, not necessarily the way the consumer behaves in the market"
Co-ordination of system use with planning cycle	Use of the system outside the organisation's formal planning processes may restrict the extent to which decisions are influenced by the planning exercise	**/+ and -. While some use is tied with planning cycle, eg need for forecasts for business plan, other use is not - eg contingencies have been defined for scenario where competitors start a price-war.

Key: see Table 8-2 on p167

10.4 Case G: Causal modelling in a drinks company

10.4.1 Case description

Background

This drinks company regarded itself as brands led. The industry was:

> "increasingly polarising around big brands. It's important to be able to go into an account with a big portfolio, with the big brands and heavyweight support behind them."

A marketing manager admitted that this emphasis had slipped for a while following supply and invoicing problems which accompanied a takeover: "we were certainly sales led, in a desperate attempt to minimise losses through the disruption to customers". The emphasis had now returned to building brands, however. The importance of marketing had been heightened further by legislative changes which had the effect of freeing up the market.

The marketing director had several teams: brand management, market research, market planning, commercial and PR. Market planning acted as a facilitator and information provider to the brand managers in the production of their annual brand plans, providing market forecasts, competitor research, and ad-hoc analyses such as assessment of promotion effectiveness. Their role complemented the market research team which commissioned consumer research.

Econometric modelling was used for the ad-hoc analyses, in order to model the factors driving market share for a particular product, on the basis of historical time series data, as a basis for decisions about the marketing mix.

Purchase and use of the system

The 4Thought system was purchased for use on such ad-hoc analyses. As well as market share or size models, it was hoped that the system would make possible profiling applications, where in place of a time series, the data varied by some other variable. For example, the market planning manager tried an analysis of which outlets would be likely to succeed with a particular product. This particular exercise proved impracticable due to inadequate data on the company's database, and use of the system so far had been restricted to time series work, though various such profiling applications were being considered.

The 4Thought system was chosen largely because of the simplicity of its user interface, rather than because of its neural network technology.

> "If I can get at a forecast that I'm happy with, that's enough, and I want to be able to arrive at that forecast easily. I have not seen a regression package packaged in the same way as this is. If I did, there might be a lot more people making good use of regression."

Previously, a regression extension to a standard PC spreadsheet package had been used.

> "This is the first system I have seen that really lets you move the data around easily. At the time I was using something called Lotus Regression, which was really difficult to move your data in and out."

Nevertheless, there was one perceived advantage of neural networks: "Neural networks allow us to look at curvilinear relationships. That's an attraction." While you could build non-linear models with regression, "I think that neural networks handle it much more readily."

Example of use: price sensitivity of a major brand

One exercise conducted with the system involved analysis of the price sensitivity of one of the company's major brands. Using information from grocery retailers, the model tracked the drivers of weekly market share over the last few years, with variables including brand price, brand price for various competitors, display distribution (tracking posters about the product) and product distribution. The choice of competitors was based on the company's market hierarchy, which was determined separately, and allocated the product to a mainstream rather than a premium segment. General media spend did not need to be included, as the model was good without it, accounting for 94% of the variance in market share, over a period when the products share varied from 2% to 20%.

The model was then used to test out various pricing scenarios. Conclusions were reached about the optimal level of pricing in terms of profit: it was found that a price just below the competitor average would improve profitability. Scenarios were also tested about the timing of promotions. One manager had suspected that promotions should be timed when competitors were not promoting, rather than at the same time as at present. The model showed, however, that the current approach was the right one. A final conclusion was that it would not be possible to return to the market share previously achieved, as had been hoped.

Using the model's outputs about pricing proved difficult, however. In order to act on the model's conclusions, information on competitors' future price was necessary.

> "It's great that we have an understanding of what's affected it in the past, but unless we can accurately model the future of those components, there's a restriction. And at the moment we haven't accurately modelled the future."

The marketing planning manager related this to the resource available for this modelling work.

> "This came about because I decided to be proactive, staying late after work to get it done. I am going to have to...get a budget signed off to make sure we can get hold of that data."

In the meantime, could the pricing conclusions not be used tactically, reacting to competitors' prices as they occurred? There were various barriers to this. Firstly, tactical decisions relied on the sales force, who needed to be convinced of the model's correctness. In the view of a marketing manager serving the sales force:

> "The easiest people to convince are analysts. The problem is convincing the rest of the organisation, particularly salespeople, who aren't interested in all this fancy stuff. And therefore one needs to be able to get back into the data in a very simple way and say look guys, here are the patterns."

Secondly, pricing and promotional decisions were largely allocated at the start of the year. Thirdly, sales force decisions were taken at store level, rather than the aggregated level used in the model. On the promotions findings, however, the marketing manager agreed that the model had proved of value: "Something very practical there - I can say, guys, this is the time when we ought to be promoting."

The applicability of econometric modelling

A more fundamental difficulty was raised by two interviewees. The model, like much of the thinking in the company and the industry, was based on a market hierarchy which separated the standard drinks from premium drinks, and one category of drinks from another. In their view, these distinctions were artificial, and shown to be false by consumer data, which illustrated that many people switched from one category to another.

> "It's production speak. If you explore consumer data, you find that the areas aren't so much grey as they don't exist."

This could, in their view, have profound implications for pricing and other aspects of marketing. The econometric modelling could only to a limited extent help to validate these ideas - if the price of a competitor supposedly in a different segment was found to be a significant variable, that would suggest that the segment boundaries were incorrectly drawn, or at least not hard and fast.

For one of the interviewees, this illustrated the general principle that multiple sources of market information, and multiple systems analysing it, needed to be used to complement each other.

> "There's three things there. There's a descriptive technique, which is study the data; there's consumer research, not so much the ad-hoc, but the continuous stuff, where you can identify the consumer relationships, behavioural patterns that the consumer has; and then you apply what you know in this sort of statistical data, and you know from the quality of the statistics produced whether the pattern that you're trying to explore as robust or not. I see them as complementary along a range."

So what was the role of judgemental models within the company? Models such as the DPM would certainly not be appropriate if based on consensus, according to one marketing manager, because the conventional wisdom was so pervasive:

> "That's what this market operates on - and it's a bloody disaster. Because they are convinced that the market works in a certain way."

As communication devices, however, they might have a role, in providing graphical presentations of data.

10.4.2 Benefits

Table 10-5 assesses the case against the benefits defined under Case F above.

Table 10-5: Case G benefits

Benefit	Description	Assessment
Update managers' intuition through causal modelling of factors driving a variable of interest	Causal modelling of variables such as market size and share update the users' intuition, which can improve tactical and strategic decisions	+ Size, share examples quoted, leading to insights on pricing, promotions timing, and general brand strategy. While intuition updated somewhat, not always actioned for other reasons - eg timing of decisions on promotions

Improve decision justification, credibility and confidence	Resulting decisions are often better justified and more credible, and the decision-makers have more confidence in them	DK Few decisions affected by modelling as yet
Enable aspects of live marketing model	The system can form the repository for "live" models of important markets, checked continuously and updated by exception when market conditions change, rather than at regular intervals to fit with planning procedures.	NA Too early in usage of system to assess

Key: see Table 8-1 on p167

10.4.3 Success Factors

The case is assessed in Table 10-6 against the success factors defined for case F.

Table 10-6: Case G success factors

Success factor	Description	Assessment
Culture supportive of causal modelling	The organisational culture needs to accept causal models as a basis for decision-making. This implies a degree of understanding, and freedom from excessive political or other constraints on decisions	**/++ Sales need either explanation of causal models, or explanation in other terms (as favoured by one manager).
Availability of expertise in modelling	The definition of models and their interpretation is sufficiently skilled to need specialist training that goes beyond how to use the system. This implies use of experts in modelling, whether internal or external.	***/+ In-house expert provides modelling service to brand managers. View expressed that use by brand managers "a bit dodgy. The danger is they put data in, but they end up...accepting models that they don't realise are crap". No direct comparison available
Appropriate definition of market segments	The appropriate definition of market segments is critical to obtain meaningful results. While models may suggest flaws in segmentation, correction may need other data sources such as consumer research.	**/++ Segmentation used in one model criticised as wrong, therefore model not thought to address key issue in relevant product group. Choice of level of analysis affected utility - a more detailed (store) level regarded as more relevant to sales force.
Co-ordination of system use with planning cycle	Use of the system outside the organisation's formal planning processes may restrict the extent to which decisions are influenced by the planning exercise	**/+. Some implications of model cannot be acted upon due to timing of promotion decisions as part of annual planning

Key: see Table 8-2 on p167

10.5 Case H: Planning in speciality chemicals company

10.5.1 Case description

Background

This speciality chemicals company had grown from a small company serving the textile industry after the war to a profitable diversified company with a £350m turnover, selling into a number of industries around the world. The UK still provided 60% of the manufacturing, but only 12% of turnover, the rest being provided by a series of subsidiaries and agents. With a reasonably dominant position in its markets, it had shown high growth in recent years. The board reportedly felt this growth could probably be maintained, through geographical expansion into parts of the world in which it currently did little business, but was well aware that this presented a number of organisational development issues.

With this in mind, it had recently appointed a group strategic planning manager, reporting to the group CEO. One identified weakness on which he was working was the lack of marketing processes. Marketing activities were carried out on an ad-hoc basis by sales managers, and R&D expenditure tended to be a "bunfight" between divisions. He claimed to be putting into place processes for forecasting, market intelligence, annual planning, and control. He also had involvement in choosing strategy, and delivering aspects of the strategy on a project basis.

History of use: evaluating a new business opportunity

The system was bought to look at one particular issue of choice of strategy, on which the strategic planning manager was called in to provide an independent assessment. His understanding was that one of the group executives was very keen to move to a particular business area, but that the others were unconvinced, feeling it did not relate very well to the other parts of the business.

He decided to try the Business Insight system to assist with the assessment. He interviewed a number of board members and other relevant managers in order to obtain the necessary input, translating the system's prompts into questions and feeding the answers into the system. He then wrote an assessment for the board, backing up some of his "fairly subjective conclusions" with appendices containing printouts from the system.

He presented his report to the board, and used the system to answer some of the questions that arose in discussion. The board decided not to proceed with the new business area.

System description

Based on an integration of marketing and strategy theory such as portfolio analysis and Porter's 5-forces model and generic strategies, the system provides a detailed analysis of a particular product-market or business unit. Unlike the multiple product-market systems, it examines one product-market in depth rather than assisting directly with issues of portfolio balance and resource allocation, although principles about these issues are raised as they might affect the product-market in question.

The system prompts for a number of inputs covering all aspects of business strategy, including the nature of the product, the market and the competition, the company's human resources, marketing and sales, production issues, and financial information.

It then produces a number of strategy charts, such as a chart assessing the product-market's match with Porter's generic strategies of cost leadership, differentiation and focus, and a product positioning matrix plotting price against value. These are complemented by advice of various kinds, including a strengths/weaknesses analysis and an assessment of the product-market on key factors such as profit potential. The reasons for advice given can be traced back in terms of the inputs that led to the advice and how they were combined.

Impacts of the system

The system was used not just to produce recommendations, but also to debate them. This had some advantages over a paper report, in the strategic planning manager's view:

> "We had it up on a screen as we were talking through the results. And people could say, I don't agree with that, I think you've completely underestimated the importance of having a distributed, well-trained salesforce able to respond in half an hour, and that's how we defined responsiveness to customers' requests, and you've completely underestimated how good we are at that. And you'd say, OK, well let's see, and change the scoring, and see what happened to the overall rating of attractiveness or whatever. And of course, by and large, small changes in one thing don't have much effect. There are some exceptions to that. So it was a kind of way of saying, we might be wrong about that individual thing, but unless you can point out a series of things we're wrong about, it doesn't change the overall conclusion. So it was a way of giving a weighting to individual issues which could be instantaneously reflected in an overall conclusion."

Inevitably, an issue in such discussions was the weight that could be attached to the system's extensive advice:

> "You always then get onto the next issue, which was how exactly is this black box combining all these various factors? And of course I can't answer that because I don't know. All I can say is based on my experience of doing these things before, I'm not really surprised at the way in which it combines the answers - all it is really is Porter's 5 forces plus a bit more in a fancy slide show. It's in line with what I would have expected. You're right that I can't explain what the weighting is - if you want we can go back and alter the weighting. For the purpose I was prepared to trust it."

How about the argument that the advice was trying to quantify the unquantifiable with excessive precision?

> "I'm an engineer. My approach is always that you can never have enough numbers. But I think it's particularly true here, because on the pendulum between gut feel and tell me the numbers we're off scale on the gut feel end. So I don't have any problem with asking for numbers here, because we've got far too few."

But if the system was trusted because its outputs matched expectations, was it simply confirming what managers already thought? For the strategic planning manager, the answer was no:

> "You get a list of twenty key issues. I would have said four or five of them were not obvious but were probably right."

It appeared to confirm the thinking of some of the other managers present:

> "Some of the non-executive directors were involved as well - it probably confirmed some of the concerns that someone who's a bit more detached would have. They are unbiased, relatively, so an unbiased collation, which is what it was, more or less reflected what they expected."

For example, the system's generic strategies analysis found that there was no single clear strategy, with arguments between cost leadership and differentiation finely balanced. This led to the argument that the company was already competing in enough areas on the basis of cost leadership, and this area would rapidly become very dependent on low cost. The system had not changed the mind of the champion of the new business area, however.

> "He couldn't knock down the basis for the conclusion on an individual basis. But it's a bit like which football team do you support - they aren't susceptible to complete rationalisation, are they, sometimes? And there's always a balance of this hard stuff with judgement and gut feel and so forth. All that you could point out was that there was weight of evidence for a guilty verdict. You couldn't actually be the jury."

Had the system had any educational side-effects to help the strategic planning manager in his missionary role?

> "Well, it's a kind of condensed MBA strategy class, isn't it? I'm not sure you can learn very much from it if you haven't been through it before. Or if you haven't read a book about the 5 forces and all the rest of it. I think you need lots of examples of what is meant by a lot of these concepts. And it doesn't give any examples, because it's trying to use your data as an example. And it's not really, to me, a tool that is a good first approach to the subject. You've got to know the rules of the game first, and then you can use it as an assistant, to collate their answers and present them back quickly. That's what it's good at."

In summary, in the view of its champion, the system had helped to provide a focused debate that resulted in a clear-cut decision.

> "It put a line in the sand. It allowed you to do an exercise, capture the opinions, make a decision, and rule further discussion out of court. So probably what would have happened is we wouldn't have made as clear a decision as quickly."

Success factors

In the strategic planning manager's view, at least, the value of the tool was in analyses of new business areas or radical changes of strategy, where the board did not have sufficient expertise to take decisions unaided. In accordance with this view, the system had not been used for a decision on a divestment, which had focused on short term financial problems.

> "Most of our decisions are about how to improve what we now do, and the rate of expansion of the manufacturing, and the marketing and distribution scope. That's what we spend most of our time discussing. There, I don't think this thing would be as applicable. It's applicable if there is much less information, and there's less knowledge and experience of the business area. The value of that thing was that it was a way of condensing a new area and comparing it with something that was existing."

The system had been applied with the strategic planning manager acting as a facilitator. What would have happened without the facilitator could only be answered hypothetically.

> "The system kind of puts another person into the room. The person is a kind of robot. It was up to me to run the robot and explain what the robot was saying in language they understood. I guess if they had sat there and thrashed the keyboard they wouldn't have taken much notice of it."

One further requirement for use was adequate time to feed in considerable quantities of data, and to research it as necessary.

> "It's pretty heavy on data input. The balance to that is you can get something out without putting very much in. But to get something out that was recognisable it was pretty input intensive. But that's the way of the world - you get out what you put in - I don't think one should be too surprised at that. But the fact of the matter is it took a long while."

10.5.2 Benefits

Unlike the other cases we have discussed in this section, the benefits and success factors that emerged from this case were found to be adequately described by the benefits and success factors arising from the EXMAR formative evaluation. Table 10-7 therefore summarises the case against these benefits.

Table 10-7: Case H benefits

Benefit	Rating	Notes, illustrative quotations
Improve support for planning process	NA	The system doesn't explicitly include process support
Enable a live marketing model	NA	System only used for one-off exercise
Aid use of marketing tools through calculations, graphical display, guidance on use	+	System integrates wide range of marketing theory, prompting for data once and re-using it for different analyses as necessary. Resulting recommendations found useful. Emphasis on advice rather than graphical display, though both present. No direct comparisons with paper use of tools.
Aid identification of data requirements, resulting in improved information accuracy and availability	+	Some occasions when user realised needed data due to system prompt, though "I didn't always collect it". System "onerous" in data required, but "I don't have any problem with asking for numbers here, because we've got far too few."
Save time, particularly on revisions	DK	Not mentioned as benefit. No re-use so time for revisions not assessed
Support group planning, resulting in focused debate, improved mutual understanding, more equal participation and greater consensus	++	Ability to iterate in response to questions valuable: "it was a way of giving a weighting to individual issues which could be instantaneously reflected in an overall conclusion." Examples of agenda provided for debate, eg round Porter's generic strategies. Some resulting effect on consensus
Ease integration of functional perspectives	DK	While system incorporates different functional perspectives, little direct basis for comparison with previous planning
Improve plan credibility and confidence	+	Decision better justified than sometimes the case in the company, "because on the pendulum between gut feel and 'tell me the numbers', we're off scale on the gut feel end"
Aid individual and group learning about marketing planning	x	"It's not really, to me, a tool that is a good first approach to the subject". Could relate to the system's lack of transparency - although possible to trace basis for decisions, difficult to comprehend why question responses combined as they are
Increase marketing planning confidence and enthusiasm	DK	Little direct comment
Help manage complexity of multi-level plans	NA	The strategic choice for which system used did not involve more than one level of analysis

Key: see Table 8-1 on p167

10.5.3 Success Factors

Table 10-8: Case H success factors

Success factor	Factor presence	Factor influence	Notes, illustrative quotations
A market orientation, or the perception of the need for it	**	+	System brought in by new strategic planning manager, consistent with his task of improving marketing professionalism
Absence of excessive short-term pressures	DK	DK	No direct indications of excessive short-term pressures.
Presence of a system champion and sponsor	**	+	System used due to senior manager choosing to do so. No regular use since - partly an issue of system credibility with senior managers, also champion's time
System perceived as empowering not controlling	**	o	Not an issue as system only used by its introducer, the strategic planning manager.
Sufficiently wide team definition	***	+	Board and other relevant managers provided input, then outputs discussed by board. This helped buy-in
Adequate training	DK	DK	User familiar with relevant marketing/strategy theory. System not thought difficult to use, but details of training not known
Adequate facilitation	***	+	Facilitator used. Thought essential though no direct comparisons
Coordination of system use with planning cycle	*	–	Use was not related to formal planning cycle, but this was no barrier to system's impact on decision-making process, as board wished to decide on the issue
Appropriate planning units	***	o	No known problems with definition of product/market
Flexibility in planning processes	DK	DK	No signs of insufficient flexibility
Garbage in, garbage out: avoiding manipulation	DK	DK	No problems known with manipulation or of the fear of manipulation.
Ease of use	DK	DK	Ease of use not criticised
Degree of calculated imprecision	***	+	On the one hand, "I don't have any problem with asking for numbers here, because we've got far too few". On the other, "there's always a balance of this hard stuff with judgement and gut feel and so forth." Sensitivity analysis on the system helped to determine how critical particular inputs were: "By and large, small changes in one thing don't have much effect. There are some exceptions to that. So it was a kind of way of saying, we might be wrong about that individual thing, but unless you can point out a series of things we're wrong about, it doesn't change the overall conclusion."
Development expert driven as well as user driven	DK	DK	Information on development of this off-the-shelf system not available
Use prototyping or otherwise allow for iteration	DK	DK	Information on development not available

Key: see Table 8-2 on p167

10.6 Summary: Benefits and success factors

We first review the system benefits and success factors identified for the various system types covered in this chapter. It should be noted that as each system type is only represented by one or two cases, the findings of this chapter should be treated as tentative. Given this limited evidence, this discussion concentrates on the nature of the hypothesised benefits and success factors, rather than the degree of support for each.

Table 10-9 summarises the main benefits arising from the case studies. The equivalent list for multiple product-market planning systems is described in Table 8-27 on p219, and assessed in Table 8-28 and Table 9-12.

Table 10-9: System benefits by type of system

Data consolidation/display systems: case E	**Causal modelling systems: cases F and G**	**Planning systems for one product/business unit: case H**
Update intuition through graphical display & iterative specification of data	Update intuition through modelling of factors driving marketing variables	Aid use of marketing tools through calculations, graphical display, guidance on use
Information availability and accuracy	Enable aspects of live marketing model	Aid identification of data requirements
Improve decision justification, credibility & confidence	Improve decision justification, credibility & confidence	Improve plan justification, credibility & confidence
Time savings on information retrieval		Support group planning, focusing debate & improving consensus

The benefits of the data consolidation and display system studied in case E were, naturally enough, focused on the availability, accuracy and timeliness of data. While the concept of "updating of intuition" applied to this system as to multiple product-market planning systems, here the users' understanding of the workings of the market was challenged simply through the graphical display of data on market size and sales figures aggregated in diverse ways, and through the ability to explore the reasons for patterns in data by "drilling down" to a finer level of detail.

In contrast, the causal modelling cases performed this role of challenging the managers' current understanding through a statistical model. Like the multiple product-market planning systems, they also allowed a move towards continuously updated marketing models, with snapshots being taken for annual planning purposes. Being based on regularly collected time series data, such a model can be updated by exception when market conditions change, as case F showed, rather than in response to an annual planning cycle.

The benefits shown by the single case covering a planning system for one product/business unit (case H) did not differ significantly from the benefits of multiple product-market systems, with the exception that the marketing tools supported emphasised business unit strategy, such as Porter's generic strategies, rather than issues of portfolio balance and synergies between product-markets. The particular system studied also had more of an expert systems flavour than cases A to D, being more pro-active in offering advice. While this was found to be useful in providing a further means by which the user's understanding could be challenged, a trade-off was that it was not always easy to understand the reasoning for the advice given. Trust in the system was therefore more of an issue than with the systems which put more of the onus of interpretation onto the user.

Table 10-10: Success factors by type of system

Data consolidation/display systems: case E	Causal modelling systems: cases F and G	Planning systems for one product/business unit: case H
Adequate training	Supportive culture	Perception of need for market orientation
Sufficiently wide system availability	Availability of modelling expertise	System champion & sponsor
Co-ordination of system use with planning cycle	Appropriate definition of market segments	Adequate facilitation
Appropriate analysis units	Co-ordination with planning cycle	Sufficiently wide team definition
		Degree of calculated imprecision

Regarding success factors, Table 10-10 can be contrasted with the equivalent success factors for multiple product-market planning systems, described in Table 8-29 on p227, and assessed in Table 8-30 and Table 9-13.

The data consolidation and display system was used by individual product managers, rather than by a team. Here, the equivalent of 'sufficiently wide team definition' was sufficiently wide system availability, as the multiple ways in which the data could be analysed were of relevance to different groups for different decisions. As with cases A to D, the appropriate definition of product and market hierarchies seemed to be an essential precursor to analysis.

Causal modelling systems similarly depend on appropriate definition of market segments, some results in case G being questioned on the basis of whether segments were in fact distinct. One difference from the judgemental modelling systems of cases A to D is that the model can be defined by an expert without the involvement of relevant managers, though of course the results must then be presented to those involved in the market. The equivalent of 'adequate facilitation' is therefore the availability of a user with sufficient statistical knowledge to define inputs and interpret the results, as well as the ability to run the system.

Success factors for the single-product/business unit system were similar to those for the multiple product-market systems studied earlier. This case again challenged the hypothesis that system use needs to be related to the formal planning cycle in order for insights to influence decisions: as with case C, the board's involvement ensured that the system's use had an opportunity to have a bearing on the decisions taken.

10.7 Approaches to market modelling: a comparison

We have seen that the various system types exhibit different benefits and different success factors for achieving them. This is, of course, a reflection of their differing functions, as discussed in sections 3.4 and 3.5. For example, the data consolidation and display systems have a strong role in control of progress against the annual plan, whereas other planning software concentrates on plan creation. But in one respect, several of the system types can perform what at a broad level is the same function: the modelling of the workings of a market and the various competitors' strengths and weaknesses, as a basis for decision-making about marketing strategy and tactics. When, then, should one system type be used rather than another? Table 10-11 provides some tentative pointers arising from this research, which extend our discussion of this issue in chapter 3.

In this table, the planning systems for multiple product-markets and the planning systems for one product or business unit are combined under the heading of judgemental systems, as their analyses of the workings of a market typically emphasise managerial judgement (as, for example, in definition of critical success factors, weights and scores). The other approaches to market modelling are characterised as causal/econometric, and descriptive - this last being the approach of the data consolidation/display systems.

Table 10-11: A comparison of software-aided approaches to market modelling

Approach	Judgemental	Causal/ econometric	Descriptive
Applicability to: Analysis	Group hypothesis consolidation	Hypothesis testing	Hypothesis generating (individual)
Forecasting	Uncertain data NPD, changing markets	When data available When past=future (variables driving market, not necessarily values)	Extrapolation - when past=future (values as well as variables)
Strategy/tactics formation	Portfolio strategy; overall product-market strategy	Marketing mix fine-tuning	Current/historic size/sales as baseline for planning
Control	Regular/annual: review of strategy	Continuous: market departing from model	Continuous: sales departing from plan
Other selection criteria Data requirements	Low: views of managers close to market	High: hard data, all relevant variables	Medium: hard data, sales/market size
Threats to validity	"Conventional wisdom" biases in culture	Causality vs association: choice of variables	Disentangling causality: subjective interpretation
Threats to acceptability	Rejection as "pseudo-science"	Communicability; presence of statistics skills	Computer use in daily role of product managers

Analysis

The data consolidation and display system (case E) acts as a generator of hypotheses about the workings of the market, as users, typically working on their own on the computer, explore the reasons for a peak or a trough in market sales or market size. These hypotheses (often regarded as 'facts' by the users) can be tested more rigorously through the use of a causal model, which assesses the relevance of each hypothesised variable in predicting sales or market size. A judgemental model, by contrast, allows the views of several managers to be consolidated, for example in a list of critical success factors, weights and scores. The logic of such an approach is that the managers will have different experience and knowledge which, when combined, is likely to lead to a better model than that obtained from one manager alone.

Forecasting

Descriptive systems can only forecast with accuracy if the future is an extrapolation of the past. This implies both that the same variables (such as promotions, advertising spend, and price) are driving the market, and that their values either remain constant or will continue to change much as they have in the past. By contrast, causal models can still produce an accurate prediction if values of relevant variables change radically - for example, in the wake of a change in pricing strategy from a competitor. If the nature of the market changes, however - as, for example, when a new factor emerges, such as product safety following a well-publicised safety scare - a causal model will not be able to make predictions until a number of months of data is available. In these situations, and in other situations where data is uncertain or unavailable, such as in entirely new markets, judgemental modelling offers a more structured alternative to individual 'gut feel'.

Strategy/tactics formation

Descriptive systems can simply offer current and historic data to form a base-line for planning, at whatever level of product-market is required. Apart from producing more robust forecasts, causal models can allow the modelling of particular proposed alterations to the marketing mix, such as the optimal level of pricing. Because judgemental models can include 'soft' variables for which data is rarely available, such as product quality, service and image, they can form the basis for the wider definition of product-market strategy, as well as for issues of resource allocation between a number of product-markets, for which causal models may not be available.

Control

Because of their subjective nature, judgemental models cannot be continuously monitored against reality without the reconvening of the group that arrived at the model. The appropriate way to update such models is therefore through a regular review process, either as part of an annual planning cycle or at more frequent intervals (as in the bi-annual reviews of case A). As case F illustrated, causal models can, by contrast, be automatically monitored against reality, with an update to the model being triggered when new data does not fit with its predictions. The control role of descriptive systems is more commonly to monitor sales against plan, and where there is a divergence, to use "drill-down" facilities to examine where the divergence occurs.

Data requirements

The approaches vary in their requirements for information. Judgemental models are based on the views of those managers who have knowledge of the market in question, supplemented by harder data where available (as illustrated by case D, where causal modelling and market research influenced the judgemental model). As with the informal conclusions reached by users of descriptive models, judgemental models can only be tested informally against hard data. Descriptive systems require, however, at least the availability of sales data, and often market size data as well. Causal models require data on all relevant variables, including variables such as advertising spend. This can be hard to come by, and may require considerable creativity in its definition (as in the BSE example in case D).

Threats to validity

The potentials for bias differ between the three types of market modelling. Judgemental models can be subject to biases due to a culture where certain "conventional wisdom" tenets are held to be self-evident (cases D and G). In these cases, the averaging effect of involving several managers deemed to possess relevant knowledge may not approach the market reality. Although based on hard data, interpretations made by users of descriptive systems - as, for example, on the reason for a dip in sales being an advertising campaign by a competitor - are subject to difficulties in disentangling the effects of various variables which may be changing simultaneously. This subjectivity of interpretation is not a problem with causal models, where statistics are available on the relative weight of different variables. However, the choice of variables is still subject to judgement, as is the interpretation of an association between two variables which may be due to a common third cause rather than a direct causal link.

Threats to acceptability

Some other factors have been noted that may influence the acceptability of systems. Judgemental modelling may be dismissed in some particularly data-based cultures as 'pseudo-scientific' (as suggested by case F). While such cultures are likely to approve of causal modelling, this approach may in other cases be regarded as academic and incomprehensible, as explaining the outputs is not always easy (case G). A further barrier to the acceptance of causal modelling is the need for statistical expertise to define and interpret the models. The transparency of data consolidation and display systems is not subject to these problems of the believability of the system's outputs; however, as their power lies in the constant availability of updated information as a basis for control and hypothesis generation, one threat to acceptability lies in the need for wider system usage than with the other system types. Case E illustrated that not all product managers will necessarily take naturally to such systems.

Implications for software design

Some pointers towards appropriate design features to support these approaches to market modelling are provided in Table 10-12.

Table 10-12 Approaches to market modelling: software design issues

Approach Issue	Judgemental	Causal/ econometric	Descriptive
Input data	Structured and unstructured	Structured	Structured
Models/data manipulation	SWOT analysis/CSFs, portfolio matrices, perceptual maps, etc	Regression Solution of multiple linear equations	Consolidation/data slicing
Outputs	Graphical display, advice	Equations, graphical display	Graphical display,tables
Group support	Combining/contrasting perspectives	-	Data distribution
Integration	Office automation systems eg word processing	Models at higher and lower levels of aggregation	Operational systems (sales data); external databases (market size)
Users	Marketing managers + management team, facilitated	Specialists reporting to marketing/product managers	Market/product/brand managers, account managers
Tools/traditions	DSS Office automation	Statistics Spreadsheets	EIS DBMS
Bespoke vs off-shelf	Either, but off-shelf core likely to be lower risk	Off-shelf (ad-hoc) Tailored/off-shelf (regular forecasting)	EIS shell tailored with hierarchies & data feeds
Development risks	Specification Ease of use	Ease of use	Software design, eg sizing, performance Ease of use

Data

Judgemental models require a variety of types of data. The directional policy matrix, for example, requires 'structured' sales data for the circle size, 'semi-structured' assessment of strength in market and market attractiveness, and 'unstructured' words to document such factors as the reasons for scores given and assumptions made. The importance of unstructured data was mentioned in several cases (A, C and D). Causal models require structured data as inputs, though in some cases dummy variables may be used as an approximation - as, for example, when a competitor promotion is known to have occurred, but where numeric details are not available (case G). Descriptive systems use straightforward structured data, concentrating on sales and market size - though one user requested the ability to annotate the data with notes on plausible interpretations for variations and so on.

Models/data manipulation

The judgemental models such as portfolio analysis involve simple calculations and graphical display. Causal modelling naturally has a greater emphasis on data manipulation through techniques such as linear regression, or (in the case of more sophisticated econometric models) the solution of multiple simultaneous linear equations. Descriptive systems simply consolidate the data, or allow it to be broken up into its component parts.

Outputs

Judgemental models often concentrate on graphical display, to avoid the potentially spurious accuracy of numeric outputs and as a vehicle for communication. Advice based on the underlying marketing theory is an optional component whose utility was cited in case H. While causal models may also provide graphical display to illustrate the outcome, the primary result is the equation, or equations, relating the variables. Descriptive systems add value through the tabulation or graphical display of the required information.

Group support

Causal models do not need to be used by a group, though the outputs will naturally need to be disseminated. Descriptive systems only need to support a group insofar as centrally-held data is made available to a number of users; for this purpose, terminals into a mainframe or smaller server remain common. The combining and contrasting of the perspectives of different members of the management team is one of the clearest benefits of judgemental models (cases A, C, D, H). None of the systems studied explicitly supported this process through multi-user facilities or the recording of different perspectives simultaneously: rather, the perspectives were informally discussed when the system prompted for a single number such as a critical success factor score, often with the system display projected onto an overhead projector screen (cases A, C, D, H). There may be scope for useful extensions to judgemental systems incorporating explicit group support, such as anonymous voting and Delphi (Nunamaker et al 1988).

Integration

The most clearly requested link from judgemental systems is to office automation applications such as word processing, spreadsheets, graphics packages and electronic mail. Outputs from judgemental models may be included in plan documents or presentations, while further analyses or graphics may be generated using spreadsheets, and electronic mail can be used to disseminate results or to request information. Causal models may stand alone (cases D, F, G), though the integration of resulting forecasts in a hierarchy of product-markets may be useful for regular forecasting purposes (case G). Data consolidation and display systems need to be integrated with their sources of data.

Users

The differing users of the three types of model have implications for software design issues such as user interface design. Judgemental models are likely to be used by marketing managers, often in conjunction with other members of the senior management team, and with a facilitator from outside the organisation or from the marketing department. Causal models are likely to be used by specialists, while descriptive systems may be used widely by marketing and sales staff.

Tools/traditions

This entry summarises the traditions in software development on which systems draw in supporting the different types of market model. Judgemental models draw on the tradition of DSS development, as well as the recent advances in ease of use of office automation programs (cases A, C). Causal models may likewise have interfaces consistent with spreadsheet look and feel standards (cases F, G and D), as well as a statistical core. Data consolidation and display systems draw on the long tradition of corporate databases, the simplicity of use and navigation pioneered by executive information systems, and the multi-dimensional databases described commercially under various terms including DSS generators, EIS shells and OLAP systems.

Bespoke vs off-the-shelf development

Some tentative pointers can be made as to whether software development should be undertaken in-house or through purchase of an off-the-shelf system. Although judgemental systems can be developed relatively painlessly in-house (case A), problems can emerge with software development, as discussed below (cases B, C). Where an off-the-shelf system is available with a specification meeting much of the requirement, the lack of development risk should be considered as a factor. Similar remarks apply to causal modelling, where tailored or bespoke software may be subject to development risks, particularly in ease of use (case G - a system development contrasted with the main software studied). With data consolidation and display systems, the various EIS 'shells' on the market can be tailored to the organisation.

Development risks

Ease of use is an issue for all types of system, and a common area for problems in development (e.g. case B and other software cited in cases F and G). Judgemental models are subject to the further risk that the specification may rely on a mature application of marketing theory and its adaptation to the organisation: only one organisation achieved this without at least two iterations of software development (part of the software in case A). Technical design issues such as sizing and performance are particularly important for the large amounts of data handled by descriptive systems (case H), though they have also been observed with other types of system (e.g. case C).

Part 6: Conclusions and Implications

11. Conclusions and Implications

11.1 Introduction

In this chapter we summarise and integrate the findings from the various research stages, and summarise their contribution to marketing planning and decision support literature.

We recall from section 4.2 that:

Our research proposition is that an appropriately designed and implemented decision support system can improve strategic marketing planning practice.

We have explored this proposition through the development and evaluation of EXMAR, and through the evaluation of a number of other systems. The findings relate to the simplified typology of marketing planning systems presented in section 3.5. The types of system we defined, after consideration of some major functions and data items used within software for marketing (section 3.4), were:

- *Planning systems for multiple product-markets.* These systems, such as EXMAR, aim to assist with the definition and documentation of marketing strategy for a business unit with several product-markets. In common with the next type, their typical approach to market modelling can be characterised as judgemental, rather than causal or descriptive, as the analysis of the workings of a market emphasise managerial judgement (as, for example, in definition of inputs to multi-factor portfolio matrices) (section 10.7).
- *Planning systems for one product/business unit.* Typically aimed at product managers or general managers, these systems assist with planning for one product, market or business unit, not endeavouring to assist with issues of resource allocation or synergy between product-markets.
- *Causal modelling systems.* These support regression or equivalent techniques for modelling such variables as market size and market share.
- *Data consolidation and display systems.* Often corresponding to the component of executive information systems or marketing information systems dealing with aggregated marketing data, these perform the management information and management control functions in **Figure 3-1**.
- *Systems supporting individual marketing techniques.* These support techniques such as portfolio matrices or new product evaluation checklists, making little or no attempt to integrate the tools supported, or to provide a planning framework.

The next section integrates our main findings, which relate to the first system type, planning systems for multiple product-markets. Its three subsections relate to our research objectives (derived from the research proposition in section 4.2), which we repeat below for convenience. The addressing of these research objectives forms the primary contribution of the findings, thereby contributing to the marketing planning literature through an understanding of the respects in which software can assist with the achievement of improvements in strategic marketing planning practice. Secondary contributions of this study are also identified in each subsection through discussion of respects in which the findings contrast with findings in other DSS domains, or add to marketing planning literature independently of the involvement of software.

O1. The first research objective is to explore what benefits, if any, are gained by users of DSS for marketing planning. This is addressed by subsection 11.2.1, Benefits.

O2. The second research objective is to explore what aspects of the design and implementation of the systems have led to these benefits, and how they might be improved, in the areas of:

O2.1 Nature of the system: How the marketing planning process and relevant marketing techniques are formalised to provide a marketing planning model as a basis for software support; what nature of support is provided by the system. This is addressed by subsection 11.2.2, System design.

O2.2 System implementation: How the system is introduced into the organisation and applied. This is the subject of subsection 11.2.3, Implementation success factors.

Our tentative findings with respect to types of system other than planning systems for multiple product-markets are summarised in section 11.3. Finally, section 11.4 summarises the study's contribution, section 11.5 summarises the limitations of this study, and section 11.6 provides suggestions for future research.

11.2 Integration of findings for multiple product-market planning systems

11.2.1 Benefits

Introduction

The evidence on benefits was derived from the multiple-case study of EXMAR (summarised in section 8.8) and the subsequent case studies of a wider range of systems (summarised in section 9.6). Although the survey also included some early indications of benefits (section 7.5), these are not summarised here due to the problems of validity in their derivation that we have discussed. We will, though, refer to some of the relevant descriptive statistics in the discussion that follows, in order to provide tentative illumination of similarities or differences between the users' perceptions, as indicated by the descriptive statistics, and the partially external perspective derived from the case studies. We also ignore some early findings from the system design evaluation, which are presented in Wilson and McDonald (1994b), which is included in Appendix D.

Table 11-1 summarises the benefit propositions hypothesised from the cases, and the support for each hypothesised benefit, firstly from the EXMAR multiple-case study, and secondly ('Other' column) from the exploration of generality of findings. We have added reference numbers to the benefits (BE1 to BE11), and to the success factors we discuss later (SF1 to SF15), for ease of reference within this chapter.

In discussing the support for the hypotheses below, we include discussion of the reasons for differences between the two multiple-case studies.

Benefits supported

Within this group of benefits, either one or both of the multiple-case studies provide support for the hypothesised benefit, showing that the benefit can be obtained from an appropriately designed and implemented system. Where the other multiple-case study differs, this does not contradict this conclusion, as we argue below.

BE1 Aid use of marketing tools. A number of cases in both multiple-case studies (cases 2, 3, A, C) showed the greater ease of use of marketing tools when appropriate software support is available. Rather than resulting in lower use of time, this seems in the main to result in greater use of marketing tools than previously. Hence, the system was frequently perceived as delivering the tools' benefit of an updated intuition, often described as a confirmed or modified "gut feel". This is probably the explanation for the relatively high score in the survey for the perceived system impact on the variable tentatively termed "Innovation", corresponding to the statement "EXMAR provides the 'fresh pair of eyes' that is essential if planning is to be able to break the accepted truths that have been built up by the organisation" (mean score 4.15).

BE2 Support group planning. In conjunction with the support for marketing tools, the ability of systems to iterate quickly, often described by users as providing a "what-if" facility, provides a valued support to team-based planning exercises, providing a common framework and communication medium for the strategy debate (cases 1, A, C). The incorporation of an explicit planning process was found within the EXMAR multiple-case study to further assist with group planning through the provision of a readily agreed agenda. In many cases, though, a facilitator performed this role of agenda setting, and the cases studying other systems showed that group planning can still be enhanced in the absence of explicit process support. The specific implications we have listed of better focused debate, improved mutual understanding, more equal participation and greater consensus are tentative, although consistent with the survey's relatively positive scores on questions relating to these issues which formed the 'system impact on communication effectiveness' variable (mean score 4.02).

BE3 Enable live marketing model. While the EXMAR cases introduced the notion that the system could aid with the maintenance of a periodically-updated marketing model of the business (cases 3, 4), none showed this benefit to have been delivered to date, as in most cases, planning had only occurred in a single one-off exercise for each business unit since the system's introduction. This benefit was shown, though, by the subsequent study of other systems (case A in particular).

Table 11-1: Support for hypothesised benefits

Hypothesised benefit	Description	EXMAR	Other
BE1 Aid use of marketing tools through calculations, graphical display, guidance on use	Marketing tools can be more easily used with appropriate system support, due to calculations and graphical display, reuse of data between techniques, and guidance on their application. Hence in limited time, tools are more likely to be used. This can update the users' intuition on their markets and their place within them.	Supported	Supported
BE2 Support group planning, resulting in focused debate, improved mutual understanding, more equal participation &greater consensus	DSS support for fast iteration facilitates collaborative workshops. Incorporation of a planning process provides a readily agreed agenda. These can result in better focused discussions, better mutual understanding and greater consensus about the strategies that emerge. The system can depersonalise disagreements, leading to more equal participation.	Supported	Supported
BE3 Enable live marketing model	The system can form the repository for "live" electronic plans, updated periodically, from which annual snapshots are taken for formal presentation.	Little evidence	Supported
BE4 Ease integration of functional perspectives	The electronic medium can facilitate the integration of the marketing plan with analyses from different functional perspectives to form a convenient and internally consistent aid to strategy debates.	Little evidence	Supported
BE5 Help to manage complexity of multiple-level plans	The system can help to manage the complexity of planning at more than one organisational level by ensuring consistency in planning, aiding comparison across SBUs; allowing a shared representation of the hierarchy of product-markets; and aggregating data from several SBUs to form the basis of a higher-level plan.	Not supported	Supported
BE6 Aid identification of data requirements, improving accuracy & availability	Systems can assist with identification of critical data requirements. This can help target market research and specify marketing information systems, as well as clarifying assumptions where data is absent. In time this can lead to better availability of accurate data.	Limited support	Limited support
BE7 Save time compared with equivalent paper planning,particularly on revisions	A time investment in learning systems is needed, unless a facilitator is used. Once this has been made, systems can save time compared with equivalent paper planning, due particularly to calculations and graphical display, especially when revising existing plans.	Limited support	Limited support
BE8 Improve plan credibility & confidence	The resulting plan is more credible than it would otherwise be, and its authors have more confidence in it.	Limited support	Limited support
BE9 Improve support for planning process	The system can provide a consistent, logical process to follow, of particular value to users inexperienced in marketing planning. Navigation facilities, status feedback and online help can result in better process support than equivalent paper-based systems.	Mixed support	Mixed support
BE10 Aid learning about marketing planning	Through planning with the system, users learn to apply the process and techniques it includes, knowledge they can apply in future planning, whether DSS-aided or not.	Limited support	Mixed support
BE11 Increase planning confidence and enthusiasm	For many managers, the learning effect of systems adds to their confidence in their marketing planning skills, and their enthusiasm for marketing strategy activities.	Mixed support	Limited support

Benefits supported (continued)

BE4 Ease integration of functional perspectives. An aim of some companies using EXMAR was to integrate the marketing perspective on the business represented by the marketing plan with other functional perspectives, but none had yet attempted to do this electronically. The study of other systems showed, though, that holding the basis of a marketing plan electronically could allow it more readily to be integrated with other data for purposes of presentation and analysis (cases A, C). Complementary analyses could thereby be kept in step through common use of shared data.

BE5 Help to manage complexity of multiple-level plans. Users in one EXMAR case (case 4) desired to be able to aggregate data from lower-level plans into a higher-level plan, a facility that was not provided by the EXMAR prototype. This was hypothesised as a potential efficiency-related benefit from systems, a benefit confirmed by two of the non-EXMAR cases (cases B and C).

Benefits with limited support

Within this group, while all of the cases in both research stages are consistent with the hypothesised benefit, rival hypotheses cannot be ruled out.

BE6 Aid identification of data requirements. Many users attributed to systems the benefit of clarifying critical data requirements for planning, and hence influencing data collection activities including market research and specification of marketing information systems (cases 1, 2, 3, 4, 5, A, B). This is consistent with the survey, in which the variable for the system's impact on data requirements had a mean score of 4.25. The mechanism by which this was achieved, though, seemed in the main to be simply the prompting for information on the screen, which leaves open the notion that a directly equivalent paper procedure would have the same effect. Two possible related and 'irrational' causes for the system differing from paper planning were, however, cited in the EXMAR cases. One was that the system's credibility inspired staff to make more efforts in data collection (case 3); the other was that the system may be perceived as less easy to leave blank than a paper form, thus "forcing" users to collect information (case 5). See also the success factor SF11 concerning "A degree of calculated imprecision" in section 11.2.3 below for a related potential dysfunctional effect.

BE7 Save time compared with equivalent paper planning. While a number of users claimed to have gained time savings from the system (cases 1, 2, 3, A, C), direct comparison with paper planning was difficult, due to the more thorough planning that in general accompanied system use, or in some cases the wider involvement in planning that also had time implications. A significant time investment was also often required to learn systems, although the use of facilitators often reduced this. The non-EXMAR cases where software was particularly poor in quality showed no perceived time savings, and, indeed, may have suffered net time losses due to the system (case B; remote use in case C).

BE8 Improve plan credibility and confidence. Reasons quoted for the system improving the credibility of the resulting plan were that the rationale for proposed strategies is more thoroughly argued and better presented than previously (case 4), and that system-facilitated group planning sessions lead to greater commitment due to wider involvement (cases 5, A). It seems plausible, though, that these benefits could have been obtained without computer support. A further 'irrational' factor cited in one EXMAR case is the credibility of IT-supported plans in a technologically-based company with many "system-driven individuals" (case 3).

Benefits with mixed support

In this group, support for the hypothesised benefit is partly positive and partly negative.

BE9 Improve support for planning process. The EXMAR system was the only system studied which included an explicit planning process, providing a degree of encouragement to complete a number of steps, although allowing steps to be re-ordered. Such process support, provided here via navigation facilities, status feedback and online help, can aid inexperienced users in following a standardised process, and can help to ensure that important steps have been covered (cases 1, 2). However, the danger was raised that the system might thereby encourage insufficient flexibility in the process followed, suggesting that there may be a trade-off between process structure and flexibility (case 4). The presence of a computer may irrationally exacerbate the danger of blindly followed the analyses recommended without stepping outside them where relevant. Although the other systems did not include an explicit process, they still exhibit a similar potential trade-off between the benefits of structure and the hindering of creativity that can result, as in for example the definition of a standardised, centrally defined set of product-market definitions (case B). This seems consistent with the survey's higher score for the variable relating to the system's impact on process thoroughness than that for process flexibility (mean score 4.08 vs 2.97). See also the success factor SF7 'Flexibility in planning processes' below.

BE10 Aid learning about marketing planning. Interviewees in several of the EXMAR cases believed the system to be a learning aid for staff inexperienced in marketing planning (cases 1, 2, 4, 5, D). This seems consistent with the survey's relatively high score for the variable relating to the system's learning effect (mean score 4.24). Opinions differed on whether the system complemented other learning methods or replaced them, and on whether the system influenced fundamental attitudes or whether "customer focus" or "market orientation" were prerequisites (see success factor SF6). However, the possibility that the claimed benefits were in fact due to the accompanying introduction of a planning process or the presence of a facilitator could not be ruled out. This possibility was strengthened by one of the non-EXMAR cases (case B) in which the absence of a facilitator coincided with a lack of perceived learning benefits. It is not clear, then, whether the combination of system and facilitator is a more effective learning aid than a facilitator alone.

BE11 Increase marketing planning confidence and enthusiasm. The cases provided some limited evidence that the learning effect of the system may increase the subsequent planning confidence of users (case 5), and that feeding back the views of participants with system outputs may be motivational (cases 2, 3). On the other hand, two EXMAR cases (cases 3 and 4) suggested that the system's encouragement of a more thorough process can result in planning being harder work than previously, leaving some users daunted by the prospect of further use.

Impact on marketing planning barriers

In section 2.3 we summarised the barriers to marketing planning identified in previous research. We now discuss the extent to which the benefits we have identified act to reduce these barriers. Table 11-2 summarises which benefits are relevant to which of the groups of marketing planning barriers we listed in **Table 2-1**. We do not repeat here the literature references for the relevant barriers which were given in full in section 2.3.

Table 11-2: Impact of benefits on planning barriers

Marketing planning barriers	Relevant system benefits
Roles people play B1 Lack of chief executive/senior management involvement B2 Lack of cross-functional involvement B3 Lack of top management support	BE2 Support group planning BE4 Ease integration of functional perspectives
Cognitive B4 Knowledge and skills B5 Lack of innovation/non-recognition of alternatives	BE1 Support use of marketing tools BE9 Improve support for planning process (mixed support) BE10 Aid learning (limited support)
Systems and procedures B6 Lack of care in marketing planning introduction B7 Forecasts without documentation of intervention B8 Inflexible application of textbook process B9 Lack of follow-through to implementation B10 Too much detail	BE5 Manage complexity of multi-level plans BE3 Enable live marketing model BE9 Improve support for planning process (mixed support) BE8 Improve plan credibility & confidence (limited support)
Resources B11 Lack of time (elapsed and/or effort) B12 Lack of money (for market research etc)	BE7 Save time, particularly on revisions (limited support)
Organisational environment/culture B13 Organisational structure inappropriate B14 Stage of organisational development B15 Corporate politics B16 Short-term oriented reward systems B17 Culture stifling idea generation/openness	BE8 Increase planning confidence/enthusiasm (mixed support)
Data B18 Lack of information	BE6 Identify critical data requirements (limited support)
Environmental B19 Difficulty of forecasting in times of turbulence and inflation	-

Roles people play. System use does not of itself reduce the barriers of inadequate cross-functional and senior management involvement: indeed, the success factor of "sufficiently wide team definition" (SF3) confirms that with system-aided planning, as with paper-based planning, the planning team needs to be sufficiently wide to gain from differing perspectives and to build commitment. When an appropriate group is assembled, though, the system can assist with providing a common framework for the discussion which can be rapidly updated in response to modified inputs (benefit BE2). This framework can include analyses deriving from different functional perspectives, drawing on common data and hence kept internally consistent (benefit BE4). To this extent, a system can support moves to reduce these barriers.

Lack of top management support for marketing planning is likewise uninfluenced by system use, and again corresponds to one of the success factors we have identified, the presence of a system champion and sponsor (SF1).

Cognitive. One aspect of the system's support for marketing tools (benefit BE1) is to reduce the knowledge required by the user. The system can, for example, prompt for necessary inputs to portfolio matrices, perform any necessary calculations, lay out the axes appropriately, place circles correctly and make related textbook advice readily available, hence reducing the prior knowledge of the matrix required by the user. Similarly, support for a planning process (BE9) may reduce the knowledge required by guiding the user through a 'textbook' series of steps. The mixed support for the planning process benefit, though, reminds us that flexibility in the planning process is still needed, suggesting a level of judgement from the user or from a facilitator that cannot be replaced by the system.

The barrier of inadequate knowledge and skills may also be addressed by the learning benefit of systems, whereby the user may learn through doing as a plan is developed with the system's support (BE10). This benefit, however, has only limited support from the cases.

Systems and procedures. The barriers listed under this heading are not directly addressed by system benefits, though there are some indirect connections. Lack of care in marketing planning introduction is not an issue with which the system provides assistance. We would expect the documentation of interventions by which forecasts are to be achieved to be an effect of improved support for the planning process - EXMAR, for example, explicitly separating trends, assuming no action is taken, from objectives, and then prompting for the means by which the gap between the two is to be closed. There was, indeed, support from the cases for increased thoroughness of the planning process, although this was balanced by the dangers of decreased flexibility (BE9). The explicit link between any such increased thoroughness and documentation of interventions is, however, inadequately documented in the cases to be confident that this is indeed occurring.

There is no evidence that the system decreases the problem of inflexible application of a textbook planning process - indeed, it may increase it if the system is followed unthinkingly (see SF7, 'flexibility in planning processes'). Similarly, the problem of too much detail in planning may be increased if users assume that information on computers must be complete and exact (success factor SF11, 'a degree of calculated imprecision'). However, the system seems to act in some circumstances to reduce the level of detail through focusing on critical information and analyses (e.g. case 2), though whether this data-related benefit was indeed due to software is uncertain.

No clear benefit of improving the implementation of marketing plans emerged from the cases. One benefit that may indirectly assist with implementation is the improved plan credibility and the users' increased confidence in it reported in some cases.

Two of this study's clearest benefits, though, while relating more naturally to 'systems and procedures' than the other groups, do not directly address any of the barriers we identified. Firstly, assistance with managing the complexity of multiple-level plans forms a straightforward automation benefit where organisations have marketing plans at more than one level of detail. Secondly, assistance with maintenance of a live marketing model supports those organisations who wish to plan more continuously than the traditional, once-a-year planning cycle, or to update plans for ad-hoc reasons such as relevant internal or external events.

Resources. The barrier of lack of time for planning relates directly to the 'save time' benefit BE7 which has, however, only limited support from this study. We have little reason to suppose that systems affect the money available for market research and other activities relating to planning. We have not concentrated, however, either on measurable financial benefits or on direct financial costs of system ownership: direct costs such as system purchase can, in any case, be expected to vary from those in the case studies as commercial products are developed.

Organisational environment/culture. These barriers seem little affected by system use. They have several parallels with the success factors we have identified, notably a marketing orientation, or the perception of the need for it (SF6); absence of excessive short-term pressures (SF8); appropriate planning units (SF5); and avoiding manipulation (SF10). The hypothesised benefit of increased planning confidence and enthusiasm relates to the organisation's supportiveness of planning, but received mixed support. There is some tentative evidence that the definition of planning units on the system may influence thinking about organisational structure (e.g. case 4). Although the support for group planning provided by systems might be hoped to influence a culture stifling openness and idea generation, this did not seem to have occurred in the case which this description best fits (case 6).

Data. As we have seen, there is limited evidence that a system can identify critical information more effectively than paper-based approaches, and hence that in time it can lead to better availability of information.

Environmental. A number of cases exhibited turbulence in their external environment, posing difficulties for planning including the difficulty of forecasting (e.g. cases 3, 4) and difficulty with finding sufficient time for planning (e.g. cases 2, 4). There was little suggestion that the system in any sense reduced these difficulties.

Summary. To summarise the impact of systems in reducing marketing planning barriers: systems can support moves towards team-based planning through assisting with group planning exercises and through the integration of different functional perspectives; they can reduce the knowledge required of certain technical aspects of planning through automation; and they can aid with patterns of planning which differ from a traditional annual cycle through the maintenance of a live marketing model, while helping to manage the complexity of multiple-level planning. There is some limited evidence for systems' role in reducing some other barriers, notably that systems may reduce the problem of insufficient knowledge and skills through their learning impact; may aid with the identification and documentation of interventions by which objectives are to be achieved; may save time; and may help the identification of critical data requirements. In many other respects, though, barriers to marketing planning addressed by previous research must be addressed by other means. Several of these barriers are confirmed or elaborated by the success factors we discuss in section 11.2.3.

11.2.2 System design

Introduction

Having discussed the benefits that can be gained from systems, we now turn to the ways in which the systems' design has led to these benefits.

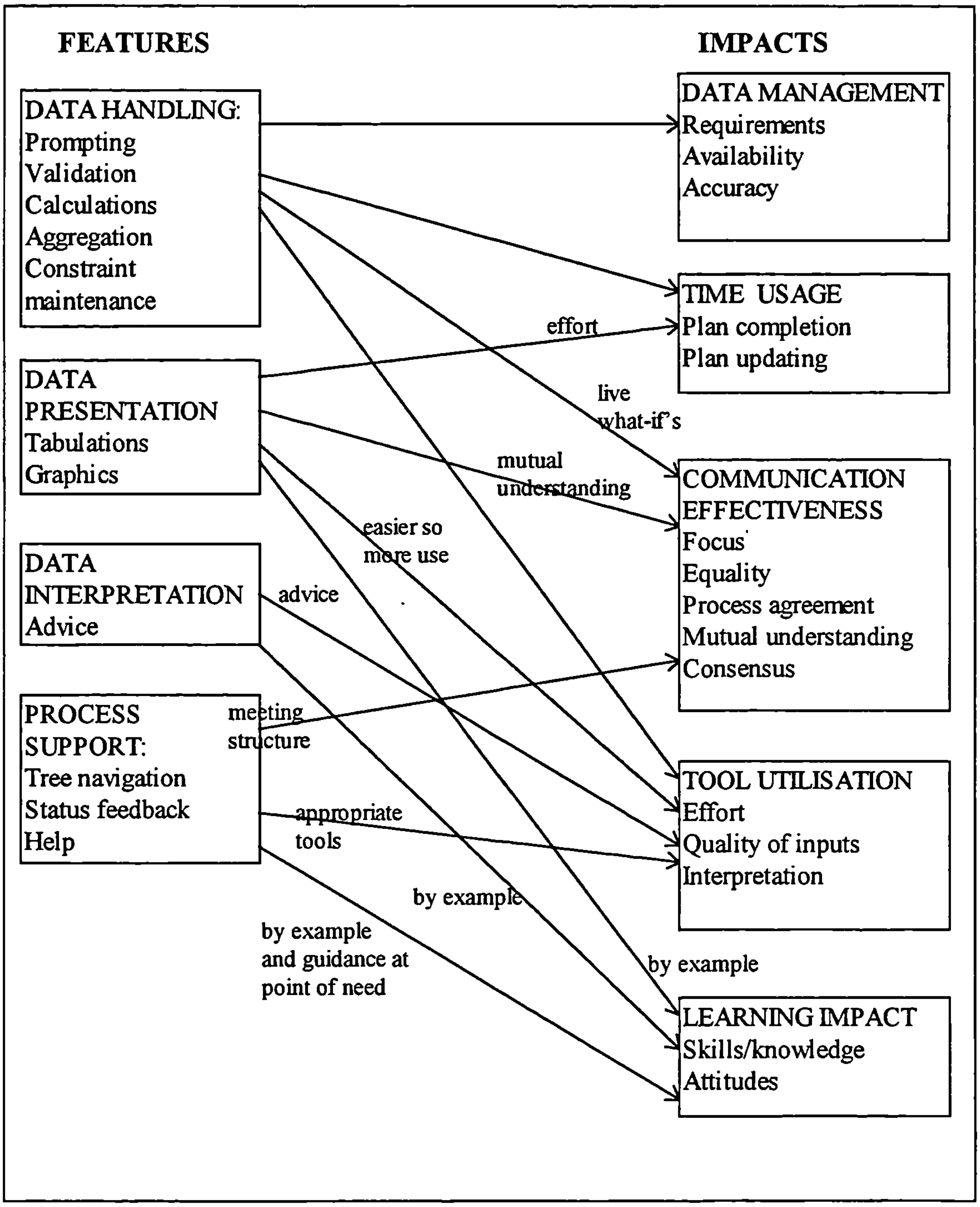
The analysis of system benefits has included, at a broad level of detail, discussion of the mechanisms by which the benefits are achieved. Figure 11-1 summarises this relationship between system 'features' and the aspects of planning that are affected by the features. It is repeated from Figure 8-1, as no modifications were found necessary in the light of the exploration of generality of findings.

We have also presented in greater detail a design for a specific system, EXMAR. This represents just one of an indefinite number of possible designs, and we cannot claim any aspect of the design to be optimal. In this section, as well as summarising the broad feature/benefit relationships, we nevertheless endeavour to make some tentative, more specific recommendations to future developers. For simplicity we do not repeat the strength of support for the various system benefit propositions when we refer to them. We structure the discussion according to the features in Figure 11-1, followed by some additional specification areas first enumerated in **Table 6-3**.

Data handling

The system's data handling facilities most obviously affect data management (benefit BE6). Prompting for data may affect awareness of data requirements. This may in turn affect data availability. The system's validation of data entry, and maintenance of constraints between numbers entered such as the relationship between market size, market share and revenue, can improve data accuracy. Data handling facilities may also save time (BE7) , and can aid in group communication sessions through the facility to re-enter data items and rapidly see the response on dependent data items or graphical displays (BE2). Finally, data handling facilities can aid the use of marketing tools through reduced effort and improved quality of the inputs (BE1).

Figure 11-1: Major relationships between features and process/learning variables



One sense in which the system can maintain constraints concerns the interrelationships between marketing techniques. The marketing planning model developed as part of EXMAR's development integrated a number of techniques around a common data model. This has the theoretical advantage that information entered once can be used in different analyses, reducing the effort involved and increasing the depth of analysis. This contrasts with some of the other systems reviewed under the category 'systems supporting single marketing techniques', where multiple techniques, if supported, each drew on its own data inputs. Organising round a logical data model may also help the user to understand the tools and techniques, by making transparent their interrelationships. While the EXMAR prototype exploited few of these theoretical advantages due to its relatively narrow scope, similar interrelationships were exploited in the bespoke systems of cases A and C, and both also illustrated the disadvantages that can occur where data that can theoretically be shared between analyses is, in fact, not shared.

A final point about data handling concerns structured versus unstructured data. The marketing planning model includes some structured data, such as financial information; some unstructured data, such as assumptions and details of strategies; and some data that could be regarded as semi-structured, such as the judgmental numeric analyses of critical success factors and market attractiveness. These are, however, intimately interlinked: for example, assumptions may relate to a particular numeric value, while strategies may be associated with a modified critical success factor score. An important design issue concerns how best to support these links. In the EXMAR prototype, entry of text and numbers was sufficiently separate to give some difficulties to users in representing the relevant connections. The later MacroScope and Visual Basic versions of EXMAR adopted a more closely integrated approach, for example using 'post-it' icons to attach arbitrary text to numbers. Similarly, the system in case A allowed assumptions to be entered behind numbers, while the absence of such facilities in case B caused valued insights to be lost. The ideas on the integration of types of data explored under the term 'hypertext' (Ritchie 1993; Halasz et al 1987; Wilson 1990) have proved useful in the development of EXMAR, the demonstrator using the NoteCards hypertext system as part of the development environment, and the prototype using the Analyst system.

Data presentation

Data presentation, whether in the form of graphical displays or retabulations of input data in a different format, may save time when this presentation is desired as part of the plan; and where the display corresponds to a 'marketing tool' such as a portfolio matrix, the data presentation assistance can reduce the effort required in the tool's use (benefits BE1, BE7). The presentation of the user's inputs in a standardised form such as a portfolio matrix, a product life cycle or gap analysis may also have a learning effect (BE10). Graphical presentations may aid with mutual understanding within a group (BE2).

The importance of data presentation in the support of marketing tools deserves some discussion. We have observed that in describing the utility of some system-supported tools such as portfolio matrices, users tend to refer to their role in confirming or modifying intuitions about some aspect of the organisation's market situation, and in communicating these insights within a group. This is a very different emphasis to the sometimes assumed primary role of such tools of prescribing or at least advising the appropriate action, Armstrong and Brodie (1994a) for example critiquing the Boston matrix on this basis. Instead, in the cases we have described, textbook advice has been regarded as at best a suggestion to encourage thought and debate, and at worst a prescription which, if followed blindly, can leave those in receipt of plans open to manipulation. (We do not endeavour to criticise Armstrong and Brodie's analysis of the weaknesses of the 'textbook' advice, but merely to emphasise that the utility of tools is, at the very least, more complex than simply the production of advice.) We have characterised the primary analytical role of judgemental tools as aiding a process of hypothesis consolidation, in which judgements of relevant managers, combined with any relevant external data, can be represented and synthesised in a commonly owned model (section 10.7). Hence, the judgemental tools are complementary to each other and to analyses of 'hard' data such as causal models, and are of particular relevance to situations where information is imperfect, rather than being competitors to financial or other models as implied by Armstrong and Brodie. Given their role in group communication, then, their graphical presentation is particularly important.

This view of marketing tools has resonances in some current discussions concerning strategy formulation in teams. Bowman (1991) wrote of "surfacing managers' perceptions", using scales to measure the organisation's perceived cost leadership and differentiation, and reflecting the resulting measures graphically back to the participants as an intervention in their strategy debate. These perceptions varied - in some respects systematically, for example varying by function (Bowman and Daniels 1995). Decisions could nevertheless emerge from a management team despite the persistence of some differences in perceptions - a finding echoed within group psychology by Moscovici and Zavalloni (1969) and, more recently, by Langfield-Smith (1992). Differences were also found in managerial perceptions of their competitive environment assessed using cognitive maps by Daniels, Johnson and Chernatony (1994). These authors concluded that:

> "a team of managers is able to debate strategy based upon mutual recognition and understanding of each others' mental models, rather than cognitive similarity"

- cognitive similarity relating here to the extent to which the managers shared:

> "similar, if not the same, conceptions about whom the competition is, and the strategies that these competitors are following".

In these terms, we can rephrase the role of some analytical tools as being to assist the participants' "mutual recognition and understanding of each others' mental models".

The resulting emphasis on graphical display of the users' inputs as a communication device is consistent with our literature review, in which we noted that graphical display has been experimentally shown to impact decision-making positively (Benbasat and Dexter 1986; Jarvenpaa 1989), suggesting that if the effort involved in generating the displays was reduced, it would render the marketing tools more usable.

Data interpretation: advice

Data interpretation assistance in the form of advice can help with the interpretation of marketing tools (BE1), and can also have a learning effect (BE10).

In accordance with the above discussion about the importance of data presentation and the role of marketing tools, advice has not formed a major component of any of the EXMAR versions, and is only a significant component of one of the non-EXMAR systems studied in the cases, the Business Insight system used in case H.

This may lead to the question to what extent the 'expert systems' label is appropriate for EXMAR. The EXMAR club's original aims were to apply expert systems to marketing planning, initially employing expert systems terminology such as 'domain expert' and 'knowledge engineer'. As described earlier, however, the author's analysis approach was consciously open-minded, modelling the available expertise with whatever modelling representations proved most appropriate, starting with the most well-established and verified expertise, which concerned marketing tool inputs and their place within a process, rather than reliable rules on their interpretation and implications for action, which were conspicuous by their absence. In particular, it did not seem relevant to use the rule-based representations sometimes defined as the essence of expert systems. We have also seen that the 'expert systems' term raised some specific and counterproductive expectations for some users, despite the careful qualifications in the use of the term from the earliest publications (McDonald and Wilson 1990).

All aspects of the EXMAR system can, though, reasonably be said to be based on expertise, including the process, the data model, the means of presentation of information, the checklists and help provided and the few cases where advice is given - though it can been argued that (say) a payroll system incorporates expertise similarly. Regarded as an expert system, then, the system thus takes the "low road" according to Brown's (1984) categorisation of expert systems discussed in section 3.2, in that expertise is embedded in data structures and procedures, rather than being present as an explicit representation such as that contained in rule-based systems. There is certainly much available (but not necessarily formalisable) expertise that has not been captured. A critical design task has been the effective definition of the boundary between the system and the user such that the user is encouraged to think about the issues that the system cannot of itself address.

This co-operative style of software support, involving a humbler role for the computer than the ambitious aims of some expert systems, is consistent with the distinction discussed by Charles Handy (1989 p118) between 'automating' and 'informating':

> Automating tends to concentrate on the smart machine and to cut out or reduce people. Informating organizations also use smart machines but in interaction with smart people...Informating wins in the longer term because the organization's thinking or 'intellective' capacity has been increased."

The boundary between a "low road" expert system and a decision support system is difficult to draw. The EXMAR system can perhaps best be described as an "expert support system" in Luconi et al's (1986) categorisation that we discussed in section 3.2, given the shared responsibility between system and user for the decision process, which we now turn to.

Process support

Support for a planning process can help to structure planning meetings - though we have also noted the danger of insufficient process flexibility (BE2; SF7). It may also help to select an appropriate tool for the relevant stage of the process (BE9). As with other aspects of the system, it may have a learning impact by example, and through the convenient availability of 'textbook' guidance relevant to the step being performed (BE10).

The importance, though, that the system's process support should guide rather than dictate is shown by the success factors 'System seen as empowering not controlling' (SF4) and 'Process flexibility' (SF7). The divergences in processes that may legitimately be followed when first developing a plan, the necessity of iteration and the concept of continuous planning (BE3) imply maximum flexibility in the ordering of tasks, including the facility for any part of the system to be revisited at any point.

This issue of the regularity and frequency of planning is one respect in which marketing planning as observed in the case studies differs from much prescriptive theory. We have seen that some companies aim (with the aid of software in our study) to maintain a live marketing model of the business, from which snapshots are taken if and when required for formal presentation and review. In others, the reality is one of 'ad-hoc' strategy formulation exercises carried out for particular purposes, with no plan revision necessarily scheduled for the following year. These observations confirm that planning theory, and therefore planning systems, that assume an annual cycle may be neither realistic nor ideal. Although marketing literature has long referred to continually updated marketing audits (McDonald 1995), this point goes beyond this towards a change in the conception of marketing planning to "a continuous rolling process which is a central part of managing the business" (Piercy and Giles 1989), contrary to the emphasis of some on the plan itself (Abell and Hammond 1979). More echoes are to be found in literature not specifically dealing with marketing, for example in the theme of different styles of strategy formation (Anderson 1983; Pinfield 1986; Bailey and Johnson 1994), and related calls for continuous planning (Morgan and Piercy 1993).

Related to this variety in styles of planning is variety in the sequencing of planning tasks. Piercy and Giles' (1989) argument for "starting at the "end" with tactical implementation issues and working back to the "beginning " of strategies and missions" has parallels in the domain-independent DSS work of Eden (1989), whose influential "Strategic options development and analysis" (SODA) approach, supported by software named COPE, allows either or both of two modes of working to be used: "working with the client on an analysis of the goal system and then down the model towards options, or working from options towards goals". It also has echoes in Anderson's (1983) analysis of US decision-making in the Cuban missile crisis, in which "the act of making decisions led to the discovery of goals".

We would therefore support the decision calculus school (Little 1970) in the belief that the user should be left in control of decisions, including decisions about the process followed. This implies a free interface, almost certainly based (given current options) on windowing technology, following the edict of the developers of the seminal Xerox Star interface: "Never pre-empt the user" (Bewley et al 1983). Some users nevertheless appreciate the support gained from being guided through a typical process. This guidance is different in nature on the one hand from the support for rigorous clerical processes traditionally addressed by transaction processing systems, and on the other from the totally free interface of a word processing package or a spreadsheet. In the development of EXMAR, the approach to this has taken some time to evolve: the demonstrator seemed too close to the former, the prototype to the latter, the later versions we hope about right. Nevertheless, the process-related benefits found in this study (BE9) can be gained without such explicit process support, as illustrated by some of the non-EXMAR cases.

Tailorability

Only one of the multiple product-market planning systems studied, EXMAR, was applied as an off-the-shelf system to more than one organisation. While the experience of its evaluation shows that such a standardised approach is feasible, there are nevertheless respects in which tailorability is, at least, desirable.

Firstly, there may be cases where a standardised approach does not apply to a specific company. Modelling in the financial services sector of the variables leading to revenue in a product-market, traditionally 'price' and 'volume', is a case in point.

Secondly, the non-EXMAR cases illustrated how the incorporation of analyses from different functional perspectives can help with cross-functional strategy debates. While some of these might be incorporated in a generic tool, it seems likely that such analyses as the manufacturing risk matrix in case A may vary from one organisation to another.

Where these tailorability issues can be anticipated in advance, it may be possible to provide for system options, or parameters, that allow tailorability without programming. Such an approach has been adopted in some simple cases in EXMAR. For more arbitrary tailoring, object-oriented programming is claimed to help with the management of complexity of complex systems, hence helping with software adaptability, largely through the relative ease of software reuse due to the inheritance concept (Lazarev 1991; Deutsch 1989). While the author's impression is that the lack of object orientation was one reason why the MacroScope EXMAR version became difficult to change and poor in robustness, this remains speculative, while the ease of tailoring the various EXMAR versions has not as yet been tested.

Multiple plan support

One special case of the data calculations we discussed earlier is the aggregation of product-market data into business unit data, and aggregation from business units to a higher-level business unit. Although the EXMAR prototype only supported the former, the benefits of the latter aggregation between planning levels were shown by other cases (BE5).

We note that when the aggregation is immediately performed on data entry or update, this may to some extent blur the distinctions between top-down and bottom-up planning (McDonald 1995 p416). While paper plans may need to be produced in a specific order decided in advance, an integrated system may allow any numbers to be changed at any time, in a sense allowing planning to occur at more than one level simultaneously. In practice, a specific ordering may be imposed for organisational as well as for technical reasons: in cases B and C, for example, plans were completed by countries remotely and sent in for aggregation on diskettes. However, the complex interplay between planning levels found desirable in case 2 suggests that a design that allows aggregation to be performed automatically on data entry if desired would provide the maximum flexibility for modification of the order of planning.

Group support

Although most of the multiple product-market planning systems we studied in the cases were designed for a single personal computer (the exception being part of the system in case A), in practice most were used with a cluster of users round a screen, or displaying the screen onto the wall using an overhead projector. To support such group use, the monitor size (case 3) and the presence and quality of the projection device (case 4) become important aspects of the system. The PC revolution has perhaps been fueled by the added sense of control users have over their own computer (Morris et al 1989). Enabling users to exchange plans readily on a diskette has so far proved adequate, and there has been little pressure to extend the systems to become multi-user, though no firm conclusions can be drawn on this point.

Another contribution to marketing planning: formalisation of theory

The marketing planning model we described in chapter 6 itself forms a contribution to the prescriptive literature. To summarise some specific points:

1. The integration of techniques around a common data model, described in our discussion of data handling above, makes explicit some of the technique interrelationships in a way not apparent from the relevant textbooks examined (Abell and Hammond 1979; Kotler 1988; McDonald 1995): for example, the relationship between perceptual maps (Kotler 1988 p6, p70) and critical success factor analyses (Kotler 1988 p45, p199). The complexity involved provides an additional hypothesis as to why the techniques are not used more in practice: we have discussed the potential role of systems in managing this complexity to render techniques more usable.
2. The Directional Policy Matrix (Hussey 1978) has been developed to avoid the common pitfall of clustering in one corner of the matrix (Kotler 1988), through defining the business strength axis as relative to the best of the competition (borrowing an idea from the Boston matrix); encouraging the user to spread out market attractiveness scores by advice where necessary; and automatically scaling the axes.
3. Tentative conclusions have been reached on the relationship between Porter's definition of "differentiation" (Porter 1980a) and the use of critical success factors to model "strength in market", extending recent research into applying Porter's work more precisely (Speed 1989; Sharp 1991; Cronshaw et al 1994).

11.2.3 Implementation success factors

Introduction

The evidence on success factors was derived from the survey (summarised in section 7.4), the multiple-case study of EXMAR (summarised in section 8.9) and the subsequent case studies of other systems (summarised in section 9.7).

Table 11-3 summarises the success factors hypothesised from the cases, and the support for each hypothesised success factor, in approximate decreasing order of strength of support for the factor. The survey findings relating to success factors are summarised in Table 11-4 and Table 11-5, which repeat **Table 7-38** and **Table 7-39** for convenience.

In discussing the support for the hypotheses below, we include discussion of the reasons for differences between the findings in the different research stages.

Table 11-3: Summary of support for success factors from case studies

Success factor	**Description**	**EXMAR**	**Other**
SF1 Presence of a system champion and sponsor	Two important roles are a champion to drive the process of system introduction, and a senior level sponsor to provide a supportive environment.	Supported	Supported
SF2 Ease of use	Ease of use, and particularly, ease of learning, help to motivate users, and to reduce the difficulties when staff and roles change.	Supported	Supported
SF3 Sufficiently wide team definition	The planning team needs to be sufficiently wide to incorporate the perspectives of those with relevant market experience, and sufficiently senior to act on insights reached. Obtaining cross-functional or director-level input on paper is not generally as successful as active involvement.	Supported	Supported
SF4 System perceived as empowering not controlling	A system that is seen as empowering will gain better-quality results than one which is seen as controlling.	Supported	Supported
SF5 Appropriate planning units	The definition of the business unit and its component products and markets are crucial. Judgements required include the right level of detail for bottom-level segments and the order in which multi-level plans are developed. It is important not to follow an inappropriate organisational structure, eg a product-based one.	Supported	Supported
SF6 A market orientation, or the perception of the need for it	The organisation needs a market orientation, or at least the perception of the need to increase market orientation, for marketing planning to be accepted, whether computer-aided or not.	Limited support	Limited support
SF7 Flexibility in planning processes	Procedures, whether on paper or incorporated in a system, should be followed flexibly to avoid hampering creativity. For example, inexperienced users can exhibit a "new convert effect", assuming that the marketing technique they have just learned about on the system is the answer to all problems, and interpreting it dogmatically. Given that a single model is a simplifying perspective on reality, other perspectives may be needed to gain a balanced picture. Users may at first be mechanistic.	Limited support	Limited support
SF8 Absence of excessive short-term pressures	If short-term pressures are such that relevant managers do not have sufficient time and motivation for strategic planning, whether due to short-term remuneration policies, market conditions or other reasons, any system use is cursory and of limited utility.	Limited support	Limited support
SF9 Adequate training	Training is needed both in how to use the system, and in how to apply underlying concepts. Facilitation may partially substitute for training.	Limited support	Limited support

SF10 Garbage in, garbage out: avoiding manipulation	The system's outputs are determined by the user's inputs. Until this is recognised, users may doubt the tool, and those in receipt of outputs may be subject to manipulation for political reasons.	Limited support	Limited support
SF11 A degree of calculated imprecision	Although good-quality inputs are important, obtaining exact information may be a time-consuming diversion.	Limited support	Limited support
SF12 Development expert-driven as well as user-driven	While the involvement of potential system users in software development helps to ensure relevance, usability and organisational fit, involvement of marketing planning expert(s) is also important to maximise the benefits of the inclusion of marketing theory in system design, & to aid in propagating 'best practice'.	-	Limited support
SF13 Adequate facilitation	A facilitator can complement the system in tasks such as market segmentation, and can help to manage time and enhance the learning process for inexperienced users. Good facilitators are knowledgeable about marketing theory and cautious with advice.	Mixed support	Mixed support
SF14 Coordination of system use with planning cycle	Where formal planning processes are strong, system use outside them may restrict the extent to which the strategy is influenced by the planning exercise.	Limited support	Mixed support
SF15 Use prototyping or otherwise allow for iteration	As the theory of marketing planning is imperfectly defined & validated, and the means of support for marketing planning through software are multifarious and only partially explored, prototyping or otherwise iterating as part of the software development is likely to be necessary in order to arrive at a useful and usable system.	-	Mixed support

Success factors supported by both survey and case studies

These two success factors, supported by the case studies, have equivalents in the survey where the relevant variable was found to be significantly correlated with system success on at least one of the success measures.

SF1 Presence of a system champion and sponsor; H3 top management support

Hypothesis H3 relating to top management support for the system seems equivalent to the need identified in the case studies for senior management "sponsorship" of the system. The sponsor seems to provide support, resources and an environment conducive to the system's use, his or her essential characteristics being a belief in the importance of marketing planning accompanied by a sympathy with use of supporting software, of which the sponsor may or may not have intimate knowledge. The cases illustrated that sponsorship can affect both the amount of use (cases 5, B, C) and its effectiveness (case 6).

Consistent with this, the survey showed a particularly high association between top management support and the personal dependence success measure, with a lesser association with organisational benefit. It seems plausible that users should be freer in their views (on the system's benefit to the organisation) than in their jobs, the latter depending to a greater extent on the views of their managers.

Table 11-4: Success factors - survey results summary, interval variables

Hypothesised success factor	System use: Correl-ation r	System use: Regress step	System use: ΔR^2	Organisational benefit: Correl-ation r	Organisational benefit: Regress step	Organisational benefit: ΔR^2	Personal dependence: Correl-ation r	Personal dependence: Regress step	Personal dependence: ΔR^2	User satisfaction: Correl-ation r	User satisfaction: Regress step	User satisfaction: ΔR^2
H1 Training												
H2 Purchase involvement	.24*			.27*	4	.05	.30**	2	.06	.33**	3	.06
H3 Top mgt support for system	.27*			.36**			.60**	1	.37	.54**	1	.29
H4 Support												
H5 User interface satisfaction				.37**	1	.14	.31**			.40**	2	.09
H6 Attitude towards mkt planning				.34**	3	.09						
H7 Task interdependence												
H8 Top mgt support for planning												
H9 Level of follow-through												
H10 Top mgt involvement												
H11 Mkt planning experience												
H12 Seniority							.37**			.32*		
H13 Organisation size				-.35**			-.35**			-.41**		
H14 Process flexibility	.40**	1	.16	.37**	2	.11	.26*			.37**		
H15 Data availability										.29*		
H16a Alternatives exploration												
H16b Innovation												
H17a Time availability (personal)												
H17b Time availability (elapsed)												

Key *: p<= .05 **: p<= .01 (1-tailed for H1-10, 2-tailed for H11-17)

Table 11-5: Success factors - survey results summary, nominal variables

Hypothesised success factor	*Results*
H18 Industry sector	No significant differences found in success measures by sector
H19 Function	No significant differences found in success measures by function
H20 Task definition	Those using the DSS for long-term plans have higher system usage than those using the system for one-year plans, and higher usage than those who have used the system for neither long-term nor short-term plans Both organisational benefits and user satisfaction are lower for those few respondents who have used the DSS neither for long-term nor for short-term plans than for the other respondents.

No significant association was found between top management support for marketing planning and system success (H8). But this cannot be taken as contradicting our observation that one characteristic of sponsors is a belief in the importance of marketing planning. One might expect any association here to be lower than that for top management support for the system, as some managers may favour planning but not regard its support by the system to be desirable (case 5), while the low sample size suggests a low statistical power, that is, a significant probability of not identifying a significant association when, in fact, the variables are indeed related. Hence we can deduce nothing either way from the absence of a significant association.

The cases also showed the importance of a system champion to drive the process of system introduction (case 4), typically pioneering its use and encouraging colleagues to follow suit. While this role could be combined with that of sponsor (case 2), in most cases separate managers could be readily identified for the two roles.

This champion/sponsor proposition can be viewed as a simple subset of the roles involved in organisational change. Leppard and McDonald (1991) review a number of perspectives on change from its extensive literature, such as the commonly-cited roles of change agents, catalysts, pacemakers and diffusion agents (Williams 1970), applying these to a study of marketing planning. Christopher et al (1991) define four phases of organizational commitment to (marketing-oriented) quality, characterised by the activity of vanguard, ferment, follower and stabilizer groups. These authors also propose a means of working round limited support from the CEO, involving pilot projects and alliances with other departments, and suggest that companies move through a number of transitions on a path to a quality goal, from developing strategy through signalling commitment, increasing involvement and continuous improvement to quality leadership. While McDonald, Wilson and Hewson (1996) begin to map Williams' (1970) model against data from this thesis, the simple approach represented by proposition SF1 has been found to map readily onto the data, and begins, at least, to expand upon the simple statement of the importance of top management support which has been found to be an important factor in other DSS research (Guimaraes et al 1992).

SF2 Ease of use; H5 User interface satisfaction.

How easy the system is to use seems of considerable importance in how useful the system is to the organisation, appearing first in the regression equation for organisational benefit and second for user satisfaction. Similarly, several of the cases showed system utility to be affected by the system's ease of use (cases 1, 4, B, C). In some cases, ease of use was related to system robustness (cases B, C). Of course, all the survey respondents were using the same system, but perceived ease of use may vary with such factors as their previous experience of computers, the time available for learning the system, the training and support they receive, and whether a facilitator operates the system. Supporting this argument, user interface satisfaction is highly correlated with training ($r=.60$, $p=.000$) and also significantly correlated with system support ($r=.24$, $p=.032$), while the cases suggested that the degree of training and the presence of a facilitator could also compensate for ease of use weaknesses.

It would seem reasonable to conclude that ease of use should be an important factor in choosing a system, and an important design consideration in software development. This is consistent with Davis' (1989) results for a number of mainly single-user productivity tools. Davis also provides data to justify our approach of regarding ease of use as a causal antecedent to perceived usefulness, as opposed to a parallel, direct determinant of system usage.

Success factors supported by the case studies only

In this group, either there is no equivalent variable in the survey (SF4, SF5), or the variable was not found to be a significant predictor of success (SF3).

SF3 Sufficiently wide team definition; H10 top management involvement

The importance of defining a planning team that is sufficiently widely-defined (cases 2, 3, 5, B, C) and sufficiently senior (case 4) was emphasised by our analysis of the cases. Where managers with important market knowledge were regarded merely as data-providers, whether on paper (case 6) or by filling in data for analysis centrally (cases B, parts of C), their enthusiasm contrasted sharply with those who used the system in interdisciplinary teams and stressed group benefits.

When this success factor is considered in terms of its implications for marketing planning irrespective of the use of a DSS, it serves to support and to clarify John and Martin's (1984) finding that high centralization of marketing planning authority impacted plan credibility and utilisation negatively. While John and Martin concluded that "it is important...to encourage greater participation of lower level personnel in the marketing planning process", this should be in addition to, not at the expense of, involvement of top management.

Furthermore, involvement needs to go beyond remote, asynchronous collection of data to synchronised group development of the plan. This is consistent with Bartlett and Ghoshal's (1995) observation that in one dysfunctional case, management systems had been allowed "to impede rather than support relationships with those below them in the organisation", as the generation and transmission of reports (often computer-based) "replaced direct communications from people representing their own ideas, analysis and proposals". By comparison, in companies they regarded as successful, the "objective was to reinforce the rope bridge of systems-based communication with the steel girders of frequent personal contact".

Hypothesis H10 relating to the impact of top management involvement addresses part of this proposition. No significant association with system success was found, however. Hence (as argued above in our discussion of H8), the survey neither supports nor contradicts the cases' findings on this point.

SF4 System perceived as empowering not controlling

In this domain so reliant on managerial judgement, the futility of system-aided planning felt by users to be at the behest of, and for the benefit of, others in the organisation was illustrated starkly by one case in particular (case 6), supported by evidence from others (cases B, C). This contrasts with other cases where conscious efforts were made to obtain the commitment of users (cases 4, A), which did not necessarily preclude compulsory use (case A).

This supports John and Martin's (1984) argument, derived from relevant organisational research literature, that marketing planning is a domain in which tasks cannot be monitored easily, rendering any attempts to control through centralisation of authority difficult and subject to negative attitudinal effects. Similar results were reported in a recent study of sales and marketing databases (Hewson and Hewson 1994). The proposition is also consistent with Christopher et al's (1991 p115) view that eliciting commitment is a more effective means of making the "transition to quality leadership" than imposing control.

The need for users to feel empowered also has implications for the system's design (case 2), users wishing to feel in control of both the process and the outputs. This relates to our discussion of system design above, notably under process support and data interpretation. This point has an exact parallel in Lodish's (1981) CALLPLAN paper, in which, we recall, he reported that users displayed "varying levels of enthusiasm as the salesman realized that he was controlling the program, rather than it controlling him".

SF5 Appropriate planning units

No cases displayed consistent problems with inappropriate definition of business units, products and markets. Where isolated problems occurred, however (cases 4, A and B), they significantly reduced the value of part or the whole of the system for relevant users. None of the systems studied provided significant assistance with these important judgemental decisions.

It is, perhaps, not surprising that issues of planning unit definition should prove important in the utility of systems, given the importance and difficulty of market segmentation discussed earlier (Wensley 1995). Various guidelines have been provided on business definition and segmentation, for example on the various possible bases for segmentation (Kotler 1988 p286-296, Christopher et al 1991 p47-51), on relationships between market segmentation and organisational structure (Jenkins and McDonald 1994), on the importance of including different means of satisfying the same need (Ansoff 1987) - a central point in Levitt's (1960) famous paper - and on what constitute sensible segments once identified (Kotler 1988 p298). We have also mentioned that various 'bottom-up' techniques are available for grouping customers into segments using market research or operational information, and for testing the extent to which segments overlap through substitutability (Tull and Hawkins 1984; McDonald and Dunbar 1995). While some of the judgemental tools incorporated in the planning systems we have studied, such as perceptual maps and Porter's cost-differentiation matrix, may suggest respects in which the initial segmentation might be modified or further broken down, these still leave the chicken-and-egg problem that the analysis will depend on the initial planning units defined. All these techniques and guidelines still, in any case, fall far short of removing judgement from the process of market or segment definition, which is widely regarded as a creative one.

It seems difficult, then, to remove the risks from inappropriate planning unit definition, but we can at least conclude that unit definition is an important precursor to system use that may require substantial work. Hard-coding of definitions into systems may prevent inappropriate definitions from being modified (cases A, B). Definition of planning units is one area where facilitation has been applied (discussed under SF13).

Success factors supported by the survey only

In the first two members of this group, while the survey found an association with system success, the closest equivalent proposition from the case studies found only limited support. In the remaining members of the group, the survey variable had no equivalent in the case study propositions.

H6 Attitude to marketing planning; SF6 Market orientation

Attitude to marketing planning is significantly correlated with organisational benefit, accounting for 9% of the variance of organisational benefit in the regression equation. This suggests that the introduction of a system may need to be accompanied by an educational programme, aiming to change attitudes about the importance of marketing in general and marketing planning in particular. The absence of a similar correlation with personal dependence may be because personal dependence on the system depends more on the views of the user's manager than on the user's own views, although as we have already discussed, nothing conclusive can be drawn from the absence of a significant correlation with the small sample.

The related proposition on the need for market orientation received only limited support from the cases. As we discussed earlier, the term "market orientation" is used according to Kohli and Jaworski's (1990) definition of "the organizationwide *generation* of market intelligence pertaining to current and future customer needs, *dissemination* of the intelligence across departments, and organizationwide *responsiveness* to it." While some evidence suggested that a high degree of market orientation, or at least a perception of the need for it, was a prerequisite to successful marketing planning, whether system-supported or not (cases 4, 5, 6, B), other examples cited changes in the direction of a greater market orientation as a result of system use (cases 4, 6). This evidence may not be conflicting: one explanation is that it is the case *both* that a higher perception of the importance of market orientation will aid the system's acceptance, *and* that system use can influence attitudes in the direction of a higher market orientation.

Regarding the relationship between a positive attitude towards the need for market orientation, as discussed in the cases, and a positive attitude towards marketing planning, as measured in the survey, Kohli and Jaworski's definition of market orientation seems close to the aim of the marketing plan as commonly described, as illustrated by a comparison of the definitions of marketing planning we discussed in chapter 2 with Kohli and Jaworski's market orientation definition. It seems plausible that the two are closely related, then, although attitude towards marketing planning may for some respondents involve a (more or less conscious) acceptance of the assumption that formal planning is an appropriate way to implement the aims of market orientation. One difference, though, between the survey hypothesis and the case study proposition is that the former was measured for individuals, whereas the latter deals with aggregated attitudes and practices across the organisation.

H14, SF7 Process flexibility

We recall that the process flexibility variable in the survey was based on a single question derived from Ames (1968), "Our procedures for marketing planning in this organisation are so structured that they act as a hindrance rather than a help". This variable is significantly correlated with each perceptual success measure, and is the only variable in the regression equation for system usage. While only six respondents agreed or strongly agreed with the statement, the size of the correlation suggests that when the problem arises, it can be a significant dampener on system benefits. Given that this is one of the barriers to marketing planning identified in previous research, this finding seems to confirm that inflexible application of a standardised process can hinder the effectiveness of marketing planning, whether system-aided or not.

The process flexibility proposition SF7 sheds light on the problems that may underlie the survey's finding, covering a number of examples of problems that can arise if insufficient flexibility is used in the application of standard techniques and process. Portfolio matrices can lead to "box thinking" (case 1) in their interpretation, while the inclusion of a standardised process can hamper the "free flow of ideas" (case 4; similar comments in case B). Case C illustrated that the process (part of which was supported on paper) may also suffer from excessive detail. Other than modifying those procedures found to be excessively constricting (case C), facilitation was cited as a means of countering these dangers (cases 1, 4).

While these findings might appear to be contrary to John and Martin's (1984) result that a bureaucratised planning structure with formal rules and procedures can enhance both plan credibility and plan utilisation, we recall from our discussion of the benefit proposition "Improve support for planning process" (BE9) that while a DSS can improve process thoroughness, this can be at the expense of process flexibility. It seems that while a degree of process thoroughness is desirable, the danger that formal processes (whether computer-supported or not) can lead to insufficient flexibility must be guarded against.

H2 Purchase involvement

Involvement in the decision to purchase the system is significantly correlated with all the success measures. Each of the following possible reasons for this finding is plausible in the light of the case studies, and it seems likely that the relatively small effect found is due to a combination of these factors.

1. Involvement in the purchase decision is likely to lead to a better understanding of the strengths and weaknesses of the software and how to apply it effectively.
2. Being consulted about the software purchase may lead to an emotional commitment to make the software work, with positive effects on the impact of the system.
3. Given that respondent companies *did* decide to purchase the system, those involved in the purchase decision clearly reacted favourably to the system. They may therefore as a group be more predisposed to see benefits from software for marketing planning than some of their colleagues.

For software not developed in-house, purchase involvement seems the closest equivalent of the widely-used concept of user involvement. Montazemi (1988), Guimaraes et al (1992) and Franz and Robey (1986) all found that end-user satisfaction was positively affected by involvement in the development process, and Ginzberg (1981) found a similar association with user responsibility for the system. This finding suggests that a similar effect can occur with purchase involvement, though subject to the possible bias described under point 3 above.

H12 Seniority

Seniority is significantly correlated with personal dependence and user satisfaction, senior managers being more dependent on the system than more junior managers. This is consistent with the notion that strategy is formed higher in the organisation. Seniority is not, though, correlated significantly with system usage. Senior executives are no more likely to use the system than more junior colleagues, but they do on average depend on it more in performing their job. This suggests that whoever has operated the system or participated in system-aided planning sessions, the outputs are more likely to be critical to senior executives. This has parallels with general information systems research, Franz and Robey (1986) finding that users at higher levels found their systems more useful.

H13 Organisation size

Size is negatively correlated with the three perceptual success measures. It does not, however, appear in the regression equations. This seems to be due to its correlation with other success factors, particularly top management support for DSS and process flexibility. It seems that larger organisations are more likely to suffer from inflexible, over-structured procedures, and are less likely to have top management support for the system. For both of these reasons, system success may be affected.

The tendency of large organisations towards bureaucracy is comprehensible, and is consistent with life-cycle models of organisational development reviewed by Leppard and McDonald (1991), such as a "crisis of red tape" that may follow growth through co-ordination. But why large organisations should also tend to have less top management support for the system is not clear. One possible reason is that in smaller organisations, the decision to purchase and use the system is likely to involve much of the senior management team. In larger organisations, there is more scope for a decision to obtain the system to be taken at lower levels, without strong commitment from above, or for varations in opinions between functions or divisions. This may lead to lower top management support as a whole, and in turn to lower benefits.

Success factors with limited support from case studies

In this group, the case studies found only limited support for the proposition, while any equivalent variable in the survey was not significantly related to system success.

SF8 Absence of excessive short-term pressures

Various short-term pressures were quoted as reducing system use and related marketing planning activities, including the need for tactical responses to rapidly changing market conditions (case 3), the difficulty of planning in tough market conditions when "we're concentrating on not drowning" (case 4), a more internal focus immediately following a restructure (case D), and short-term oriented reward systems (case 4). In each case, though, there were other possible factors, such as ease of use (cases 3, 4, D) and the sideways move of the system champion (case 4). While it seems likely that the excuse of short-term pressures was at least to some extent genuine, the possibility was not ruled out that short-term pressures formed a polite, easy excuse to give to the researcher, to hide or underplay other reasons such as a desire to avoid the hard work involved in planning (case 3), shifts in the influence of the system champion (case D) or a negative view towards the system's efficacy for unstated reasons (an interviewee in case 4). We therefore can provide only tentative support for this proposition, which is consistent with the marketing planning barriers B11 (lack of time) and B16 (short-term oriented reward systems).

SF9, H1 Adequate training

Inadequate training was cited as a factor in several cases, though the presence of other, often more influential factors made it difficult to isolate the impact of training on the system's utility. Poor training in cases 1 and 3 seemed to be effectively countered by the presence of an internal facilitator who invested time in learning the system, while the internal facilitator in case 4 was trained mainly by sitting through facilitations run by an external system expert. Poor training seemed more of a problem where the system was used remotely in cases B and C, but in both cases other, more critical factors included the system's poor reliability.

The direct impact of training on system success, then, is tentative. Similarly, the survey found no significant association between training and system success, unlike DSS surveys by Guimaraes et al (1992) and Sanders and Courtney (1985) which found an association; however, as we discussed under "Ease of use" above, the association between ease of use and training suggests that better training may lead to a higher perceived ease of use, and hence have an indirect effect on system utility.

SF10 Garbage in, garbage out: avoiding manipulation

The need to avoid manipulation of the system to achieve a desired result was expressed by many interviewees (cases 1, 4, A, C). Only one instance was cited (in case 1), though, of manipulation actually occurring. While this suggests that users may be sufficiently aware of the dangers of manipulating to avoid doing so, an alternative explanation is that users were not open with the interviewer about specific examples. One attempted control mechanism adopted to avoid manipulation in cases A and C was the definition of formal scoring criteria for important judgemental data - though the attempt entirely to control out judgement is inappropriate:

> "One can view it as the ease of manipulation, or as the flexibility of modelling. What's the difference? I like the flexibility of modelling. It does require some mature insight, if you like." (case 1)

Another point arising from cases 1 and 4 is the need to educate those in receipt of system outputs so that they are aware of the respects in which analyses are subjective.

This is, then, an interesting but unconfirmed proposition. One reason cited for manipulation, laziness or the desire to cut corners and finish the plan (case 1), is consistent with Piercy and Morgan's (1994) analysis of planning avoidance as one set of behavioural planning problems. Another reason, the desire to protect resources under the user's control (cases 4, A), is consistent with Piercy and Morgan's "politics and myopia" factor, and reflects concerns about politics in planning voiced by Ames (1968) and Hopkins (1981), and Kohli and Jaworski's (1990) proposition that a high acceptance of political behaviour increases interdepartmental conflict and hence reduces market orientation. The deliberate holding back of explanations of how a system output is arrived at has precedents in studies of information and power (Piercy 1989), here being perhaps as appropriately described as pertaining to knowledge and power, the knowledge relating to the derivation, for example, of portfolio matrix axes. Kohli and Jaworski (1990) proposed that individuals in an organisation are likely to be more responsive to intelligence generated by individuals who are regarded as having high expertise. The contention that system outputs may be believed more readily than an identical paper analysis, and hence may be more subject to manipulation, suggests that this proposition can be extended to systems as well as individuals.

SF11 A degree of calculated imprecision

Users can feel that information requested on a computer must be exact (cases 2, 4), leading to a search for exactitude which can form an inefficient use of resources (case 2), at least in some cases (case 3). A balance needs to be struck between excessive subjectivity and an unnecessary concentration on data accuracy. Subjectivity can be reduced through teamwork (cases B, D) and through data gathering and analysis focused on critical areas (case C), balanced by an acceptance that some data will be based on the judgement of those close to the market.

The empirical DSS literature tends to assume that increased data accuracy and availability necessarily represent benefits to be sought from systems (Money et al 1988). The notion that increased accuracy can be dysfunctional seems to have been little discussed. As an exception, Piercy (1984) reviews some challenges to the assumptions behind much management information literature, including the assumptions that managers want or need more hard data, and that accuracy in such data is crucial. This proposition, although too little explored in the cases to be definitive, adds a question-mark to such assumptions within this domain.

SF12 Development expert-driven as well as user-driven

The cases provided comparatively little evidence on this proposition as only four systems were used within the ten cases, due to the seven cases using EXMAR. The proposition was assessed only for cases A to D. Some respects in which the system in case B did not match marketing theory may have been prevented by greater involvement from external experts. By contrast, case C's external input ensured a specification that was "right first time" - though the implementation of the specification was not. Although not confirmed, then, this proposition is consistent with the limited data available.

We discussed earlier the respects in which the "expert systems" term applied to the EXMAR system. The proposed involvement of both users and experts in system development represents another respect in which the expert systems rhetoric partially applies to this domain. While the DSS literature concentrates on the importance of user involvement (Guimaraes et al 1992), expert systems developments classically proceed by knowledge acquisition from experts (Hickman 1989). This proposition perhaps reflects the state of marketing planning knowledge, in which academic "experts" can to some extent represent "best practice" in imparting formalisms found to aid with a planning process (John and Martin 1984), but in which this prescriptive expertise is both potentially flawed (Armstrong and Brodie 1994a) and in need of tailoring to specific organisations (our marketing planning barrier B8).

Success factors with mixed support from case studies

In this group, the evidence for the proposition was partly positive and partly negative. The propositions have no direct equivalents in the survey.

SF13 Adequate facilitation

The presence of a facilitator can help to avoid a number of the potential 'soft' pitfalls identified in this list of success factors, including inappropriate definition of planning units (case 2), a search for excessive exactitude (case D), and inflexible application of a standardised process (case 2). It can also reduce the learning requirement (cases 1, 2) and may play a role in changing attitudes in the direction of a greater receptivity to marketing planning (case 4).

A facilitator's involvement may often, then, be useful; but it cannot be listed as an essential factor, at least in sense of a separate person outside the management team (cases 3 and C). The difficulties in case B, though, suggest that the presence at least of an experienced user, whether or not acting as a facilitator, is useful.

Cases 1 and 4 suggest that where a facilitator is not part of the management team for the business unit, lack of neutrality on the plan content can lead to rejection of the facilitator.

SF14 Coordination of system use with planning cycle

Case 1 showed that system use outside the planning cycle may have restricted influence on strategy. In the light of case 2, where strategy formation was less formal and the timing of system use seemingly less critical, the proposition was revised to include the qualification concerning the presence of strong planning processes. Subject to this qualification, the proposition was consistent with the EXMAR cases. However, in case C, director involvement ensured that ad-hoc use was still effective, despite the presence of strong planning procedures. It appears, then, that the importance of coordination of system use with the planning cycle depends on circumstances that may not have been fully identified, including the seniority of team involvement, the nature of ad-hoc use, and the role of formal planning in the organisation.

SF15 Use prototyping or otherwise allow for iteration

As with the involvement of experts and users in system development, this factor was only introduced for the second multiple-case study. Case A provided an example of a successful development without the need for iteration - parts of the system being developed in one cycle. However, some of the most complex parts (involving portfolio matrices) were developed with more iteration. Other cases supported the success factor.

This suggests that while this factor probably forms a sensible guideline in bespoke developments in this domain, it is not necessarily essential.

11.2.4 Revisions to theoretical framework in light of findings

Figure 11-2 shows additions to the theoretical framework we presented in **Figure 3-2** arising from the findings.

Planning units definition. This variable has been added to the User Task subclass due to the importance of the definition of appropriate planning units as a determinant of system success (SF5). This is a domain-specific variable with no obvious implications for non-planning domains, which could be regarded as part of the task definition.

Perceived system control. To complement the extent of system usage as a potential influence on the planning process, this variable represents the extent to which the user regards the system as empowering rather than controlling (SF4). Given the parallels discussed in other research (Lodish 1981; Hewson and Hewson 1994), this variable may be relevant to other domains.

Plan credibility. The framework originally concentrated on plan quality and the authors' confidence in it, corresponding to the more specific 'decision quality' and 'decision confidence' examined in numerous DSS studies. The cases emphasised that the credibility of the plan is a significant outcome of planning (benefits BE8, BE2, BE4), although one where the DSS' impact is inconclusive. Although studies of group decision support systems have included effects on group members such as commitment and confidence (Pinsonneault and Kraemer 1989), the effect on the credibility of decisions *outside* the decision-making group seems to have received little attention. Within marketing planning, we therefore support those who have advocated and used plan credibility as one measure of planning effectiveness (John and Martin 1984; Piercy and Morgan 1994).

Updated intuition. We have also discussed the importance of an 'updated intuition' in users' descriptions of the role of systems and analytical marketing tools. This is perceived to be a benefit irrespective of what is then written in a marketing plan. This has precedents in the study of variables relating to the understanding of the decision-makers' problem, for example Money et al's (1988) list of studies examining 'problem appreciation benefit'. It perhaps represents, though, a different emphasis, as managers do not necessarily perceive themselves to be facing a "problem" requiring an immediate "solution" when they refer to their "gut feel" being supported or modified by use of a system.

Figure 11-2: Revisions to framework in light of findings

User environment

User
- Knowledge and skills
- Experience
- Seniority
- Function
- Attitude towards marketing planning

User Task
- Definition
- Interdependence
- *Planning units definition*

Task context
- Top mgt. support for planning
- Top mgt. involvement in planning
- Follow-through to implementation
- Marketing planning introduction

Organisational environment
- Structure
- Management Style
- Culture
- Size
- Product/market complexity

External environment
- Industry
- Turbulence
- Competition severity

Use process
- System usage
- *Perceived system control*
- Process thoroughness
- Process flexibility
- Data utilisation
- Alternatives exploration
- Time usage
- Communication effectiveness
- Cross-functional involvement

Implementation process
- Training
- Purchase involvement
- Top management support for system

Operations process
- Support
- Facilitation

Planning outcome
- Plan quality
- *Plan credibility*
- Confidence in plan
- *Updated intuition*

DSS

Characteristics
- Content
  - data
  - models
  - process support
- Presentation

Effectiveness measures
- Perceived benefits
- User satisfaction

Key

Italics=variable added due to multiple-case studies

11.3 Findings for other system types

The previous section summarised our main findings, which relate to planning systems for multiple product-markets. Our findings for other types of system were presented in sections 10.6 and 10.7, and are summarised here. In view of the use of only one or two cases for each of the three other system types studied, these findings are highly tentative.

The benefit and success factor propositions derived from the EXMAR multiple-case study were found only to apply to one further system type, the single-product/business unit planning system (case H). One difference was that the marketing tools supported emphasised business unit strategy, such as Porter's generic strategies, rather than issues of portfolio balance. The particular system studied was also more pro-active in offering advice than the multiple product-market systems studied. While this provided a further means to challenge the user's understanding, it was not always easy to understand the advice given: hence, trust in the system was more of an issue than elsewhere. Broadly, this case suggests that the propositions discussed in the previous section may apply to other types of system sharing such characteristics as judgemental modelling of the market.

The mismatch between the propositions and the data from the other cases was sufficiently great that fresh propositions were generated for each system type. These are unlikely to be "saturated" (Glaser and Strauss 1967) with the little data available, but serve to suggest that causal modelling systems update intuition through the modelling of factors driving key marketing variables, and hence may improve decision justification, credibility and confidence, while data consolidation/display systems serve the same purpose of updating intuition through the graphical or tabular display of iteratively specified data searches.

Perhaps the most useful aspect of the study of other system types is the comparison of the different approaches to modelling a market (**Table 10-11**). Broadly, data consolidation/display systems correspond to a 'descriptive' approach where descriptive data is presented to the user to form their own interpretations. The dominant mode of market modelling in the multiple product-market planning systems was 'judgemental', using analyses involving user judgement such as the DPM, while causal modelling systems primarily rely on statistical analysis of data sets to determine relationships between marketing variables. (Naturally, this relationship between system types and styles of modelling is imperfect, given that our definition of system types relies on a rough clustering of systems, analogous to a market segmentation's grouping of customers. Actual systems may include more than one modelling style.) The judgemental approaches can be characterised as group hypothesis consolidation in situations of uncertainty through the involvement of managers close to the market. By contrast, causal modelling acts to test hypotheses when hard data on all relevant variables is available. This stringent condition is typically the case only for fine-tuning of the marketing mix for well-defined, disaggregated product-markets. The data requirements for descriptive modelling are intermediate: hard data is required on the dependent variable (typically sales or market size), allowing the individual user to generate hypotheses through data exploration, perhaps facilitated by any available data on independent variables (such as promotions). The main point to emerge is that these approaches to modelling are complementary, not competing, and their automation will be appropriate in different circumstances.

With respect to our main findings in the previous section, this clarifies the circumstances in which models such as portfolio matrices are appropriate. While these analyses are inevitably more subjective than (for example) econometric models, and while it is possible to define circumstances in which their assumptions do not hold (Armstrong and Brodie 1994a), they may nevertheless be useful in the common circumstances where harder data is not available, as a means of making the best of the available insights from those close to the market.

11.4 Summary of contribution

The primary contribution of this study is to the marketing planning literature, through an exploration of whether and how decision support systems can improve strategic marketing planning practice. Appropriately for an early study on this topic, we have adopted a formative evaluation approach, concentrating on improving the evaluand - how to design and implement a planning system - as much as on evaluating its efficacy. We have therefore generated a range of propositions not only on the benefits that can be gained from systems, but also on how to introduce them into the organisation and apply them effectively. We have also related the benefits to design features, illustrated by presentation of the design of one specific system, EXMAR, in depth.

The study has, however, included a degree of theory testing as well as of theory generation, through a survey and through the analytic induction method of iteratively generating and testing propositions against qualitative data. With regard to the benefits supported for systems we have described as planning systems for multiple product-markets, systems can aid in the use of marketing tools through automated calculations, graphical display and guidance; the support for fast iteration can facilitate group planning; and the electronic format eases the integration of cross-functional analyses and assists with multi-level planning, as well as supporting moves towards more continuous planning based on a live marketing model of the business. The cases are inconclusive on several other hypothesised benefits: time savings, identification of data requirements, and the impact on softer factors such as marketing planning confidence. While learning benefits are a common aim, they are not always achieved, suggesting that learning may depend on the presence of a facilitator. The structuring of the planning process can be a benefit, but is subject to the danger of hampering creativity, which must be countered through a flexible approach, a point which applies also to paper-based systems.

These benefits can help to reduce some of the marketing planning barriers we identified at the start of this thesis. "What-if" features and the incorporation of cross-functional models can facilitate the involvement of widely-defined cross-functional teams and the board, while the support for marketing tools can reduce the level of knowledge and skills required. Support for multi-level plans and maintenance of a 'live', continuously updated model enable approaches to planning that may be better attuned to the requirements of some organisations. Other barriers must be addressed by other means, however, including cultural problems, while systems are likely to make at most a limited impact on resource and data constraints.

Implementation success factors supported are top management support; the system's ease of use; sufficiently wide and senior definition of the planning team; a system that is seen as empowering rather than controlling by its users; the definition of appropriate planning units such as business units, product groups and market segments; and the absence of excessively structured planning procedures. Attitude to marketing planning, involvement in the purchase decision and seniority also positively affect perceived system utility. A negative correlation between organisation size and system success has a number of possible explanations. The support for a number of other hypothesised success factors was inconclusive or mixed.

Secondary contributions of the study are:

1. Contributions to marketing planning literature independently of the use of software.

The analysis of implementation success factors confirms some of the marketing planning barriers identified by previous research, notably the importance of top management support and sufficiently wide team definition, and the need for flexibility when applying standard planning procedures. This last complements previous findings that formal planning procedures enhance plan credibility and utilisation (John and Martin 1984). Some other findings have implications that extend the previously identified barriers: the need to empower rather than control planners; the importance of appropriate planning unit definition; and the need to allow for ad-hoc or continuous planning as well as traditional annual planning. The nature of the use of software-supported analytical tools emphasises that such tools can serve as aids to the surfacing of managers' perceptions (Bowman 1991) as much as to generate prescriptive suggestions on the appropriate strategy, implying an emphasis in their use on the agreement of the inputs amongst the management team, rather than on the nature of any advice associated with the tool.

A further contribution to prescriptive marketing planning literature is through the definition of a marketing planning model integrating techniques into a planning process, and round a common data model. This makes explicit some technique interrelationships in a way not apparent from most textbooks, such as the relationship between Porter's definition of differentiation (Porter 1980a) and the use of multiple-factor analyses of business strength. Some modifications to the Directional Policy Matrix (Hussey 1978) are also proposed.

2. Contributions to DSS literature independently of the domain of application.

This study forms a further empirical investigation of decision support systems, unusual for its use of analytic induction as well as a survey, most studies being experiments, surveys or informal single-case studies (Benbasat and Nault 1990). The survey's definition of scales for personal dependence and organisational benefit as components of user satisfaction forms another precedent that may be of use to other researchers.

The element of theory generation in the method has brought to light some variables that may be of relevance in other domains, including the extent to which the system is viewed as empowering, plan/decision credibility outside the decision-making group, and the importance of the native category (Chapman and Buckley 1994) of "gut feel" and modifications to it arising from system use. Light has also been shone on some well-studied variables. Despite occasional dissidents arguing to the contrary (Piercy 1984), studies of data-related DSS effects continue to concentrate on assumed 'goods' such as data availability and accuracy. This study has suggested that more detailed or more accurate information is not necessarily beneficial (SF11), and that indeed one potential role of a DSS can be to help managers to identify the critical information amongst the large amount available (BE6). Similar issues of appropriateness as well as quantity apply to alternatives exploration, in which appropriate choice of analyses (SF5, SF7) are as important as support for depth of analysis (SF1).

Regarding schools of DSS development, we support all of Little's 'decision calculus' guidelines (1970): that the system should be simple, easy to control, easy to communicate with, robust, complete and adaptable. Our difference is over the need for a prescriptive model, an assumption rather than an explicit statement by Little: this difference may be due to the benefits enhanced user interface technology can bring in areas such as graphics, and represents, perhaps, a less ambitious role for the computer in this wider domain. Little user demand has been evident for greater structuring of the decision-making itself, along the lines advocated by 'decision analysis' (Wind and Saaty 1980). Rather, the role of the system is, perhaps, analogous to that of the psychotherapist: non-judgemental listening, and feeding back of a perception of reality to the client to enhance the client's own understanding, combined with guidance on process (Jung 1964).

The propositions on the involvement of both users and experts in development (SF12) and for the use of prototyping (SF15) represent a synthesis between the evolutionary approach to development advocated by the 'implementation process' school (Keen 1980), which taken to the limit could imply that the objective of development is purely to produce a system that the users will use, and the 'decision research' school (Stabell 1986), which advocates steering of users' current behaviour in a "better" direction.

11.5 Strengths and limitations of research method

As an early study in this domain, this study has been broad in scope and goal-free in its assumptions of system objectives in order to generate theory as a basis for future research. This has been reflected both in the use of analytic induction, and in the use of a survey measuring a wide range of variables. While this breadth has been to some extent at the expense of depth of examination of specific hypotheses, it would be understating the results to describe the research wholly as hypothesis generating. The qualitative data has been matched for fit against the hypotheses generated and against certain rival hypotheses, leading to some propositions having been described as supported by the findings; and although the survey's small sample size has restricted the power of statistical tests, some statistically significant findings have nevertheless emerged. Nevertheless, there is a need for further research examining specific hypotheses in more depth, and with an approach specifically attuned to hypothesis testing.

Regarding internal validity, the case studies have the strength of allowing causal mechanisms to be explored. A threat to internal validity derives from the difficulty of sustaining the rigour of analytical induction with complex theory involving non-dichotomous variables, necessitating extensive use of researcher judgement. We have endeavoured to minimise this, and the corresponding weakness in reliability, by using and documenting procedures which follow the logic of analytic induction as closely as possible.

Another validity threat arises from the dominant use of interviews in the case studies, introducing the interviewee as a filter of reported events. Only two case studies made use of participant observation to complement in-depth interviews. We can expect that this will lead to an under-representation of some covert behaviours which may be relevant to marketing planning and the role of the system. Political issues, for example, have arisen relatively little in the analysis, from which we should not conclude they are not relevant. A related problem is that the interviews were largely cross-sectional, only some of the companies being visited more than once over a period of time. A longitudinal approach may have shed more light on dynamic change-related benefits and success factors, such as changes to attitudes and the diffusion of the system around the organisation.

We have discussed the possible bias in interview data due to the interviewees' desire to please the researcher as the known EXMAR developer. Similarly, the fact that the case study organisations had purchased or developed a system, and the selection mainly of those exposed to the system as interviewees, suggest that interviewees may as a group have been more predisposed to be positive about the use of systems than their colleagues. While we discussed in depth the various strategies adopted to attempt to control these biases, they cannot be ruled out as potential threats to validity.

The survey has been used to explore factors affecting successful implementation, its descriptive data on system benefits only being used within this summary chapter to shed light on the discussion of case study data. Other than reducing the power of statistical tests, the small sample size has rendered impractical such analyses as factor analysis on more than a few variables. Other weaknesses in variable definition include the small number of items and limited scale development for some attitude scales, although some scales such as the important user satisfaction and ease of use variables were able to draw on previous research. The survey's range of measures of system success were limited to user satisfaction and system usage, ignoring for example measures based on user benefit perception and cost/benefit approaches, the latter also being absent from the case study analysis.

Taken together, the research approaches have had the advantage of methodological triangulation regarding success factors, though not regarding benefits. We have explained the historical reasons why the survey and EXMAR multiple-case study were conducted in parallel, but with a clean sheet, another approach might have been preferred, such as building on the case study with a subsequent survey. The main weakness of the combination of approaches adopted has been the lack of a benefits assessment with the experiment's advantages of reliability and internal validity, and the related weakness of an emphasis in success measurement on user perception.

11.6 Suggestions for future research

An experiment examining some of the benefit propositions arising from this research is desirable. This could not simply replicate previous DSS experiments: we have seen that some of the system impacts identified by this study do not correspond to those expected from previous DSS research, examples being the emphasis on group communication, and softer aspects of the planning outcome such as plan credibility and updated intuition. However, some of these, such as plan credibility, would be difficult to replicate in an experimental setting, and it is clear that single-user experiments focusing on decision quality such as that conducted by Bovich (1987) lose a great deal in ecological validity. The brief description of the pilot experiment in section 5.6 may form a useful starting-point for an experimental design that addresses at least some of these weaknesses.

Further qualitative research would also be of value, complementing an experiment through the ability both to research a wider range of potential DSS benefits, and to research those factors affecting achievement of the benefits that depend on the organisational context, such as senior management support for the system and the manner in which the system is introduced. In order to strengthen the theory-testing value of such research, the main rival hypotheses we have discussed could be more tightly controlled as suggested by Yin's (1984) almost quasi-experimental approach, by seeking cases in the following groups:

a) Cases where an organisation has developed marketing plans without the use of the DSS, and then developed plans with its aid. This is the main group represented in this thesis. A number of cases would be needed in this group to provide literal replication (Yin 1984).
b) Cases where an organisation has used a DSS and then reverted to manual methods. This would help to control for some extraneous variables such as the learning effect of any planning exercise on its participants.
c) Cases where two business units in the same organisation have undergone planning exercises, one without DSS support and the other with it. Here the critical task would be to check for other respects in which the business units differed: the various success factors identified by this thesis would provide an initial list. This quasi-experimental group of cases would be powerful for ruling out specific rival hypotheses, but presents difficulties for ensuring the match of the two business units on all relevant variables. It is also likely to be the most difficult group in terms of finding suitable cases: an action research approach involving participant observation might prove appropriate.

One under-explored issue that might be effectively addressed by survey or other means is the relationship between the organisation's style of strategy development and the efficacy of decision support systems. Some aspects of our findings, such as the role of systems in supporting continuous or ad-hoc planning, suggest that while one cannot simply assume that systems are applicable to any organisation, neither can one assume that they are only relevant to those with a rational, planned approach to strategy formation. There is a case for including the scales for measurement of strategy development style carefully developed by Bailey and Johnson (1994) both in surveys examining marketing planning in general, and in surveys investigating the utility of marketing planning decision support systems in particular.

Bibliography

Aaker, D.A. (1988) *Strategic Market Management*, 2nd edition. Wiley, Chichester.

Abell, D. and Hammond, J. (1979) *Strategic Market Planning*. Prentice-Hall, Englewood Cliffs, NJ.

Adams, D.A., Courtney, J.F. Jr. and Kasper, G.M. (1990) A process-oriented method for the evaluation of decision support system generators. *Information & Management*, 19, 213-225.

Aitken, S. and Bintley, H. (1989) Building a marketeer's workbench: An expert system applied to the marketing planning process. *ICL Technical Journal*, November, 721-736.

Alpar, P. (1991) Knowledge-based modeling of marketing managers' problem solving behaviour. *International Journal of Research in Marketing*, 8 (1), 5-16.

Alter, S.L. (1977) A taxonomy of decision support systems. *Sloan Management Review*, 19(1), 39-56.

Ames, B.C. (1968) Marketing planning for industrial products. *Harvard Business Review*, 46(5), 100-111.

Andersen, N.B. (1985) Conference review: IS research - A doubtful science. In *Research Methods in Information Systems*, E. Mumford et al. (eds.). Elsevier, Amsterdam.

Andersen Consulting (1989) *IT in Marketing and Sales '89*. Andersen Consulting, London.

Anderson, P.A. (1983) Decision making by objection and the Cuban missile crisis. *Administrative Science Quarterly*, 28, 201-222.

Ansoff, H.I. (1987) *Corporate Strategy*, revised edition. Penguin, London.

Arinze, B. (1990) Market planning with computer models: A case study in the software industry. *Industrial Marketing Management*, 19, 117-129.

Arkush, E.S. and Stanton, S.A. (1988) Measuring the value of end-user computing. *Journal of Information Systems Management*, 5(4), 62-63.

Armstrong, J.S. and Brodie, R.J. (1994a) Effectiveness of portfolio planning methods on decision making: Experimental results. *International Journal of Research in Marketing*, 11, 73-84.

Armstrong, J.S. and Brodie, R.J. (1994b) Portfolio planning methods: Faulty approach or faulty research? A rejoinder to "Making better decisions" by Wensley. *International Journal of Research in Marketing*, 11, 91-93.

Arnold, M.E. and Penn, J.M. (1987) The information technology revolution in marketing (1): A review of some current applications. *Quarterly Review of Marketing*, January, 1-7.

Bailey, R. (1989) Knowledge-based systems in personnel selection. In *Proceedings of 5th International Expert Systems Conference*, London, June, 145-156. Learned Information, London.

Bailey, A. and Johnson, G. (1994) A taxonomy of strategy development processes. In *Proceedings of British Academy of Management Annual Conference*, Management School, Lancaster University, 293-4.

Ballantyne, D., Christopher, M., Payne, A. and Clark, M. *The Changing Face of Service Quality Management*. Working Paper SWP 33/92, School of Management, Cranfield University.

Barker, R. (1989) *Entity Relationship Modelling*. Oracle Corporation UK Ltd, Bracknell.
Barker, V. and O'Connor, D. (1989) Expert systems for configuration at Digital: XCON and beyond. *Communications of the ACM*, 32(3), 298-318.
Baroudi, J.J. and Orlikowski, W.J. (1988) A short-form measure of User Information Satisfaction: A psychometric evaluation and notes on use. *Journal of Management Information Systems*, 4(4), 44-59.
Bartlett, C.A. and Goshal, S. (1995) Changing the role of top management: Beyond systems to people. *Harvard Business Review*, May-June, 132-142.
Bayer, J. and Harter, R. (1991) "Miner", "Manager", and "Researcher": Three modes of analysis of scanner data. *International Journal of Research in Marketing*, 8(1), 17-27.
Benbasat, I. and Dexter, A.S. (1986) An investigation of the effectiveness of color and graphical information presentation under varying time constraints. *MIS Quarterly*, March, 59-83.
Benbasat, I. and Nault, B.R. (1990) An evaluation of empirical research in managerial support systems. *Decision Support Systems*, 6, 203-226.
Bennett, R. (1991) The nature of management research. In *Management Research Handbook*, N.C. Smith and P. Dainty (eds.). Routledge, London.
Bernstein, J. (1973) *Einstein*. Collins, Glasgow.
Bewley, W.L., Roberts, T.L., Schoit, D. and Verplank, W.L. (1983) Human factors testing in the design of Xerox's 8010 "Star" office workstation. In *CHI '83 Human Factors in Computing Systems*, December, 72-77. ACM, New York.
Bloor, M. (1978) On the analysis of observational data: a discussion of the worth and uses of inductive techniques and respondent validation. *Sociology*, 12, 545-552.
Bobrow, D.G., Mittal, S. and Stefik, M. (1986a) Expert systems: perils and promise. *Communications of the ACM*, 29(9), 880-894.
Bobrow, D.G., Kahn, K., Kiczales, G., Masinter, L., Stefik, M. and Zdybel, F. (1986b) CommonLoops: Merging Lisp and object-oriented programming. In *Proceedings of the ACM OOPSLA 1986 Conference*, 17-29.
Borch, O.J. and Hartvigsen, G. (1991) Knowledge-based systems for strategic market planning in small firms. *Decision Support Systems*, 7, 145-157.
Bovich, E.P. (1987) *Marketing management decision making and the role of decision support systems*. Unpublished PhD dissertation, University of Michigan.
Bowman, C. (1991) *Perceptions of competitive strategy; realised strategy, consensus and performance*. Unpublished PhD dissertation, Cranfield School of Management, Cranfield University.
Bozionelos, N. (1994) Investigation of the relationship between and correlates of managerial attitudes towards use of computers and managerial attitudes towards IT. *British Academy of Management Annual Conference Proceedings*, Lancaster University, 373-374.
Bowman, C. and Daniels, K. (1995) The influence of functional experience on perceptions of strategic priorities. *British Journal of Management*, 6, 157-167.
Brooksbank, R.W. (1990) Marketing planning: a seven-stage process. *Marketing Intelligence and Planning*, 8(7), 21-28.
Brown, J.S. (1984) The low road, the middle road, and the high road. In *The AI Business*, P.H. Winston and K.Prendergast (eds.). MIT Press, Cambridge, MA.

Buchan B. and Shortliffe E. (1984) *Rule-based Expert Programs: the MYCIN Experiments of the Stanford Heuristic Programming Project.* Addison-Wesley, Reading, MA.
Burgess, R.G. (1984) *In The Field.* Allen & Unwin, London.
Burrell, G. and Morgan, G. (1979) *Sociological paradigms and organisational analysis.* Heinemann, London.
Buttery and Tamaschke (1995) Marketing decision support systems in a small trading nation: an Australian case study. *Marketing Intelligence and Planning*, 13(2), 14-27.
Campbell, D.T. (1969) Reforms as experiments. *American Psychologist*, 24 (April), 409-429.
Campbell, D.T. (1984) Foreword to Yin, R.K. (1984), *Case Study Research: Design and Methods*, Sage, Newbury Park, CA.
Canter, D., Rivers, R. and Storrs, G. (1985) Characterizing user navigation through complex data structures. *Behaviour and Information Technology*, 4(2), 93-102.
Chadha, S.R., Mazlack, L. and Pick, R.A. (1991) Using existing knowledge sources (cases) to build an expert system. *Expert Systems*, 8(1), 3-12.
Chambers, J.C., Mullick, S.K. and Smith, D.D. (1971) How to choose the right forecasting technique. *Harvard Business Review*, July-August, 45-74.
Chapman, M. and Buckley, P. (1994) The use of 'native categories' in management research. *In Proceedings, British Academy of Management Annual Conference*, Lancaster University, 29-46.
Chetty, S.K. and Hamilton, R.T. (1993) The export performance of smaller firms: a multi-case study approach. *Journal of Strategic Marketing*, 1, 247-256.
Chin, J.P., Diehl, V.A. and Norman, K.L. (1988) Development of an instrument measuring user satisfaction of the human-computer interface. In *Proceedings, CHI '88 Human Factors in Computer Systems.* ACM, New York.
Christopher, M., Payne, A. and Ballantyne, D.(1991) *Relationship marketing: Bringing quality, customer service, and marketing together.* Butterworth-Heinemann, Oxford.
Coad, P. and Yourdon, E. (1990) *Object-oriented analysis.* Prentice-Hall, Englewood Cliffs, NJ
Codd, E.F. (1970) A relational model of data for large shared data banks. Communications of the ACM, 13(6), 377-387.
Cohen, L. and Holliday, M. (1982) *Statistics for social scientists: an introductory text.* Harper and Row, London.
Cook, D.A. and Sterling, J.W. (1989) Alacrity: software that asks shrewd questions. *Planning Review*, Nov-Dec, 22-27.
Cooper, R.G. (1981) An empirically derived new product project selection model. *IEEE Transactions on Engineering Management*, 28(3), 54-61.
Cosse, T.J. and Swan, J.E. (1983) Strategic marketing planning by product managers. *Journal of Marketing*, 47, 92-102.
Cowell, D.W. (1987) Some insights into the background and training of marketing executives in the UK. *Journal of Marketing Management*, 3(1), 51-60.
Cressey, D. (1950) The criminal violation of financial trust. *American Sociological Review*, 15, 738-743.
Cressey, D. (1953) *Other people's money.* Free Press, New York; extracts published in Manning, P. K. (1982), op. cit.

Cronshaw, M., Davis, E. and Kay, J. (1994) On being stuck in the middle or Good Food Costs Less At Sainsbury's. *British Journal of Management*, 5, 19-32.

Curry, B. and Moutinho, L. (1991) *Environmental Issues in Tourism Management: Computer Modelling for Judgemental Decisions*. Working Paper, Cardiff Business School.

Dandurand, L. (1993) A computer-based technology structure for international marketing strategy development. *Journal of Strategic Marketing*, 1, 141-152.

Daniels, K., Johnson, G. and Chernatony, L. (1994) Differences in managerial cognitions of competition. *British Journal of Management*, 5 (Special Issue, June), S21-S29.

Date, C.J. (1986) *An Introduction to Database Systems*, Vol 1, 4th edition. Addison-Wesley, Reading, Massachusetts.

Davis, F.D. (1989) Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, Sept, 319-339.

DeMarco, T. (1978) Structured analysis and system specification. In GUIDE 47 Proceedings, GUIDE International Corporation. Reprinted in Yourdon, E.N. (ed.) (1979) *Classics in Software Engineering*, Yourdon Press, Englewood Cliffs, NJ.

Denzin, N.K. (1978a) *The research act: a theoretical introduction to sociological methods*, 2nd edition. McGraw-Hill, New York.

Denzin, N.K. (1978b) The logic of naturalistic inquiry. In *Sociological methods: A sourcebook*, N.K. Denzin (ed.). McGraw-Hill, NY.

DeSanctis, G. and Gallupe, R.B. (1987) A foundation for the study of group decision support systems. *Management Science*, 33(5), 589-609.

Deutsch, L.P. (1989) The past, present and future of Smalltalk. In *Proceedings of the 1989 European Conference on Object-Oriented Programming*, Cook, S. (ed.), 73-87. Cambridge University Press, Cambridge.

Dickmeyer, N. (1983) Measuring the effects of a university planning decision aid. *Management Science*, 29, 673-685.

Doll, W.J. and Torkzadeh, G. (1988) The measurement of end-user computing satisfaction. *MIS Quarterly*, June, 259-274.

Doukidis, G.I. (1989) General considerations on knowledge-based management support systems. In *Knowledge-based management support systems*, Doukidis, G.I., Land, F. and Miller, G. (eds.), 13-21. Ellis Horwood, Chichester.

Duan, Y. and Burrell, P. (1995) A hybrid system for strategic marketing planning. *Marketing Intelligence and Planning*, 13(11), 5-12.

Dubelaar, C., Finlay, P.N. and Tylor, D. (1991) Expert systems: the cold fusion of marketing? *Journal of Marketing Management*, 7, 371-382.

Economist (1994) Death of the brand manager. Editorial in *The Economist*, 9 April, 79-80.

Eden, C. (1989) Using cognitive mapping for strategic options development and analysis (SODA). In *Rational Analysis for a Problematic World*, Rosenhead, J. (ed.), 21-42. Wiley, Chichester.

Eisenhardt, K.M. (1989) Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.

Eisenhart, T. (1990) After 10 years of marketing decision support systems, where's the payoff? *Business Marketing*, June, 46-51.

Elliot, J. (1991) *Action research for educational change*. Open University Press, Milton Keynes.

Eom, H.B. and Lee, S.M. (1990) Decision support systems applications research: A bibliography (1971-1988). *European Journal of Operational Research*, 46, 333-342.
Evans, G.E. and Riha, J.R. (1989) Assessing DSS effectiveness using Evaluation Research methods. *Information and Management*, 16, 197-206.
Fitzgerald, G., Hirscheim, R.A., Mumford, E. and Wood-Harper, A.T. (1985) Information systems research methodology: An introduction to the debate. In *Research Methods in Information Systems*, E. Mumford et al. (eds.), Elsevier.
Floyd, S.A., Turner, C.F. III, and Davis, K.R. (1989) Model-based decision support systems: an effective implementation framework. *Computers and Operations Research*, 16(5), 481-491.
Franz, C.R. and Robey, D. (1986) Organisational context, user involvement, and the usefulness of information systems. *Decision Sciences*, 17, 329-356.
Fudge, W.K. and Lodish, L.M. (1977) Evaluation of the effectiveness of a salesman's planning system by field experimentation. *Interfaces*, 8 (November), 97-106.
Galliers, R.D. (1995) A manifesto for information management research in the late 1990s. *British Journal of Management*, 6(Special Issue), S45-S52.
George, A.L. (1979) Case studies and theory development: The method of structured, focused comparison. In *Diplomacy*, Lauren, P.G. (ed.), 43-68. Free Press, New York.
Gibson, E. (1990) Objects - born and bred. *Byte*, October, 245-254.
Gill, J. and Johnson, P. (1991) *Research Methods for Managers*. Chapman, London
Ginzberg, M.J. (1981) Key recurrent issues in the MIS implementation process. *MIS Quarterly*, June, 47-59.
Glaser, B.G. and Strauss, A.L. (1967) *The discovery of grounded theory: Strategies for Qualitative Research*. Aldine, New York.
Goldberg, A. and Robson, D. (1983) *Smalltalk-80: The Language and its Implementation*. Addison-Wesley, Reading, MA.
Goodchild, M.F. (1991) Geographic information systems. *Journal of Retailing*, 67(1), 3-15.
Gorry, G.A. and Scott Morton, M.S. (1971) A framework for Management Information Systems. *Sloan Management Review*, 13(1), 55-70.
Gorski, D. (1993) Sales and marketing systems - a real way to achieve competitive advantage. In McDonald, M.H.B., Hewson, W. and Wilson, H.N. (eds.), op. cit.
Greco, A.J. and Hogue, J.T. (1990) Developing marketing decision support systems in consumer goods firms. *Journal of Consumer Marketing*, 7(1), 55-63.
Greenley, G.E. (1982) An overview of marketing planning in UK manufacturing companies. *European Journal of Marketing*, 16(7), 3-15.
Greenley, G.E. (1983a) An overview of marketing planning in UK service companies. *Marketing Intelligence and Planning*, 1(3), 55-68.
Greenley, G.E. (1983b) Where marketing planning fails. *Long Range Planning*, 16(1), 108-117.
Greenley, G.E. (1986) *The strategic and operational planning of marketing*. McGraw-Hill, Maidenhead.
Greenley, G.E. (1987) An exposition of empirical research into marketing planning. *Journal of Marketing Management*, 3(1), 83-102.
Greenley, G.E. (1989) The logic of strategic marketing planning: a comment. *Journal of Marketing Management*, 5(2), 231-234.

Greenley, G.E. (1993) *Research on strategic planning and performance: a synthesis.* Working paper WPC 93/03, Department of Commerce, University of Birmingham.
Greenley, G.E. (1995a) Invited comment on the market orientation content of 'A critical review of research in marketing'. *British Journal of Management*, 6(Special Issue), S87-S88.
Greenley, G.E. (1995b) Market orientation and company performance: Empirical evidence from UK companies. *British Journal of Management*, 6, 1-13.
Greenley, G.E. and Bayus, B.L. (1993) Marketing planning decision making in UK and US companies: an empirical comparative study. *Journal of Marketing Management*, 9, 155-172.
Gregory, D. and Martin, S. (1994) Crafting evaluation research in the public sector: Reconciling rigour and relevance. *British Journal of Management*, 5 (Special Issue), S43-S52.
Grönroos, C. (1994) Quo vadis, marketing? Toward a relationship marketing paradigm. *Journal of Marketing Management*, 10, 347-360.
Grundy, A.N. (1992) *Managers' perspectives on the linkages of strategic and financial appraisal of major investment decisions.* Unpublished PhD dissertation, Cranfield University.
Guilfoyle, C. and Engelien, B. (1990) *The Business Desktop: The Next Five Years.* Ovum, London.
Guimaraes, T., Igbaria, M. and Lu, M. (1992) The determinants of DSS success: An integrated model. *Decision Sciences*, 23, 409-430.
Halasz, F.G., Moran, T.P. and Trigg, R.H. (1987) NoteCards in a nutshell. *Proceedings, ACM CHI+GI Conference*, Toronto, Canada, April 5-9. ACM, New York.
Handy, C. (1989) The age of unreason. Century Hutchinson. Reprinted Arrow, London (1990).
Hares, J.S. (1990) *SSADM For The Advanced Practitioner*. Wiley, Chichester.
Henderson, D.A. Jr. (1986) The Trillium user interface design environment. *Proceedings, ACM CHI '86, 221-227.* ACM, New York.
Herman, J.L., Morris, L.L. and Fitz-Gibbon, C.T. (1987) *Evaluator's Handbook.* Sage, Newbury Park.
Hewson, N. and Hewson, W. (1994) *The impact of computerised sales and marketing systems in the UK*, 4th Ed. HCG Publications, Milton Keynes.
Hewson, W. and Wilson, H.N. (1994) Exploring the alignment of information technology investments with sales and marketing strategies. In *Proceedings of British Academy of Management Annual Conference*, Management School, Lancaster University, 372-373.
Hickman, F.R. (1989) The pragmatic application of the KADS methodology. In *Proceedings of the 5th International Expert Systems Conference*, June, London. Learned Information, London.
Higgins, J.C. and Opdebeek, E.J. (1984) The microcomputer as a tool in marketing decision aids: Some survey results. *Journal of the Market Research Society*, 26(3), 243-254.
Hill, T. and Smith, M.D. Role of efficacy expectations in predicting the decision to use advanced technologies: the case of computers. *Journal of Applied Psychology*, 72(2), 307-313.

Hirschheim, R.A. (1985) Information systems epistemology: An historical perspective. In *Research Methods in Information Systems*, E.Mumford et al (eds.). Elsevier, Amsterdam.
Hirst, M. (1991a) Personal computer software for use in marketing education, Part 1. *Journal of Marketing Management*, 7, 77-92.
Hirst, M. (1991b) Personal computer software for use in marketing education, Part 2. *Journal of Marketing Management*, 7, 167-188.
Hoinville, G., Jowell, R. and Associates (1988) *Survey Research Practice*. Heinemann, 1988.
Holden, P.D. (1991) *A multiple perspective approach towards the assessment and development of expert systems in manufacturing*. Unpublished PhD dissertation, Cranfield University.
Holt, J (1988). Assessing the need for decision support systems. *European Journal of Operational Research*, 37, 73-82.
Holtham, C. (1993) Groupware in marketing. In M.H.B. McDonald, W. Hewson and H.N. Wilson (eds), op. cit.
Hooley, G.J., West, C. J. and Lynch, J.E. (1984) *Marketing in the UK: a survey of current practice and performance*. Chartered Institute of Marketing, Maidenhead.
Hopkins, D.S. (1981) *The Marketing Plan*. The Conference Board, Research Report No. 801, New York.
Hoptroff, R.G. (1992) The principles and practice of time series forecasting and business modelling using neural nets. In *Neural Computing Applications*, 1(1), Springer-Verlag, London.
Hussey, D.E. (1978) Portfolio analysis: practical experience with the directional policy matrix. *Long Range Planning*, 11, 2-8.
Iivari, J. and Karjalainen, M. (1989) Impact of prototyping on User Information Satisfaction during the IS specification phase. *Information & Management*, 17, 31-45.
Ives, B., Hamilton, S. and Davis, G.B. (1980) A framework for research in computer-based management information systems. *Management Science*, 26(9), 910-934.
Jarvenpaa, S.L. (1989) The effect of task demands and graphical format on information processing strategies. *Management Science*, 35(3), 285-303.
Jarvenpaa, S.L., Dickson, G.W. and DeSanctis, G. (1985) Methodological issues in experimental IS research: Experiences and recommendations. *MIS Quarterly*, 59 (June), 141-156.
Jenkins, A.M. (1985) Research methodologies and MIS research. In *Research Methods in Information Systems*, E. Mumford et al. (eds.). Elsevier, Amsterdam.
Jenkins, M. and McDonald, M.H.B. (1994) *Market segmentation: archetypes and research agendas*. In *Proceedings, Marketing Education Group Annual Conference*, 533-542, University of Ulster.
John, G. and Martin, J. (1984) Effects of organisational structure of marketing planning on credibility and utilization of plan output. *Journal of Marketing Research*, 21, 170-183.
Johnson, G. (1981) *The application of grounded theory to a study of corporate growth*. Working Paper 21, July, University of Aston Management Centre.
Jolson, M.A. and Rossow, G.L. (1971) The Delphi process in marketing decision making. *Journal of Marketing Research*, Nov, 443-448.

Jones, A.P. and James, L.R. (1979) Psychological climate: Dimensions and relationships of individual and aggregated work environment perceptions. *Organisational Behavior and Human Performance*, 23, 201-250.

Jones, S. (1985) The analysis of depth interviews. In *Applied Qualitative Research*, R. Walker (ed.). Gower, Aldershot.

Jung, C.G. (1964) (ed.) *Man and his symbols*. Aldus, London. Reprinted (1978) Pan, London.

Kaplan, B. and Duchon, D. (1988) Combining qualitative and quantitative methods in information systems research: a case study. *MIS Quarterly*, December, 571-586.

Keen, P.G.W. (1980) Adaptive design for decision support systems. *Data Base*, 12, 15-25.

Keen, P.G.W. and Scott Morton, M.S. (1978) *Decision Support Systems: An Organisational Perspective*. Addison-Wesley, Reading, MA.

Kerlinger, F.N. (1973) *Foundations of Behavioural Research*, 2nd edition. Holt, Rinehart and Winston, New York.

Koestler, A. (1959) *The sleepwalkers: a history of man's changing vision of the universe*. Hutchinson. Reprinted 1964 Penguin, Harmondsworth.

Kohli, A.K. and Jaworski, B.J. (1990) Market orientation: the construct, research propositions, and managerial implications. *Journal of Marketing*, 54, 1-18.

Kotler, P. (1988) *Marketing Management: Analysis, Planning, Implementation and Control*, 6th edition. Prentice-Hall, Englewood Cliffs, NJ.

Kotler, P. and Armstrong, G. (1989) *Principles of Marketing*, 4th edition. Prentice-Hall, Englewood Cliffs, NJ.

Kraemer, K.L. and King, J.L. (1988) Computer-based systems for cooperative work and group decision making. *ACM Computing Surveys*, 20(2), 115-146.

Kraemer, H.C. and Thiemann, S. (1987) *How many subjects? Statistical power analysis in research*. Sage, Newbury Park, CA.

Kuhn, T. (1970) *The structure of scientific revolutions*, 2nd edition. University of Chicago Press, Chicago.

Langfield-Smith, K. (1992) Exploring the need for a shared cognitive map. *Journal of Management Studies*, 29, 349-367.

Larcker, D.F. and Lessig, V.P. (1980) Perceived usefulness of information: A psychometric examination. *Decision Sciences*, 11, 121-134.

Larson, J.R.Jr. and Christensen, C. (1993) Groups as problem-solving units: Toward a new meaning of social cognition. *British Journal of Social Psychology*, 32, 5-30.

Lazarev, G.L. (1991) Reusability in Smalltalk: a case study. *Journal of Object-Oriented Programming*, 4(2), 11-20.

Lennox, G. (1993) An intelligent approach to integrating marketing databases with other technologies. In McDonald, M.H.B., Hewson, W. and Wilson, H.N. (eds.), op. cit.

Leppard, J.W. (1987) *Marketing Planning and Corporate Culture: a Conceptual Framework which Examines Management Attitudes in the Context of Marketing Planning*. MPhil thesis, Cranfield University.

Leppard, J.W. and McDonald, M.H.B. (1987) A re-appraisal of the role of marketing planning. *Journal of Marketing Management*, 3(2), 159-171.

Leppard, J.W. and McDonald, M.H.B. (1991) Marketing planning and corporate culture: a conceptual framework which examines management attitudes in the context of marketing planning. *Journal of Marketing Management*, 7, 213-235.

Levitt, T. (1960) Marketing myopia. *Harvard Business Review*, July/August, 45-56.

Liebowitz, J. (1986) Useful approach for evaluating expert systems. *Expert Systems*, 3(2), 86-96.

Little, J.D.C (1970) Models and managers: The concept of a decision calculus. *Management Science*, 16(8), B466-B485.

Lloyd, B. (1991) Can we measure corporate culture? *Long Range Planning*, 24(5), 128-139.

Lodish, L.M. (1981) Experience with decision-calculus models and decision support systems. In *Marketing Decision Models*, Schultz, R.L. and Zoltners, A.A. (eds.). Elsevier, Amsterdam.

Lofland, J. and Lofland, L.H. (1984) *Analysing social settings: A Guide to Qualitative Observation and Analysis*, second edition. Wadsworth, Belmont, CA.

Luconi, F.L., Malone, T.W. and Scott Morton, M.S. (1986) Expert systems: The next challenge for managers. *Sloan Management Review*, 27(4), 7-14.

Lysonski, S. and Pecotich, A. (1992) Strategic marketing planning, environmental uncertainty and performance. *International Journal of Research in Marketing*, 9, 247-255.

Macintyre, S. (1978) Some notes on record-taking and making in an antenatal clinic. *Sociological Review*, 26(3), 595-611.

Mahmood, M.A. and Sniezek, J.A. (1989) Defining decision support systems: An empirical assessment of end-user satisfaction. *INFOR*, 27(3), 253-271.

Manning, P.K. (1982) Analytic induction. In *Qualitative Methods: A handbook of social science methods*, Vol 2, R.B. Smith and P.K. Manning (eds.), 273-302. Ballinger, Cambridge, MA.

Markus, M.L. (1989) Case selection in a disconfirmatory case study. In Kraemer, K.L. (Ed.), *The Information Systems Research Challenge*, Harvard Business School, Boston, MA.

McCann, John M. (1991) Expert systems in marketing. *International Journal of Research in Marketing*, 8(1), 1-3.

McClintock, C.C., Brannon, D. and Maynard-Moody, S. (1979) Applying the logic of sample surveys to qualitative case studies: The case cluster method. *Administrative Science Quarterly*, 24, 612-629.

McColl-Kennedy, J.R., Uau, O.H.M and Kiel, G.C. (1989) *Marketing Planning Practices in Australia: A comparison across company types*. Research Paper, Graduate School of Management, The University of Queensland.

McDonald, M.H.B. (1982) *The Theory and Practice of Marketing Planning for Industrial Goods in International Markets*. Unpublished PhD dissertation, Cranfield University.

McDonald, M.H.B. (1985) Methodological problems associated with qualitative research: some observations and a case analysis in international marketing planning. *International Studies in Management and Organisation*, 15(2), 19-40.

McDonald, M.H.B. (1989a) Ten barriers to marketing planning. *Journal of Marketing Management*, 5(1), 1-18.

McDonald, M.H.B. (1989b) Marketing planning and expert systems: An epistemology of practice. *Marketing Intelligence and Planning*, 7(7/8), 16-23.

McDonald, M.H.B. (1990a) Technique interrelationships and the pursuit of relevance in marketing theory. *Quarterly Review of Marketing*, Summer, 1-11.

McDonald, M.H.B. (1990b) Some methodological comments on the directional policy matrix. *Journal of Marketing Management*, 6(1), 59-68.

McDonald, M.H.B. (1991) *The Marketing Audit: Translating Marketing Theory into Practice*. Butterworth-Heinemann, Oxford.

McDonald, M.H.B. (1992) *Strategic marketing planning*. Kogan Page, London.

McDonald, M.H.B. (1995) *Marketing plans*, 3rd edition. Heinemann, Oxford.

McDonald, M.H.B. (1996) Strategic marketing planning: theory, practice and research agendas. *Journal of Marketing Management*, 12, 5-27.

McDonald, M.H.B., Denison, T. and Ryals, L. (1994) *Marketing: The Challenge of Change*. Chartered Institute of Marketing, Maidenhead.

McDonald, M.H.B. and Dunbar, I. (1995) *Market segmentation: a step-by-step approach to creating profitable market segments*. Macmillan, Basingstoke.

McDonald, M.H.B., Hewson, W. and Wilson, H.N. (eds) (1993) *Emerging Information Technologies - A Marketing Opportunity*. HCG Publications, Milton Keynes.

McDonald, M.H.B. and Wilson, H.N. (1990) State-of-the-art developments in expert systems and strategic marketing planning. *British Journal of Management*, 1, 159-170.

McDonald, M.H.B and Wilson, H.N. (1993) Why apply software to marketing strategy? Mapping the sources of competitive advantage. In M.H.B. McDonald, W. Hewson and H.N. Wilson (eds), op. cit., 92-97.

McDonald, M.H.B., Wilson, H.N. and Hewson, W. (1996) *Towards excellence in marketing strategy: the role of systems in strategic marketing and business planning*. HCG Publications, Milton Keynes.

McKiernan, P. and Morris, C. (1994) Strategic planning and financial performance in UK SMEs: Does formality matter? *British Journal of Management*, 5(Special Issue, June), S31-S41.

McNamee, P. and McHugh, M. (1991) Modelling strategic management: A hierarchical approach. *International Journal of Information Resource Management*, 2(2), 3-15.

McNeilly, M. and Gessner, S. (1993) Business Insight: An expert system for strategic analysis. *Planning Review*, March/April.

Meador, C.L. and Keen, P.G.W. (1984) Setting priorities for DSS development. *MIS Quarterly*, June, 117-128.

Mercer, D. (1995) *Marketing*. Blackwell, Oxford.

Meidan, A. (1984). *Bank Marketing Management*. Macmillan, London.

Meldrum, M.J., Ward, K. and Srikanthan, S. (1987) Needs, issues and directions in the Marketing Accountancy divide. *Quarterly Review of Marketing*, Spring/Summer, 5-12.

Meyer, B. (1992) The new culture of software development: Reflections on the practice of object-oriented design. In *Advances in object-oriented software engineering*, Mandrioli, D. and Meyer, B. (eds.), Prentice-Hall, Hemel Hempstead.

Meyer, J. (1994) A scenario of computer integrated marketing. *Marketing and Research Today*, August, 202-212.

Miles, M.B. and Huberman, A.M. (1994) *Qualitative data analysis: an expanded sourcebook*, 2nd ed. Sage, Thousand Oaks, CA.

Miller, S.I. (1982) Quality and quantity: Another view of analytic induction as a research technique. *Quality and Quantity*, 16, 281-295.

Mingers, J. and Adlam, J. (1989) Where are the 'real' expert systems? *OR Insight*, 2, 6-9.

Mintzberg, H. (1979) An emerging strategy of "direct" research. *Administrative Science Quarterly*, 24, 582-589.

Mohr, L.B. (1985) The reliability of the case study as a source of information. *Advances in Information Processing in Organisations*, 2, 65-93.

Money, A., Tromp, D. and Wegner, T. (1988) The quantification of decision support benefits within the context of value analysis. *MIS Quarterly*, June, 223-236.

Montazemi, A.R. (1988) Factors affecting information satisfaction in the context of the small business environment. *MIS Quarterly*, June, 239-256.

Morgan, N.A. and Piercy, N.F. (1993) Increasing planning effectiveness. *Management Decision*, 31(4), 55-58.

Moriarty, R.T. and Swartz, G.S. (1989) Automation to boost sales and marketing. *Harvard Business Review*, 67(1), 100-108.

Morris, M.H., Burns, A.C. and Avila, R.A. (1989) Computer awareness and usage by industrial marketers. *Industrial Marketing Management*, 18(3), 223-232.

Moscovici, S. and Zavalloni, M. (1969) The group as a polarizer of attitudes. *Journal of Personality and Social Psychology*, 12(2), 125-135.

Moser, C.A. and Kalton, G. (1971) *Survey Methods in Social Investigation*, 2nd edition. Heinemann, London.

Moutinho, L. and Paton, R. (1988) Expert systems: A new tool in marketing. *Quarterly Review of Marketing*, Summer, 5-13.

Mumford, E. (1988) Designing computer based systems. *University of Wales Review Business and Economics*, 3.

Newing, R. (1995) Marketing Director: marketing made easy. *Management Consultancy*, April.

Norusis, M.J. (1993) *SPSS for Windows Base System User's Guide*, release 6.0. SPSS Inc, Chicago, IL.

Nunamaker, J.F., Applegate, L.M and Konsynski, B.R. (1987) Facilitating group creativity: Experience with a group decision support system. *Journal of Management Information Systems*, 3(4), 5-19.

Nunamaker, J.F., Applegate, L.M. and Konsynski, B.R. (1988) Computer-aided deliberation: Model management and group decision support. *Operations Research*, 36(6), 826-848.

Nunnally, J.C. (1967) *Psychometric Theory*. McGraw-Hill.

O'Brien, R.C. (1991) EIS and strategic control. *Long Range Planning* 24(5), 125-127.

Ohmae, K. (1983) *The Mind of the Strategist*. Penguin, Harmondsworth.

O'Keefe, R.M. (1989) The evaluation of decision-aiding systems: guidelines and methods. *Information and Management*, 17, 217-226.

Oppenheim, C. (1993) On line information retrieval. In McDonald, M.H.B., Hewson, W. and Wilson, H.N. (eds), op. cit.

Papadakis, V.M. (1995) The contribution of formal planning systems to strategic investment decisions. *British Journal of Management*, 6, 15-28.

Parker, D. (1995) Privatization and agency status: identifying the critical factors for performance improvement. *British Journal of Management*, 6, 29-43.

Patton, M.Q. (1987) *How to use qualitative methods in evaluation*. Sage, Newbury Park, CA.

Patton, M.Q. (1990) *Qualitative evaluation and research methods*, 2nd edition. Sage, Newbury Park, CA.
Pennington, N. and Hastie, R. (1988) Explanation-based decision making: Effects of memory structure on judgement. *Journal of Experimental Psychology*, 14(3), 521-533.
Perry, C. and Euler, T. (1989) Marketing simulations in tertiary institutions: A review and future directions. *European Journal of Marketing*, 23(4), 40-49.
Peterson, C.R. (1994) Software review: HIVIEW. *OR/MS Today*, April.
Phillips, D. (1993) Abbey National Direct - Creating a future with information and marketing technology. In McDonald, M.H.B., Hewson, W. and Wilson, H.N. (eds.), op. cit.
Phillips, L. (1989) People-centred group decision support. In *Knowledge-based management support systems*, Doukidis, G.I., Land, F. and Miller, G. (eds.), 208-224. Ellis Horwood, Chichester.
Piercy, N.F. (1984) New information technology and marketing systems. In *The management implications of new information technology*, Piercy, N.F. (ed.), 263-283. Croom Helm, London.
Piercy, N.F. (1986) Marketing asset accounting: Scope and rationale. *European Journal of Marketing*, 20(1), 5-15.
Piercy, N.F. (1989) Information control and the power and politics of marketing. *Journal of Business Research*, 18, 229-243.
Piercy, N.F. and Cravens, D.W. (1995) The network paradigm and the marketing organization: Developing a new management agenda. *European Journal of Marketing*, 29(3), 7-34.
Piercy, N. F. and Giles, W. (1989) The logic of being illogical in strategic marketing planning. *Journal of Marketing Management*, 5(1), 19-31.
Piercy, N.F. and Morgan, N.A. (1991) Internal marketing - the missing half of the marketing programme. *Long Range Planning*, 24(2), 82-93.
Piercy, N. F. and Morgan, N.A. (1994) The marketing planning process: behavioral problems compared to analytical techniques in explaining marketing plan credibility. *Journal of Business Research*, 29, 167-178.
Piersol, K.W. (1986) Object oriented spreadsheets: The Analytic Spreadsheet Package. *Proceedings, ACM OOPSLA '86 Conference*, 385-390. ACM, New York.
Pinfield, L.T. (1986) A field evaluation of perspectives on organizational decision making. *Administrative Science Quarterly*, 31, 365-388.
Pinsonneault, A. and Kraemer, K.L. (1989) The impact of technological support on groups: An assessment of the empirical research. *Decision Support Systems*, 5, 197-216.
Piper, J. and Smith, G. (1990) Developing marketing planning in reality. *Marketing Intelligence and Planning*, 8(2), 28-34.
Porter, M.E. (1980a) *Competitive Strategy: Techniques for Analysing Industries and Competitors*. Free Press, New York.
Porter, M.E. (1980b) *The Business of Excellence*. Channel 4 Television, London. Quoted in Cronshaw et al (1994), op. cit.
Porter, M.E. (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*. Free Press, New York.

Proctor, R.A. (1992) Marketing decision support systems: a role for neural networking. *Marketing Intelligence and Planning*, 10(1), 21-26.
Proctor, R.A. (1995) Marketing planning: a computer assisted approach. *Marketing Intelligence and Planning*, 13(7), 7-12.
Proctor, R.A. and Kitchen, P.J. (1990) Strategic planning: an overview of product portfolio models. *Marketing Intelligence and Planning*, 8(7), 4-10.
Rangaswamy, A., Eliashberg, J., Burke, R.R. and Wind, J. (1989) Developing marketing expert systems: an application to international negotiations. *Journal of Marketing*, 53 (Oct), 24-39.
Rangaswamy, A., Harlam, B.A. and Lodish, L.M. (1991) INFER: An expert system for automatic analysis of scanner data. *International Journal of Research in Marketing*, 8(1), 29-40.
Rao, V.S. and Jarvenpaa, S.L. (1991) Computer support of groups: Theory-based models for GDSS research. *Management Science*, 37(10), 1347-1362.
Reichheld, F.F. and Sasser, W.E. Jr. (1990) Zero defections: Quality comes to services. *Harvard Business Review*, Sept/Oct, 105-111.
Reid, D.M. and Hinkley, I.C. (1989) Strategic planning: The cultural impact. *Marketing Intelligence and Planning*, 7(11/12).
Rieple, A. (1994) Managerial attributes - experience, behaviour and values: the case of a company that wanted to grow and failed. *Proceedings of British Academy of Management Annual Conference*, Management School, Lancaster University, 525-527.
Rita, P. (1991) Expert systems and marketing strategy: An application to portfolio management decisions in tourism. In *Preparing Marketing for the New Millenium*, 24th Annual Conference of the Marketing Education Group, Cardiff.
Ritchie, I. (1993) Hypertext: Navigating the information explosion. In M.H.B.McDonald, W. Hewson and H.N.Wilson (eds.), op. cit.
Robinson, W.S. (1951) The logical structure of analytic induction. *American Sociological Review*, 821-818.
Roethlisberger, F.J. and Dickson, W.J. (1939) *Management and the worker*. Harvard University Press, Cambridge, MA. Quoted and reviewed in Gill and Johnson (1991), op. cit.
Rothenberg, J. (1975) Cost-benefit analysis: A methodological exposition. In *Handbook of Evaluation Research*, Guttentag, M and Struening, E.L. (eds.). Sage, Beverly Hills, CA.
Rutman, L. and Mowbray, G. (1983) *Understanding program evaluation*. Sage, Newbury Park, CA.
Sainfort, F.C., Gustafson, D.H., Bosworth, K. and Hawkins, R.P. (1990) Decision support systems effectiveness: Conceptual framework and empirical evaluation. *Organisational Behavior and Human Decision Processes*, 45, 232-252.
Sanders, G.L. (1984) MIS/DSS success measure. *Systems, Objectives, Solutions*, 4, 29-34.
Sanders, G.L. and Courtney, J.F. (1985) A field study of organizational factors influencing DSS success. *MIS Quarterly*, March, p77-92.
Saunders, J. (1995) Invited comment on the market segmentation content of 'A critical review of research in marketing'. *British Journal of Management*, 6(S), S89-S91.

Scriven, M. (1972) Pros and cons about goal-free evaluation. *Evaluation Comment*, 3, 1-7.
Scriven, M. (1976) Maximising the power of causal investigations: The modus operandi method. In *Evaluation Studies Review Annual*, G.V. Glass (ed.), 101-118. Sage, Beverly Hills, CA.
Sethi, V. and King, W.R. (1991) Construct measurement in information systems research: An illustration in strategic systems. *Decision Sciences*, 22, 455-472.
Shadish, W.R. Jr., Cook, T.D. and Leviton, L.C. (1991) *Foundations of Program Evaluation: Theories of Practice*. Sage, Newbury Park, CA.
Sharda, R., Barr, S.H. and McDonnell, J.C. (1988) Decision support system effectiveness: A review and an empirical test. *Management Science*, 34(2), 139-159.
Sharp, B. (1991) Competitive marketing strategy: Porter revisited. *Marketing Intelligence and Planning*, 9(1), 4-10.
Shaw, R. (1991) *The sales and marketing systems report*. Shaw Consulting, London.
Shaw, R. (1994) *How to transform marketing through IT*. Business Intelligence, London.
Shipley, D.D. (1985) Marketing objectives in UK and US manufacturing companies. *European Journal of Marketing*, 19(3), 48-56.
Shlaer, S. and Mellor, S.J. (1992). An object-oriented approach to domain analysis. In *Advances in object-oriented software engineering*, Mandrioli, D. and Meyer, B. (eds.), Prentice-Hall, Hemel Hempstead.
Smith, G. (1985) *Assessing day care: a study in organisational evaluation*. Open University Press, Milton Keynes.
Smith, N.C. (1991) The context of doctoral research. In *The Management Research Handbook*, Smith, N.C. and Dainty, P. (eds.). Routledge, London.
Smith, S.M. (1987) *PC-MDS User Manual*. Department of Marketing, Brigham Young University, Provo, Utah.
Snitkin, S.R. and King, W.R. (1986) Determinants of the effectiveness of personal decision support systems. *Information & Management*, 10, 83-89.
Speed, R.J. (1989) Oh Mr Porter! A re-appraisal of Competitive Strategy. *Marketing Intelligence and Planning*, 7(5/6), 8-11.
Srikanthan, S., Ward, K. and Meldrum, M. (1987) Segment profitability: a positive contribution. *Management Accounting*, April, 27-30.
Srikanthan, S., Ward, K. and Neal, R. (1989) *The strategic use of brand valuations: the real issue of brand accounting*. Working Paper No. 45/89, Cranfield School of Management.
Stabell, C.B. (1986) *Decision Support Systems: Alternative Perspectives and Schools*. Working Paper No. 1986/6, Norwegian School of Management, Oslo.
Stasch, S.F. and Lanktree, P. (1980) Can your marketing planning procedures be improved? *Journal of Marketing*, 44(3), 79-90.
Stefik, M., Bobrow, D.G., Mittal, S. and Conwy, L. (1983) Knowledge programming in Loops: Report on an experimental course. *AI Magazine*, Fall, 3-13.
Straub, D.W. (1989) Validating instruments in MIS research. *MIS Quarterly*, June, p147-189.
Strauss, A. and Corbin, J. (1990) *Basics of Qualitative Research*. Sage, Newbury Park, CA.

Stone, R.W. and Good, D.J. (1995) Expert systems in the marketing organisation. *Industrial Management and Data Systems*, 95(4), 3-7.
Stouffer, S.A. (1930) *Experimental comparison of statistical and case history methods in attitude research*. Unpublished PhD dissertation, University of Chicago. Quoted in Manning, P.K. (1982), op. cit.
Tam, P. P. (1990) *Expert Systems in Marketing - A Prototype System in Test Marketing*. MBA Thesis, Cardiff Business School, University of Wales College of Cardiff, October.
Thomas, D. (1989) What's in an object? *Byte*, March, 228-240.
Toraskar, K.V. (1991) How managerial users evaluate their decision-support? A grounded theory approach. In *Information Systems Research: Contemporary approaches and emergent traditions*, H.-E. Nissen, H.K. Klein and R. Hirschheim (eds.). Elsevier, Amsterdam.
Trigg, R.H., Suchman, L.A. and Halasz, F.G. (1986) Supporting collaboration in NoteCards. In *Proceedings, Conference on Computer Supported Cooperative Work*, Austin, Texas, Dec 3-5. ACM, New York.
Tull, D.S. and Hawkins, D.I. (1984) *Marketing research: measurement and method*, 3rd ed. Macmillan, New York, NY.
Turner, B.A. (1981) Some practical aspects of qualitative data analysis: One way of organising the cognitive processes associated with the generation of grounded theory. *Quality and Quantity*, 15, 225-247.
Van Horn, H.H. (1990) *The telecom planner - a training tool for a collaborative approach to integrating telecommunications into the business plan*. Unpublished PhD dissertation, The Union Institute, Cincinnati, Ohio.
Vitalari, N.P. (1985) The need for longitudinal designs in the study of computing environments. In *Research Methods in Information Systems*, E. Mumford et al. (eds.), Elsevier, Amsterdam.
Vogel, D. and Nunamaker, J. (1990) Group decision support system impact: multi-methodological exploration. *Information and Management*, 18, 15-28.
Vogt, W.P. (1993) *Dictionary of Statistics and Methodology: A non-technical guide for the social sciences*. Sage, London.
Waalewijn, P. and Boulan, R. (1990) Strategic planning on a personal computer. *Long Range Planning*, 23(4), 97-103.
Ward, K., Srikanthan, S. and Neal, R. (1989) Life-cycle costing in the financial evaluation and control of products and brands, *Quarterly Review of Marketing*, Autumn, 1-7.
Ward, K., Srikanthan, S. and Neal, R. (1991) *Marketing investment analysis: the critical success factors for financially evaluating and effectively controlling marketing investment decisions*. Working Paper No. 7/91, Cranfield School of Management, Cranfield University.
Warren, C. (1990) Marketing "EXMAR". Unpublished MMP Assignment for MBA.
Watson, T.J. (1994) Managing, crafting and researching: Words, skill and imagination in shaping management research. *British Journal of Management*, 5 (Special Issue, June), S77-S87
Wensley, R. (1994) Making better decisions: The challenge of marketing strategy techniques. *International Journal of Research in Marketing*, 11, 85-90.

Wensley, R. (1995) A critical review of research in marketing. *British Journal of Management*, 6 (Special Issue), S63-S82.
Wiley, J.B. (1989) Four time series analysis packages. *Journal of Marketing Research*, Feb, 129-133.
Williams, R.C. (1970) *An exploration of the change agent and client system relationship in planned organisational change*. MSc thesis, Loughborough University. Quoted in Leppard and McDonald (1991).
Wilson, H.N. (1989) EXMAR: automating marketing planning. *Proceedings, Fifth International Expert Systems Conference*, June. Learned Information, London, 157-168.
Wilson, H.N. (1990) Hypertext: Extending the software toolbox to assist information workers. *Software Tools 90 Conference*, London, June. Learned Information, London.
Wilson, H.N. and McDonald, M.H.B. (1994a) Decision support systems as learning aids: The case of marketing planning. Refereed paper, *Proceedings of the Marketing Education Group Annual Conference*, University of Ulster, 1028-1037.
Wilson, H.N. and McDonald, M.H.B. (1994b) Critical problems in marketing planning: The potential of decision support systems. *Journal of Strategic Marketing*, 2, 249-269.
Wilson, H.N. and McDonald, M.H.B. (1996) Computer aided marketing planning: the experience of early adopters. Accepted for *Journal of Marketing Management*, scheduled for publication in Vol 12(5).
Wind, Y. (1981) Marketing oriented strategic planning models. In *Marketing Decision Models*, Schultz, R.L and Zoltners, A.A. (eds.), 207-250. Elsevier, Amsterdam.
Wind, Y. and Saaty, T.L. (1980) Marketing applications of the Analytic Hierarchy Process. *Management Science*, 26(7), 641-658.
Winer, L. (1966) A profit-oriented decision system. *Journal of Marketing*, 30, 38-44.
Wood-Harper, T. (1985) Research methods in information systems: Using action research. In *Research Methods in Information Systems*, E. Mumford et al. (eds.). Elsevier, Amsterdam.
Wright, G. and Rowe, G. (1992) Expert systems in marketing: Current trends and an alternative scenario. *Marketing Intelligence and Planning*, 10(6), 24-30.
Yin, R.K. (1984) *Case study research: design and methods*. Sage, Newbury Park, CA.
Yin, R. K. (1989) Research design issues in using the case study method to study management information systems. In *The Information Systems Research Challenge*, Kraemer, K.L. (ed.), 1-6. Harvard Business School, Boston, MA.
Zmud, R.W. and Boynton, A.C. (1991) Survey measures and instruments in MIS: Inventory and appraisal. In *The Information Systems Research Challenge*, vol 3, K.L. Kraemer (ed.). Harvard Business School, Boston, MA.
Znaniecki, F. (1934) *The Method of Sociology*. Holt, Rinehart and Winston, New York. Reprinted 1968, Octagon, New York.