



The University of Manchester

**Strategic Investment Decisions and
Investment Appraisal in UK Companies**

A thesis submitted to the University of Manchester for the degree of Doctor of
Philosophy in the Faculty of Humanities

2004

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List of Abbreviations

ABC	Activity-Based Costing.
AMT	Advanced Manufacturing Technology.
ARR	Accounting Rate of Return.
BDE	Business Development Executive.
CAPM	Capital Assets Pricing Model.
CFO	Chief Finance Officer.
CIMA	Chartered Institute Management Accountants.
DCF	Discounted Cash Flow.
FAME	Financial Analysis Made Easy
IATs	Investment Appraisal Techniques.
IRR	Internal Rate of Return.
IT	Information Technology.
NPV	Net Present Value.
NUDIST	Non-numerical Unstructured Data Indexing Searching and Theorizing
PB	Payback.
R&D	Research and Development.
ROA	Real Options Approach.
ROI	Return on Investment.
SMA	Strategic Management Accounting.

Abstract

One strand in the current debate on strategic investment emphasises technical aspects of investment appraisal. Another call is for a focus on wider decision-making processes and strategic considerations. This study seeks to merge both sets of concerns, based on an empirical study of strategic investment decisions and investment appraisal in large UK companies.

This thesis offers a multidisciplinary perspective on strategic investment decision-making and investment appraisal; it integrates what is said about strategic investment decisions and investment appraisal within the disciplines of Finance, Management Accounting, Strategic Management Accounting and Strategic Management. The insights of these disciplines are clearly capable of informing one another. What one discipline ignores in regard to investment decision-making, the other disciplines may illuminate. This thesis examines the way strategic investment decisions are made and the factors influencing the decision-making process. It explores the linkages between the process of strategic investment decision-making and the context in which these decisions are taken and incorporates characteristics of the strategic decision-making process and contextual factors in integrated models.

The empirical testing was based on 320 companies drawn from eight different manufacturing groups operating in UK. The empirical analysis yields several findings:

1. Strategic investment decisions are concurrent with the long-term strategic direction of an organisation. The use of authority is a major feature of how people influence decision-making. Capital expenditure limits at different hierarchical levels were among the traditional accounting-based control systems most frequently used to guide the investment decision process.
2. The study corroborates the contingency view of strategic investment decision-making; each contextual dimension contributes to describing strategic investment decision-making. According to this perspective, there is no universal model that explains processes of strategic investment decision-making because it varies according to the contextual factors and situations in which the organization operates.
3. Practitioners rely heavily on the computational approach to making strategic investment decisions. This implies careful step-by-step planning and the use of calculations and algorithms to compute an optimal solution before taking any action. It is noticeable that the use of computation, specifically the use of NPV, IRR and PB calculations provide the leading quantitative methods of assessing major investment projects. Practitioners attach the highest importance to DCF techniques (NPV and IRR). Sophisticated financial analyses go some way towards assisting strategic investment decisions but cannot alone provide the answers. Decision-makers use these financial tools together with strategic considerations.
4. Decision-makers adopt 'holistic' approaches incorporating both financial and strategic considerations in the evaluation of strategic investment proposals. Experienced decision-makers also use judgement and intuition, and are not just technocrats anchored on financial calculations. This suggests that strategic investment decision-making is neither an art nor a science but both. There is enough science that decision-makers are not left to rely exclusively on experience, but there is enough art that without experience and judgment, real success may not be attained.

Declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Mohamed Fadi Alkaraan

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Acknowledgements

I would like to acknowledge my deepest debt of gratitude to my supervisors, **Professor Trevor Hopper**, and **Professor Ted O'Leary** for their guidance throughout the stages of my PhD. They were always there to help me whenever I need them. Without their continuous assistance and encouragement, this thesis could not have been completed. My thanks cannot be expressed in words and I will remember the time that we were working together. I also thank **Professor Deryl Northcott** for co-supervising this thesis for two years. Besides my supervisors, I would like to express my gratitude to **Professor Richard Pike** of Bradford University for his invaluable comments all through the stages of my thesis.

In addition, I thank all academics and professionals who provided any kind of feedback on the design of the research strategy used in this study include Professor Bob Scapens, Dr John Burns, Professor Martin Walker, Professor Karel Williams, and Professor Norman Strong of Manchester University through the *PhD Committee*. Professor Stuart Turley of Manchester University and Professor Andrew Stark of Manchester Business School on the paper I presented to *The BAA -ICAEW Doctoral Colloquium*. I thank Dr Magdy Gamal Abdel-Kader of Essex University, Dr Hassan Yazdifar of Sheffield University, and all my colleagues who provided any kind of feedback on my research include Haitham Nobanee. Thanks are also due to all the administrative staff of School of Accounting and Finance and especially, Irene Kelly, Hilary Garraway, Helen McManamon, Margaret Nelson, April Pepper, Fiona Ward, and Nicola Lord.

I also thank all the participants in this research, including the individuals interviewed and the respondents to the questionnaire survey, for giving up some of their valuable time to participate in the study and provide valuable information that enriched the study's results. I thank them all specially Guy Elliott (*Group Finance Director of Rio Tinto Plc*), David Paterson (*Business Development Executive-Rio Tinto Plc*), Doug Robertson (*Group Finance Director of Britax International Plc*), Paul Jennings (*Vice President Group Finance Director of Octel International Limited*), Ken Lever (*Group Finance Director of Tomkins Plc*), Peter Whitehead (*Group Finance Director of Young & Co.'s Brewer Plc*), John Cole (*Vice President Corporate*

Finance and Taxation of AstraZeneca International), Julian Schild (Chairman Finance Director of Huntleigh Technology Plc) and Jez Maiden (Group Finance Director of British Vita Plc)

I am grateful to The University of Aleppo for sponsoring my PhD studies. I would also like to thank the Manchester School of Accounting and Finance for the financial support to conduct this study and giving me the chance to teach at the school for three years, providing me with both financial support and valuable work experience.

I would like to express my gratitude to my father for his endless support, my wife, Orouba. Without their understanding, moral support and encouragement, it would have been very difficult for me complete this research. I would like to thank my daughter Tarteel for the cheerful time allowing me much relief from the stress of PhD work.

Dedication

I dedicate this work to
My dearest Parents,
My endless love Orouba my wife
And Tarteel my daughter

Chapter One

Introduction

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Chapter One

Introduction

Strategic investment decisions are worthy of study because they are of considerable importance to an organisation, given that they usually imply a significant commitment of resources and have a profound impact on the organisation and its long-term performance. Since the consequences of strategic investment decisions are important to organisations and the expectations of investors, managers should be aware of investment appraisal techniques and the consequences of their use.

Decision-making in organisations is often pictured as a coherent and rational process in which alternative interests and perspectives are considered in an orderly manner until the optimal alternative is selected, yet real decision processes in organisations seldom fit such a description (Shapira, 2002). Management accounting research in the area of investment decision-making from the 1970s has tended to see investment decision-making as a process of investigation which occurs at many points in the organisation, and which is spread out over time, from “triggering” and “recognition” of a problem through to a fuller “definition” of an investment proposal, as it is eased through the system to formal appraisal and ultimate acceptance by higher management (King, 1975; Butler *et al*, 1993; Dempsey, 2003). The process typically is seen to involve available information,

general strategic considerations, and environment factors, together with qualitative judgements. Therefore, some researchers considered that although financial analysis techniques might constitute a framework on which to formalise investment decisions, the techniques were unlikely to determine the decision outcomes. Carr *et al.*, (1994) argued that quantitative accounting control systems may fail entirely to connect with the kind of successful investment decision-making that is required to bring real success.

One strand in the current debate on strategic investment emphasises technical aspects of investment appraisal. Another call is for a focus on wider decision-making processes and strategic considerations. This study seeks to merge both sets of concerns, based on an empirical study of strategic investment decisions and investment appraisal in large UK companies.

This thesis examines the way strategic investment decisions are made and the factors influencing the decision-making process. It brings together cognitive and organisational aspects of the decision-making process, drawing on the tradition of Herbert Simon, who studied the pervasive use in organisational decision-making of bounded rationality and the heuristics of reasoning. The study offers a multidisciplinary perspective on strategic investment decision-making and investment appraisal; it integrates what is said about strategic investment decisions and investment appraisal within the disciplines of Finance, Management Accounting, Strategic Management Accounting and Strategic Management.

The insights of these disciplines with regard to organisational decision-making are clearly capable of informing one another. What one discipline ignores in regard to investment decision-making, the other disciplines may illuminate. More recent developments across the research agendas of these disciplines indicate an increasingly strong interrelationship between them (Dempsey, 2003)¹. For example, the linking of real options theory in Finance with strategic options offers an interface between Finance and Strategic Management.

It is thus hoped that this study will contribute towards enriching our understanding of strategic investment decision-making and investment appraisal.

¹ Dempsey (2003) points out that while our understanding of corporate investment decision-making must continue to be nourished by the interplay of the various disciplines that it invokes, it appears that such disciplines will continue to protect their particular concerns, methodologies and other distinctive dimensions.

This introductory chapter provides a brief summary of (1) theoretical framework, (2) the justification of the study, (3) research objectives, (4) research strategy, (5) data collection, (6) data analysis and (7) the structure of the thesis.

1.1. Theoretical framework

The rational/technical approach assumes a pre-set goal and that alternatives are mutually exclusive and easily identified. In spite of some useful insights, the rational model of decision-making ignores the social, economic and political context in which organisations operate. Scholars using a case study approach (e.g. Butler *et al.*, 1993) show that the strategic investment decision process is a complex, lengthy and incremental one, in which earlier activities and choices are crucial. A leader of logical incrementalism, Quinn (1978, 1980), argues that strategic decisions are not just the result of power within the organisation: both power relationships and rational analysis affect the outcomes. This suggests that strategic investment decision-making processes may be better described as following an incremental/adaptive framework, rather than other models (e.g. the rational). According to this framework, the setting of objectives and the generating of alternatives are not separate but emerge simultaneously. Decision makers do not have all the information they need; yet they act deliberately. Decision makers who use their experience to generate alternatives are confident of likely consequences, and effective decisions are consistent with the overall strategy of the organisation. An incremental/adaptive model reflects a realistic approach to the complexities and uncertainties associated with strategic investment decision-making processes. It assumes that uncertainty and scarce information are the rule, not the exception, and because choices are uncertain, decision makers are always prepared to reverse their decisions if the results are inconsistent with corporate strategy. This framework draws upon Quinn (1978, 1980), Mintzberg (1978), Tomkins (1991), Hitt and Tyler (1991) and Papadakis (1993).

On the other hand, this study is largely based on a sub-part of organisational theory, contingency theory, which is still regarded as highly technical and

functional in its approach (Hopper and Powell, 1985). The cornerstone of contingency theories of decision-making is that there is no universally acceptable model that explains the diversity of organisational decision-making, because organisational design depends on contingent or contextual factors relevant to the situation, so that decision-making processes will vary accordingly.

1.2. The justification of the study

The major motivation underlying this study is to achieve an enhanced understanding of strategic investment decision-making and investment appraisal. Other interests may be briefly described as follows:

1. Financial appraisal techniques have received much attention in the normative literature (Klammer, 1972 and 1973; Scapens and Sale, 1981; Klammer and Walker, 1984; Scapens and Sale, 1985; Klammer *et al.*, 1991; Kim and Farragher, 1981; Pike, 1982, 1983 and 1988; Pike and Wolf 1988; and Arnold and Hatzopoulos, 2000). Most previous research on capital budgeting practice focuses on the rational economic analysis of investment proposals and ignores the dependence of investment decisions upon organisational context. These studies concentrate on techniques used in evaluation and reveal, for example, that capital budgeting techniques have become more popular during the past decades and that DCF methods and the payback period are the most popular techniques. However, they ignore the importance of non-financial factors. Researchers have drawn attention to the need to consider benefits resulting from modern flexible manufacturing systems. The "intangible" benefits generated by investments in advanced manufacturing technology are difficult to evaluate using conventional financial techniques, where empirical examination of strategic factors affecting strategic investment decision-making are notably absent (Fredrickson, 1985). Yet it is clear that strategic investments involve qualitative processes of judgement, negotiation, and inspiration (Butler *et al.*, 1991 and Pike and Neale, 2003).

2. Traditional capital budgeting theory may be appropriate for an economic environment in which competition is for specific product lines or specific markets (Mouck, 2000) but, in today's complex economic environment, this theory is no longer applicable. Competitors move quickly in and out of products, customers' wants and needs change rapidly, and neither markets nor competitors can any longer be clearly defined. Hence, the emphasis of capital budgeting should shift to a capabilities perspective, focusing on the processes of exploration and adaptation (Stalk *et al.*, 1992).
3. This study answers the call by some researchers (e.g. Arnold and Hatzopoulos, 2000) for further research on strategic investment in its organisational context. Important factors considered include identification of investment opportunities, the development of proposals into projects and early screening to ensure that they are compatible with strategy.
4. During the last two decades, a considerable body of literature has emerged on organisational decision-making in general and strategic decision-making in particular but our knowledge of the latter is mostly normative or descriptive and remains untested (Fredrickson, 1984; Papadakis, 1993).
5. Researchers (e.g. Nutt, 1984; Fredrickson, 1985; Lyles and Thomas, 1988; Bourgeois and Eisenhardt, 1988; and Eisenhardt and Zbaracki, 1992) have argued that little attention has been directed toward empirical studies of organizational decision-making. Most of the notable works on strategic investment decisions are based on small-sample case-study explorations. To our knowledge, with the exception of Papadakis (1993), there exists no other large-scale empirical research attempting to quantitatively assess the influence of contextual factors on strategic investment decision-making. Furthermore, the empirical testing of Papadakis's study (1993) was limited to industrial companies operating in Greece.

1.3. Research objectives

The main aim of this empirical study is to contribute to the literature on strategic investment decision-making, in response to calls by several academic researchers (e.g. Slagmulder *et al.*, 1995; Tomkins and Carr, 1996; Abdel-Kader and Dugdale, 1998; Papadakis *et al.*, 1998; Arnold and Hatzopoulos, 2000 and Adler, 2000) further research on this topic. It covers four broad areas: (1) the strategic investment decision-making process, (2) conventional investment appraisal techniques, (3) strategic factors (non-financial investment criteria), and (4) strategic methods for appraising strategic investment projects.

Particular attention is paid to the following research questions:

- 1) To what extent do decision makers rely on financial evaluation techniques and to what extent do they rely on standard capital budgeting methods to justify them?
- 2) What are the differences, if any, between investment appraisal techniques used when evaluating strategic investments and those used in non-strategic investments?
- 3) How do financial decision-makers in U.K. companies analyse the external environment, including information about markets? How is non-financial information taken into account?
- 4) To what extent are recently developed analytical techniques (e.g. the application of real option valuation theory, benchmarking, and the balanced scorecard) employed in the evaluation of strategic investment decisions?
- 5) To what extent do decision makers use their experience, intuition and judgement when making strategic investment decisions? To what extent does strategy formulation shape strategic investment decision-making processes?
- 6) To what extent do contextual factors influence strategic investment decision-making processes?

The underlying hypothesis of this research is that strategic investment decision-making processes can be viewed as the interplay of multiple perspectives (e.g.

procedural rationality, strategy formulation and political behaviour). Support for this is widespread, either implicitly or explicitly, in the literature on management accounting, strategic management accounting and strategic management.

This study brings together several strands of existing work, namely:

1. Tomkins (1991), who provides a framework for understanding effective corporate resource allocation decisions. He attempts to draw together the key strands to create a multi-disciplinary model capable of describing how a range of business disciplines must come together in this crucial area.
2. Hitt and Tyler (1991), who examine decision-making by U.S. managers, and find that internal and external environmental factors explain the largest part of the variance in strategic decisions. Also, Papadakis (1993), who examines the linkages between the process of strategic decision-making and the context in which decisions are taken. His study is based on a sample drawn from 38 industrial enterprises operating in Greece.
3. Butler *et al.* (1993), who examine strategic investment decisions in a wide range of UK companies. Their perspective is one of organisational decision-making theory, which addresses the importance of qualitative factors (i.e. factors relating to judgement, negotiation and inspiration).
4. Van Cauwenbergh *et al.*, who investigate the role and function of formal analysis in strategic investment decision-making processes in Belgium.
5. Slagmulder *et al.* (1995) and Abdel-Kader and Dugdale (1998), who examine capital budgeting practices for strategic investments in AMT and address the importance of non-financial criteria.
6. Northcott (1998) who examine capital investment decision-making as an integral part of the strategic and operational functioning of an organisation. Her study focuses on behavioural and organisational aspects of capital investment decision-making. She concludes that there is a clear dearth of empirical information relating to qualitative aspects of capital investment decisions.
7. Arnold and Hatzopoulos (2000) who argue that attention would be better directed to the organisational context of decision-making, taking into consideration such factors as identification of investment opportunities,

the development of proposals into projects and the screening of proposals at an early stage to ensure a close fit with strategy.

While the above-mentioned studies may not replicate topic considering in this research, the characteristics they identify are nevertheless relevant to this study

1.4. Research strategy

In choosing amongst the different methodological approaches that can be used in studying organisational decision-making processes, it is important to bear in mind the research questions set out in 1.2 above. The problem that faces social science researchers, including those in the accounting and finance disciplines, is establishing the most appropriate research strategy to reflect both the validity and the credibility of the conclusions of a given investigation. Ryan *et al.* (2002) argue that the selection of an appropriate methodology should consider the ontological and epistemological assumptions which underline a research problem. According to Hopper and Powell (1985), a useful framework for grouping paradigms applied in the social sciences consisting of two dimensions. The first concerns assumptions about the nature of social science and particularly how reality is perceived and knowledge obtained. The second dimension is society itself, as the scope of the research could cover factors maintaining the social order or those tending to change it. These two independent dimensions are combined to form four mutually exclusive frames of reference: (1) functionalist, (2) interpretive, (3) radical humanist and (4) radical structuralist (Hopper and Powell, 1985, p. 431). Each paradigm makes its own assumptions which distinguish it from other paradigms and are considered to be fundamental to the interpretation of social reality.

Independently of the chosen paradigm, the researcher may utilise either the survey method (questionnaires and/or interviews) or non-survey data collection techniques such as observation and the study of documents.

The functional approach is the most appropriate in conducting empirical analyses based on large databases. The aim of functionalists is to establish objective (statistical) and causal relationships amongst the research variables investigated. Questionnaire surveys and laboratory experiments are some of the data collection

methods used. The purpose of data analysis is to confirm or disconfirm theories based on the rejection or acceptance of the stated hypotheses².

According to Yin (1994, p.19), surveys are the preferred strategy when questions of “what or its derivatives” are being posed, when the researcher has no control over behavioural events, and when the focus is on a contemporary event within a real life context.

To sum up, as a survey study aiming to establish objective (statistical) and causal relationships amongst the research variables underlying it (including problem identification, formulation of hypotheses, collection and statistical analysis of data), this study can be classified as functional.

1.5. Data collection

The data sources for this study are: (1) questionnaire completions, (2) semi-structured interviews with key participants in strategic investment decision-making (CFOs), and (3) publicly available information (annual reports, company websites).

This study utilises the triangulation method for data collection. The triangulation of data collection methods can maximise the amount of data collection and improve the validity and reliability of the research results. Semi structured group interviews are a valuable way of triangulating data collected by other means such as questionnaires. (Saunders *et al.*, 1997, p. 80). Neuman (1991) has argued that the purpose of triangulation is not only to increase the “sophisticated rigor” of the data collection and analysis, but also to help disclose the “richness” of the social setting for a qualitative inquiry. Miles and Huberman (1994, p. 266) mention that “stripped to its basic, triangulation is supposed to support a finding by showing that independent measures of it agree with it or at least, do not contradict it”. The combination of data collection methods enables the researcher to overcome some of the inherent disadvantages of each individual method because triangulation involves shifting the evidence and seeing it from different viewpoints.

² It has been argued that the use of mathematical analyses and modelling, and statistical tests, does not adequately relate to specific strategic investment decision contexts (due to the lack of records on what was happening in the setting within which decisions were made and action occurred) and greater focus needs to be placed on studying how practitioners perceive their worlds (Hopper and Powell, 1985; Kaplan, 1986; Scapens, 1990; Humphrey and Scapens, 1996 and Ryan *et al.*, 2002).

1.6. Data analysis

As explained above, the objective of this research is to identify the most significant characteristics of strategic investment decision-making processes and to examine how context is associated with the making of these decisions.

The study involves the following levels of analysis: (1) in-depth examination of strategic investment decision-making processes, (2) inclusion of the characteristics of strategic investment decisions and the characteristics of CFOs, (3) objective and subjective performance considerations and (4) environmental and organisational assessment.

The data analysis was conducted in four consecutive stages. In the first stage descriptive statistics were used. Next, in stage two, an attempt was made to reduce the data to a meaningful set of composite variables and to bring together a significant number of variables into a small set of meaningful and contextual dimensions. By means of confirmatory factor analysis we assured the reliability of the constructs used (applying reliability coefficients such as Cronbach Alpha). The third stage of data analysis aims to establish, by means of correlation analyses, the association between strategic investment decision-making process characteristics and the contextual dimensions. By means of regression models, the final stage aims to integrate the contextual dimensions into an overall model illustrating contextual influences on strategic investment decision-making processes.

1.7. The structure of this thesis

Seven chapters follow this introductory chapter. Chapter Two reviews the literature on strategic investment decision-making. It examines principal approaches for studying organisational decision-making, namely: (1) the rational model, (2) the bounded-rationality model, (3) the political/power model, (4) the garbage can model and (5) the incremental-adaptive model. More specifically, it explores the main factors influencing strategic investment decisions.

Chapter Three reviews the literature on strategic investment appraisal. It provides a critical review of conventional investment appraisal techniques used by U.K. companies, tracing their development and examining their potential and limitations. It outlines recently developed methods for appraising strategic investment projects. It also reviews several approaches suggested for integrating the strategic and financial perspectives when evaluating strategic investment projects.

Chapter Four links the literature in earlier chapters and the main research conducted in this study, identifies key gaps in the literature on strategic investment decision-making processes, and relates them to the research questions that guide this study. It explains why examining them is important for understanding strategic investment decision-making. It highlights the rationale for choosing the research strategy and is organised as follows. Firstly, the underlying motivations of this study are summarised. Secondly, the research questions and the assumptions are defined and linked to the research methodology. Thirdly, the research strategy is selected and justified. Fourthly, data collection methods are discussed. Finally, it explains the questionnaire format, and summarises the procedure used in sending and following up the questionnaire.

Chapter Five presents the outcomes of the survey analysis. Every survey has some merit, telling us something of the practices at the date of the survey in responding firms (Pike, 1996). However, Graham and Harvey (2001, p.189) point out that “the survey approach is not without potential problems. Surveys measure beliefs and not necessarily actions”. Some degree of caution is needed, then, in generalising the results of any sample-based survey to a wider population of firms (Scapens, 1990). However, the high response level in this case reduces this potential problem to a degree. Caution is needed when comparing its findings with previous surveys, due to variations ranging from different sample-sizes to changes in questions asked. Nevertheless, there is considerable comparability, particularly with the results of the research conducted by Pike (1982, 1988, and

1996), Abdel-Kader and Dugdale (1998), and Arnold and Hatzopoulos (2000). These results are presented where possible as benchmarks for comparison.

Chapter Six provides an explanatory study by means of interviews conducted with some respondents to explore relevant issues regarding the research questions. The field study aimed to collect qualitative data in order to describe how strategic investment decisions are made in specific companies. Follow-up interviews were carried out between July and September 2003 to explore, enrich, and check the questionnaire findings with more detailed data. Qualitative data from interviews can help the quantitative side of a study during the analysis by validating, interpreting, clarifying, and illustrating quantitative findings (Miles and Huberman, 1994, p. 41).

By means of regression models, the study attempts not only to detect the factors that played a significant role in how strategic decisions are made, but also to assess their comparative significance. Strategic investment decision-making process dimensions are treated as dependent variables, while contextual domains are treated as independent variables. Thus, Chapter Seven investigates the multidimensional aspects of strategic investment decision-making processes and simultaneously examines the combined effects of various contextual factors on the process of strategic investment decision-making, including decision characteristics, firm characteristics, top management characteristics, corporate goals, and corporate performance. It also classifies the dimensions of strategic investment decision-making processes by means of factor analysis into three significant dimensions. Each of the resulting three dimensions is given a specific name indicating the meaning of the variables loading on the factor: procedural rationality, strategy formulation and political behaviour. Subsequently, the chapter incorporates the selected dimensions and contextual factors into integrated models by means of multivariate analysis and explores the relationships between the three dimensions and the context in which decisions are taken.

The final chapter, Chapter Eight, reviews the major outcomes of the research project, its implications for theory, the strengths and weaknesses of the current study, and suggestions for further research.

Chapter Two
Strategic Investment Decision-Making
(Literature Review)

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Chapter Two

Strategic Investment Decision-Making

(Literature Review)

2.1. Introduction

Organisations exist in the context of a complex commercial, economic, political, technological, cultural and social world (Laudon and Laudon, 2000). Predicting the future of an organisation and its environment, and matching the characteristics of the organisation to the environment is a major challenge for decision-makers. Strategic investment decisions are long-term, involve major resource allocations and affect the future direction and activities of the organisation. They are complex decisions which must take account of the organisation's objectives and its environment, since they shape suitable action under uncertainty (Amason, 1996; Northcott, 1998). Therefore, it is not surprising that strategic investment decision-making has long been a topic of interest within management accounting, strategic management accounting, finance and strategic management.

Research in this area is important for theorists and practitioners, since understanding decision-making processes gives scope for formulating how to conduct them more efficiently. One way of evaluating the process of organisational decision-making is to determine which model an organisation uses

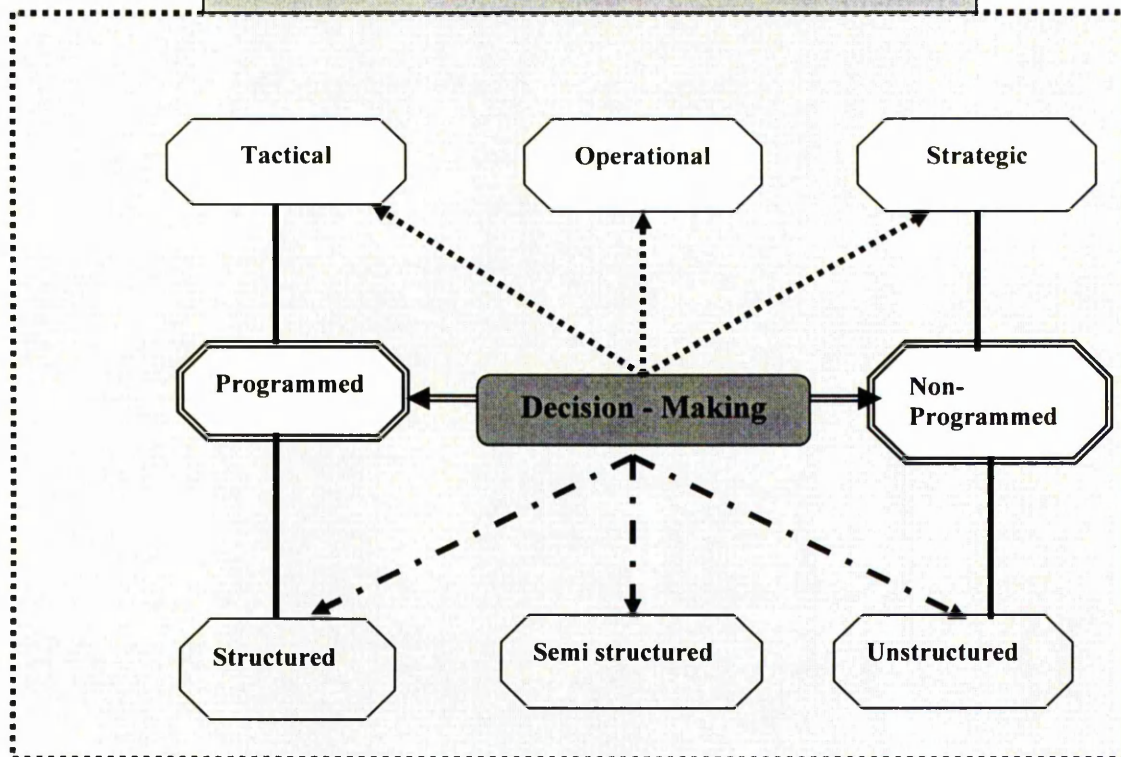
to make decisions. Once the model of the analysis is ascertained, the process can be examined in order to formulate improvement of the process.

This chapter reviews the literature on strategic investment decision-making and outlines the assumptions that underlie some of the theoretical models of organisational decision-making. Specifically, it examines various explanations of how strategic investment decision-making takes place in organisations, and the significance of contextual influence on strategic investment decision-making processes. It ends by identifying key gaps in the literature, and their relation to the research questions pursued in this study.

2.2. Common models of organisational decision-making

There are different types of decision-making (Figure, 2.1). Decision-making can be categorised as either programmed (repetitive and routine) or non-programmed (unstructured, unfamiliar, novel, and associated with a high level of uncertainty).

Figure (2.1): Different categories of decision-making.



Decisions that occur frequently and are familiar may be made in a relatively straightforward, almost routine, fashion. These decisions are comprehensible to the manager and therefore are amenable to tested protocols, formulae or procedures for making them. They are programmed and being operational, they can be left to subordinates. In contrast, strategic investment decisions are non-programmed, unfamiliar, and unusual. They present a challenge to managers (Miller *et al.* 1996) because there are no obvious directions to follow.

According to Mintzberg *et al.*, (1976), research on decision-making can be classified into three types: individual (deals with the human rational processes taking place in conditions such as those dealing with a relatively simplified problem), group and organisational (several decision makers are involved in making a specific decision). The main models used to describe processes of decision-making are to some extent distinct. The research can be reduced to the five common models of organisational decision-making. These are: (1) the rational model, (2) the bounded-rationality model, (3) the political/power model, (4) the garbage can model, and (5) the incremental-adaptive model. Each model has different assumptions regarding the style of strategy creation, the type of environment suitable for each model, the roles of members of the organization (Table, 2.1).

2.2.1. The rational model of decision-making³: This model derives from neo-classical economic assumptions and views decision-making as a sequential process aiming at the maximisation of the company's wealth. This is the classical, scientific approach to decision-making which views the process as essentially orderly and rational. A problem is defined and isolated, information is gathered, alternative identified, and the end is established. A list of the main empirical research on rationality and bounded rationality dimensions of organisational decision-making is provided in Table (2.2).

³ Allison (1969) identified three models of decision-making (cited in Papadakis, 1993): (1) a "rational policy model" which interprets decisions as "reasonable". Traditional approaches refer to this type of model, (2) an "organisational process model" which views decisions as the output of organisation, and (3) a "governmental politics model" which views decisions as a game influenced by politics and power.

Table (2.1): Summary of the common models of organisational decision-making.

Major Characteristics	Rational Model	Bounded-Rationality Model	Political Bureaucratic Model	Garbage Can Model	Incremental-Adaptive Model
Representative references	Allison (1971). Mintzberg (1978). Fredrickson (1985)	Allison (1971) Janis (1982). Hickson, Butler, Cray, Mallory, and Wilson (1986). Bourgeois and Eisenhardt(1989), Nutt (1984) Anderson(1983)	Allison (1971). Pettigrew (1973 and 1977) Mintzberg (1973) Pfeffer and Salancik (1974), Quinn (1980) Eisenhardt and Bourgeois (1988 and 1992)	Cohen, March and Olsen(1972), Anderson and Fischer(1986) Levitt and Nass(1989)	Mintzberg (1978). Chaffee (1985)
Key Assumptions	The objectives of decision maker are known in advance. Full information about the consequences of different alternatives is available. No implementation deviations are expected to take place.	Limited information processing. Satisfying rather than maximising. The use of rules of thumb	Actors have different goals and interpret organisational goals in different ways. People with political power will influence the outcome of decisions.	Decision making as a combination of problems, solutions, people and opportunities.	Companies operate in complex environments. Decision makers are human beings; suffer from limitations which prevent them from acting in a completely rational way.
Style of strategy creation	Strategy driven by formal planning systems	Strategy driven by formal planning systems	Strategy driven by internal political processes	Strategy driven from informal basis.	Strategy driven by successive limited comparisons/steps/ cycles and recycles
Probable corporate environment	Stable	Dynamic, Uncertain	Complex	Dynamic, Uncertain	Dynamic, Complex, Uncertain
Role of Organizational members	Follow the system	Follow the system	Learn and improve	Flexible to new options	Proceed with caution. Flexible to new options

Partly adapted from Lyles and Thomas, 1988; Hart, 1992; and Papadakis 1993.

The basic assumptions that underlie this model are: (1) decision makers enter decision situations with known objectives that determine the value of the possible consequences of an action, (2) full information about the consequences of different alternatives is available, (3) the decision-makers consistently evaluate the advantages and disadvantages of any alternatives with goals and objectives, (4) decision makers select the optimal alternative among all the possible courses of action, (5) no uncertainty is associated with decision-making, and (6) no deviations are expected during implementation (Hoque, 2001). As these conditions rarely prevail in any real management situation, other rational models have emerged.

Most models of rational decision-making are focused on the adaptation of means employed to the ends sought for. When the objective is not reached, the researchers invoke uncertainty, but never mention dimensions linked to the individual involved in the decision (their values, emotions, etc.) nor do they include the influence on the decision of the organisational and institutional context within which the decision is made. This model ignores the power/political behavioural aspects of organisational decision-making, bargaining and negotiations.

2.2.2. The bounded-rationality model of decision-making: Researchers on organisational decision-making (Simon, 1957, 1960; Cyert and March, 1963) pointed to the limitations of the rational approach when compared to how actual decisions are made. They challenged the validity of the classic economic viewpoint by rejecting the value-maximizing calculation in human behaviour. Simon (1957) studied how decision-makers act in real-world decision situations. Decision-makers are "satisficers" with differences from the "economic man"⁴. Based on observation, document analysis and personal interviews in a computer purchasing decision process, Simon demonstrated that decision makers are not perfect machines for making decisions in the most rational way.

⁴ The word "satisficing" was coined to denote the idea that managers will be satisfied with sufficient solutions rather than continuously searching for the ideal one (see: Simon, 1957; and Butler *et al.*, 1993). The rational model is more appropriate for routine decisions such as asset replacements, whereas the bounded rational approach is appropriate for non-programmed and more disparate decisions (Butler *et al.*, 1993, p.10).

Table (2.2): Author (s) and description of the main empirical research on rationality and bounded rationality.

	Author (s)	Topic	Description	Conclusions
1971	Allison	Essence of Decision: Explaining the Cuban Missile Crisis.	Decision process is rational and bureaucratic.	Aspects of both are present
1976	Mintzberg, Raisinghani, and Theoret	The structure of unstructured decision processes	Varieties of decision processes.	Phases of decision making in no order; conceptual structure for decision processes
1982	Janis	Crucial Decisions: Leadership in Policymaking and Crisis Management	Examples of poor and effective decision processes.	Groupthink is negative, can be avoided
1982	Mintzberg and Waters	Tracking strategy in an entrepreneurial context	Changes in strategy over time.	Planning and strategy depend on environment, size, and structure
1983	Anderson	Decision making by objection and the Cuban Missile Crisis	Empirical description of decision process.	Sequential choice of alternatives; goal discovery; failure avoidance.
1984	Nutt	Types of organizational decision processes.	Varieties of decision processes using a normative decision processes.	Managers do not follow normative process; various decision processes; solution driven decisions.
1984	Fredrickson	The comprehensiveness of strategic decision processes: extension, observations, future directions.	Effect of problems versus opportunities and performance on comprehensiveness	Executives combine rational analysis with intuition
1984	Fredrickson and Mitchell	Strategic decision processes: comprehensiveness and performance in an industry with an unstable environment.	Relationship between comprehensive decision processes and performance	Comprehensive processes correlate positively with performance in stable environments, negatively in unstable environments
1985	Fredrickson	Effects of decision motive and organizational performance level on strategic decision processes.	Effect of problems versus opportunities and performance on comprehensiveness	Executives combine rational analysis with intuition
1986	Hickson, Butler, Cray, Mallory, and Wilson.	Top decisions: Strategic Decision-Making in Organisations.	Varieties of decision processes.	Multiple decision processes depending upon type of decision
1986	Isenberge	Thinking and managing: A verbal protocol analysis of managerial problem solving	Analysis of decision processes used in solving a business case	Managers act sooner than students, reason more and use experience.
1988	Bourgeois and Eisenhardt	Strategic decision making in high velocity environments: Four cases in the microcomputer industry.	Strategic decision making in high velocity environments.	Successful strategies are fast yet rational, centralized yet delegated and bold yet safe
1989	Eisenhardt	Making fast strategic decision in high-velocity environments.	Strategic decision making speed in high velocity environments.	Tactics rational in some ways but not in others are fast and effective
1989	Langley.	In search of rationality: The purposes behind the use of formal analysis in organisations	Use of formal analysis.	Formal and social interaction are closely related
1992	Dean and Sharfman	Procedural rationality in the strategic decision making processes	Use of rational decision processes in organisations.	Organisations use procedural rationality for little threat and understood issues

Adapted from Eisenhardt and Zbaracki, 1992.

The limitations of the rational approach led the researchers to propose the alternative bounded rational model which emphasises the need for managers to make decisions with incomplete information, under time pressures when there may be disagreements over goals, and to accept that the optimal solution cannot always be achieved within these constraints. Rationality therefore is bounded (Butler *et al*, 1993). This model assumes that decision-makers are not perfectly rational in their choices and decisions (as implied by classical economic theory). The notion of economic rationality developed by Dror (1968) attempts to assimilate rationality with the idea of being "economic". He sees rationality as the ideal in making any decision, but recognizes that in real word situations this is almost impossible to achieve. He is ready to make concessions, such as sacrificing rationality when the cost of achieving it outweighs the benefits (Papadakis, 1993). The bounded rational approach to decision-making accepts a number of features which are different to those of the rational model (Butler *et al.*, 1993):

1. Decision-makers respond to problems rather than going out of their way to find them. A firm may revamp its products because it finds sales and profits falling rather than as a result of a systematic searching for opportunities
2. Cognitive limits exist in this search process, meaning that the human mind is limited in its comprehension of problems, thereby making it impossible to achieve the synoptic ideal of mapping out the complete decision tree showing the paths to all possible solutions.
3. Time pressures often apply when a decision has to be made even with incomplete information.
4. Disjointedness and incrementalism often occurs meaning that problems get attended to sporadically and solutions are implemented only partially, rather than decisions occurring through the smooth continuous process of the rational model.
5. Intuition and judgement may have to be the basis for making a decision rather than computation. Computations may inform a decision but decision makers realise that the answer cannot fall out of the figures.

6. Decision makers suffice with satisfactory solutions rather than continuously searching for the ideal one (Simon, 1957).

The rational model may be more appropriate for routine decisions (which are likely to be recurring e.g. replacing an old machine with a new machine of essentially the same technology) which tend to be programmed i.e. particular events stimulate particular actions. On the other hand, the bounded rational may be appropriate for non- programmed decisions (problems are unfamiliar and non-routine).

The above characteristics lead the decision-maker to try to stop his search as soon as he passes a “satisfaction threshold” rather than to try to attain an unreachable optimum. The idea of “satisfying” is close to the notion of “aspiration level” which has been for long familiar to psychologists and it is much easier to implement than the optimisation procedure (Romelaer and Lambert, 2001, p10).

2.2.3. The political /power model of decision-making: Underlying this model is the view that individuals, groups and organisations have self defined interests to protect, participants in the process focus on aspects which they perceive as affecting their own interests. An overview of the main empirical research on politics and power affecting organisational decision-making is provided in Table (2.3). The view that organisations are political systems (i.e., collectives of people with at least partially conflicting goals) has been addressed by several studies (e.g. Allison, 1969; Pettigrew, 1973; Eisenhardt and Bourgeois, 1988; Eisenhardt and Zbaracki, 1992; and Butler *et al.*, 1993). The concept of political behaviour as a central element in decision-making was introduced by Allison (1969) and taken up by Pettigrew (1973)⁵. Pettigrew argued that bounded rationality is the result of human and organisational constraints, which could be explained through the role of power and politics in the organisation”. Bargaining, guile, coalition building, and biasing are all examples of the kinds of process related to the political model (Butler *et al.*, 1993, p.13).

⁵ Pettigrew (1973) suggests that organisations should be viewed as complex political systems. “Political behaviour is defined as behaviour by an individual or by a sub-unit within an organisation that makes a claim against the resource-sharing system of the organisation” (Pettigrew, 1973). Politics here mean actions people take to enhance their power or influence a decision. The most comprehensive treatments of politics are Pfeffer’s (1981, 1992) discussions of tactics people use to gain power directly yet make themselves appear less political in the process (Eisenhardt and Zbaracki, 1992).

Table (2.3): Author (s) and description of the main empirical research on power and politics.

	Author (s)	Topic	Description	Conclusions
1971	Allison	Essence of Decision: Explaining the Cuban Missile Crisis.	Decision processes as bargaining games.	Outcome a result of bargaining among players
1973	Pettigrew	Politics of Organizational Decision-Making	Decision processes for purchasing a computer system.	Decision process as political struggle; control over communication channels critical to outcome
1974	Peffer and Salancik	Organisational decision making as political processes	Relationship between department, power and resource allocation.	Resources received correlate with department power; powerful departments get more of scarce resources
1978	Hills and Mahoney	University budgets and organizational decision making	Allocation of budgets.	Power affects resource allocations more when resources are scarce
1980	Borum	A power-strategy alternative to organizational development	Role of power in organisational development.	Power balance is important
1980	Gandz and Murray	The experience of workplace politics	Managers' perceptions of politics; source of politics.	Politics pervasive in organisation; managers are ambivalent about politics
1980	Peffer and Moore	Power in university budgeting: A replication and extension	Effects on department resource allocation.	Higher paradigm departments get more funds; stronger association between departmental power and resources if resources are scarce
1980	Quinn	Strategies for Change: Logical Incrementalism	Nature of strategic decision processes.	Firm is a political system; managers develop a broad strategy but implement it opportunistically
1988	Eisenhardt and Bourgeois	Politics of strategic decision making in high velocity environments. Toward a midrange theory	Politics of strategic decision making in high velocity environments.	Politics more prevalent when power imbalances exist; politics stable; effective firms avoid politics
1992	Eisenhardt and Bourgeois	Conflict and strategic decision making: How top management team disagree.	Conflict in strategic decision-making.	Conflict arises from roles, interactions and tactics; mixed performance effects
1992	Dean and Sharfman	Procedural rationality in the strategic decision making process	Study of conditions leading to political behaviour in strategic decision-making.	Differing interests lead to political behaviour; trust and importance of decision mitigate politics, theory exaggerates level of politics

Adapted from Eisenhardt and Zbaracki, 1992.

Organisational decision-making can be seen as a power game between interest groups competing for control of organisational resources⁶. In a decision processes power is shared among several actors who interpret organisational goals differently.

Two key ideas underlie this dimension of organisational decision-making. First, people in organisations have differences in interests resulting from functional, hierarchical, professional and personal factors. Second, people in organisations try to influence the outcomes of decisions so that their own interests will be served, and they do so by using a variety of political techniques (Dean Jr and Sharfman, 1996, p.374). They may agree about the welfare of the firm as an objective but be in conflict over other objectives; thus, growth may be desirable for some while profitability may be attractive for others. These conflicts result from preferences induced by position and clashes in personal goals and interests (Eisenhardt and Zbaracki, 1992).

Like the bounded rational paradigm, the political perspective to organisational decision-making is a reaction to economic assumptions that organisations possess a single, superordinate goal. In contrast to the rational model, the individuals involved do not achieve decisions through rational choice but proceed according to their interests. The strength of this model is that it characterises how the real world often operates. It provides a highly dynamic model of decision-making, but the concern is that an overemphasis upon this kind of process may lead us to neglect the rational aspect of decision-making (Butler *et al.*, 1993).

2.2.4. The garbage can model of decision-making: This model describes decision-making in organisations which are characterised by ambiguity, where objectives are ill-defined or inconsistent for individual decision-makers. This model was introduced by Cohen, March and Olsen (1972) as a reaction to rational and political models of decision-making⁷. They provide a stark contrast to the rational planning-oriented literature on organisation decision-making. A summary of the main empirical research on the garbage can model is provided in Table (2.4).

⁶ According to Miller *et al* (1996), political games include manipulating information, bargaining and compromise that may lead to sub-optimal outcomes

⁷ By using computer simulations Cohen *et al.*, (1972) have been able to demonstrate some consequences of this approach to decision-making.

Table (2.4): Author (s) and description of the main empirical research on the garbage can model.

	Author(s)	Topic	Description	Conclusions
1972	Cohen, March and Olsen	A garbage can model of organisational choice.	Introduces garbage can model of decision making in organised anarchies	Decision making as a combination of problems, solution, people and opportunities.
1976	Olsen	Choice in an organised anarchy.	Selection of dean as rational conflict and garbage can	Evidence supports the garbage can model.
1980	Padgett	Managing garbage can hierarchies	Stochastic garbage can model for bureaucracy	Implications of ambiguity; managerial implications.
1986	Anderson and Fischer	A Monte Carlo model of a garbage can decision process	Develops a Monte Carlo variation of garbage can model	Results consistent with the garbage can
1986	Carley	Measures of efficiency in a garbage can hierarchy	Simulation measuring the efficiency of garbage can and structured processes.	Measures of efficiency possible
1986	Pinfield	A field evaluation of perspectives on organisational decision making	Comparison of structured and garbage can models	Both models help understanding; decisions not as random as garbage can predicts
1989	Levitt and Nass	The lid on the garbage can: Institutional constraints on decision making in the technical core of college-text publishers.	Institutional and garbage can process	Descriptive validity for the garbage can; institutional mechanisms affect decisions

Adapted from Eisenhardt and Zbaracki, 1992.

The heart of the garbage can model is the premise that decisions are the result of a random confluence of people, problems, solutions, and choice opportunities (Eisenhardt, and Zbaracki, 1992). Central to this model is the idea that decision-makers discover their goals through actions (Eisenhardt, and Zbaracki, 1992). Problems and reactions rather than pro-active planning primarily determine organisational direction. Events and decisions in organisations are not as systematic as the bounded rationality model suggests. Instead they are depicted as an “organised anarchy” exhibiting three main characteristics (Butler *et al*, 1993):

1. Problematic preferences: problems, alternatives, solutions and goals are ill defined. Ambiguity is associated with each aspect of decision process.
2. Ambiguity technology: cause and effect relationships are difficult to identify.
3. Fluid participation: participation in any given decision will be fluid and limited.

Not all decisions are made in a logical or rational way or by bargaining and negotiating from a political perspective. An idea may even be proposed as a solution when no problem exists. The garbage can characterises organisations as experiencing rapid change and as collegial, non-bureaucratic and fuzzy. Most organisations will occasionally find themselves making decisions under problematic and ambiguous circumstances, particularly at the strategic level (Butler *et al.*, 1993). It describes some decision-making in highly ambiguous but often realistic settings. Here an 'organized anarchy', where problems, solutions and decision makers are not necessarily related to each other, may be necessary for judgemental decisions on organisations where the technologies are not clear (Eisenhardt, and Zbaracki, 1992). The problem-identification and problem-solution stages may not be connected, because "decisions are the outcome of often independent streams of events within the organisation" (Butler *et al.* 1993, p.15).

A contribution of the garbage can model is that it provides a representation of non-rational ways in which decisions can be made within an organisation. The model assumes that not all organisational decisions are made in a step-by-step, systematic way. It sees decision-making occurring in a stochastic meeting of choices looking for problems, problems looking for choices, solutions looking for problems to answer, and decision-makers looking for something to decide. In comparison to rational and political models, the garbage can model draws attention to the importance of chance. What gets decided depends very strongly on timing and luck. Decisions themselves have a fuzzy character, and lack the clear beginning and end points of the rational and political models.

2.2.5. The incremental-adaptive model of decision-making: Quinn (1980) argues that formal (i.e. rational) planning systems serve useful purposes but focus excessively upon measurable quantities and underemphasize the vital qualitative

organisational and power-behavioural factors that often determine strategic success. He stresses that formal planning can only be one of the many building blocks which determine corporate strategy. According to him, strategic decisions are not the just the result of power play within organisation, both power relationships and rational analysis affect the outcomes. The greatest strength of the incremental model is that instead of attempting to be rational and comprehensive it describes decision-making as it actually occurs. Incrementalism is a liberating philosophy that gives actors the opportunity to work out their own affairs in concert with others. It describes a natural decision-making process of pluralistic societies as it actually happens. The 'logical incrementalism' school views decision-making as a set of effective techniques using both rational/analytical and power/behavioural aspects (Papadakis, 1993)⁸. The basic assumptions underlying the incremental model are:

- 1) In today's rapidly changing competitive situations, companies operate in complex, demanding environments.
- 2) Decision-makers are human beings and suffer from cognitive limitations which prevent them from following a completely rational-analytic approach.
- 3) Goals and objectives are not firmly clarified but are subject to adjustment as the decision proceeds.
- 4) There exist differences among the decision-makers regarding values, attitudes and interests.
- 5) The outcome of the decision-making process is a mixture of both incremental and rational elements.

According to the incremental-adaptive model, decision-makers cannot set definitive objectives at the outset; instead, objectives are reconsidered and sometimes reformulated during the processes of decision-making itself.

To sum up, it may be that different styles of decision making predominate or are more effective under different circumstances. Decision-makers take advantage of the strengths of each approach while avoiding their shortcomings, a methodology

⁸ The incremental model may be best suited to medium sized or large companies operating in dynamic and uncertain environments (Papadakis, 1993).

known as “mixed scanning”. For example, in situations of low environmental uncertainty, external stimuli tend to be clear and unconfusing, thus they are consistently interpreted by decision makers at various levels in the hierarchy. This suggests that a consensus among participants is the probable outcome and resources will be unanimously utilized in solving the problem. In high-consensus environments one might expect the rational model to be used (Lyles and Thomas, 1988, Hart, 1992). The computational strategy may be appropriate for low-uncertainty environments. It may be suitable for certain ends and certain means. Decision-makers may not know the optimal solution to a problem, but they may be confident that such an answer is available through the use of particular computational procedures. They are therefore proceeding with the assumptions of rational model of decision-making. The judgement strategy may enable decision-makers to cope with the problem of ambiguity. The political model might be more suitable in high-uncertainty environments, especially where ends are ambiguous or not agreed. The process may contain both rational and incremental elements. For example, decision makers can comprehensively diagnose the situation but act incrementally when evaluating alternatives or integrating the decision into the strategy of the company (Nutt, 1977, cited in Papadakis, 1993, p.51). The political and incremental model may be suitable in a high uncertainty situation, where debate, questioning of assumptions and negotiations help resolve the issue (Hart, 1992; cited in Papadakis, 1993, p.46). Other researchers (e.g. Eisenhardt and Zbaracki, 1992) suggest that a combination of bounded rationality and political perspectives provides a compelling description of decision-making. A decision process might start from an entrepreneurial idea (e.g. profit maximisation), continue with careful information gathering and examination of alternative courses of action (rational / bounded rationality model), but also involving bargaining and negotiation among participants (political model).

The literature on strategic investment decision-making is the concern of the following sections. As starting point, it is important to consider the concept of strategic investment decision. Specifically, what types of investment decisions are strategic and what distinguishes these from other decisions.

2.3. The concept of strategic investment decision

'Investment' refers to commitments of resources made in the hope of realising benefits that are expected to occur over a reasonably long period of time in the future (Slagmulder *et al.*, 1995). Capital investment can be seen as a sub-set of capital budgeting which refers to both the selection of long-term investments, and planning for their financing. Although accountants/financial managers have an obvious role in providing financial analysis and advice, it is common to see participation of other people with different expertise, such as operational managers, production managers, engineers, and board of directors.

Investment decisions are important because they relate not only to the future operability of the organisation making the investment but also to the economy as a whole (Northcott, 1998). They commit a substantial proportion of a firm's resources to actions that are often irreversible or at least costly to amend (Drury; 1997)⁹. Therefore, as we might expect, strategic investment decisions can be complex, requiring people with different expertise, information gathering, communication, and debate.

What types of investment decisions are strategic, and what distinguishes these from other decisions?

Various characteristics of strategic investment decision are reported in the literature. Beach and Mitchell (1978) divide decision characteristics into those inherent to a decision problem (i.e. unfamiliarity, ambiguity, complexity and instability) and those referring to the environment of the decision such as, irreversibility, significance. An important research examining strategic investment decision characteristics belong to the Bradford group (Hickson *et al.*, 1986). They view strategic decisions as consisting of four characteristics. The first characteristic deals with the rarity which refers to the frequency with which decisions of the same nature arise in an organisation history. The second characteristic focuses on the consequences the decision may imply for the

⁹ These decisions can be stated as: How much of the organisation's resources should be committed to investment, that is, sacrificed immediately in return for the expectation of increased resources being available at some time in the future?

company. The third characteristic, precursiveness, deals with the extent to which the strategic investment decision sets parameters for other actions within the company. The fourth characteristic focuses on the complexity of involvements present. Indeed, there are various characteristics which can be attributed to strategic investment decision (e.g. rarity, familiarity, complexity, magnitude of impact, radicality, uncertainty-ambiguity, consequentiality). The following identifies strategic investment decisions according to criteria established by other researchers¹⁰. Strategic investment decisions are:

1. Non-programmed, unfamiliar, and unusual and present a challenge to managers because there are no obvious directions to follow (Miller *et al.* 1996).
2. Novel and complex (Mintzberg *et al.*, 1976; and Dutton *et al.*, 1983 and 1989).
3. Intended to help a firm achieve its long-term goals and maintain its competitive position by developing new product-market activities and enhancing its capabilities (Butler *et al.*, 1991; and Slagmulder, 1997).
4. Imply a significant commitment of resources and have a profound impact on the firm and its long-term performance (Carr *et al.* 1991; Papadakis, 1993; Accola, 1994; and Hickson *et al.*, 1986). Mintzberg, Raisinghani, and Theoret (1976), Eisenhardt and Zbaracki (1992) define a strategic decision as one which is "important in terms of the actions taken [and] the resources committed".
5. Made within the context of a long-term view or vision, involve strategic redirection of the business and its future survival. They help organisations cope with changes in customer preferences, competition, and new

¹⁰ There are certain types of investment which can be defined as 'strategic' in nature (Mintzberg *et al.*, 1976; Slagmulder *et al.*, 1995; Carr *et al.*, 1991; Van Cauwenbergh *et al.*, 1996 and Carr and Tomkins, 1998). These are:

- (1) Restructuring (e.g. shutting down a major part of the business, closing an overseas electronics manufacturing plant).
- (2) New product (e.g. adopting a manufacturing cell controller in an electronics company).
- (3) Organisation change (e.g. creating a new divisional structure in a lighting company).
- (4) New processes technology (Adopting an advanced information system in a chemical company).
- (5) Marketing strategy (e.g. emphasising a new market segment for a publishing company).
- (6) Geographic expansion.
- (7) Quality (e.g. developing total quality effort in a chemical company).
- (8) Diversification.
- (9) New facility (e.g. a chemical company constructs a new plant).

technologies (Bourgeois and Eisenhardt, 1988; Papadakis, 1993; Shank, 1996; Porter, 1996).

The above views on the nature of strategic investment decisions are shared by Wilson and Chua (1988, p.140)¹¹. They list seven basic characteristics of strategic decisions (cited in Northcott, 1998):

- (1) Concern with the scope of an organisation's activities.
- (2) Match the organisation's activities with its environmental opportunities.
- (3) Match the organisation's activities with its resources.
- (4) Have major resource implications.
- (5) Are influenced by the values and expectations of those who determine the organisation's strategy.
- (6) Affect the organisation's long-term direction.
- (7) Are complex in nature.

Following the advice of Mintzberg *et al.* (1976), Barwise *et al.* (1986), Eisenhardt and Zbaracki (1992), Papadakis, (1993) and Van Cauwenbergh *et al.* (1996), strategic investment decisions in this thesis refer to decisions involving a significant commitment of resources, and having a significant impact on the firm and its long-term performance¹².

Strategic investment decision-making overlaps with other fields, notably strategy and strategic planning (Papadakis, 1993; Mintzberg, 1994; Northcott, 1998). The strategic planning process usually begins with a detailed analysis of opportunities and threats in the environment, and ends by drafting a blueprint for an organisational structure to translate the strategy into action. Capital investment should be undertaken in close association with strategic planning to ensure a match between an organisation's long-term objectives and the direction of resources towards achieving those objectives. Since strategic investment decision-

¹¹ Wilson and Chua's views reflect those of Stein (1980) about an extensive definition of strategic decisions. The contribution of a single decision to organisational strategy can be argued only from a subjective point of view. More appropriately, the terms strategic and non-strategic are useful to broadly distinguish between two extremes of a continuum, with an underlying scale that measures the strategic nature of a decision. The operational criteria to determine whether a decision is strategic will be the relative importance, judged by top management, of the decision compared to all other decisions made by the organisation (Stein, 1980, p.24).

¹²We adopt a framework for identifying strategic investment decisions similar to that adopted by Mintzberg *et al.* (1976), Jemison (1984), Hickson *et al.*,(1986), and Van Cauwenbergh *et al.*(1996). This framework is similar to the one used by Papadakis (1993), which benefited fundamentally from the approach used by Dess and Robinson (1984).

making is vital for the long-term strategic direction of an organisation, it cannot be seen as a separate independent activity. It is an integral part of strategic planning, and occurs with it rather than following it. It flows from the strategic plan and organisational goals¹³.

On the other hand, strategic investment decisions can be seen as an integral element of the strategy process. To understand the interaction between strategy and strategic decisions, we need to understand the concept of strategy. A strategy is a master plan for how an organisation intends to compete in its environment and what sort of structure is required to implement the plan. It is concerned with fundamental, large-scale problems relating to how an organisation defines itself including its relation to the environment (Macintosh, 1994). There is no single, universally accepted definition of 'strategy', a term borrowed from the military (Lord, 1996). The first definition of strategy in the context of corporate decision-making was developed four decades ago by Alfred Chandler (1962), who defined strategy as the determination of the basic long-term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals (Papadakis, 1993). From a strategic management perspective, strategy can be seen as formulated and implemented through a centralised strategic planning approach based on rational analysis (Anderson, 2001). This perspective based on management theory defines strategy as the resolution of the basic long-term goals and objectives of an enterprise, the adoption of courses of action and the compilation of resources essential for carrying out these goals (Mintzberg, 1978). Thus, strategy is viewed as a set of consistent behaviours by which the organisation establishes for a time its place in its changing environment (Mintzberg, 1978; Miller *et al.* 1996). In this sense, strategy is a foundation for identifying the opportunities that exist in an organisation's environment¹⁴.

Mintzberg (1985) makes a distinction between strategy formulation and formation. He defines strategy formulation as long-term planning by leaders of organisations, whereas strategy formation is the result of the interplay between

¹³ This may help to explain why planning is sometimes treated as synonymous with decision-making.

¹⁴ Many terms can be used in relation to strategy (for example, mission, vision or strategic intent, goal, objective, core competencies, strategies).

environments, the organisational operating system, and the organisation's leadership. He distinguishes between deliberate strategies and emergent strategies. Emergent strategy is defined as "a pattern in a stream of decisions". Deliberate strategies arise out of precise intentions common to all actors in the organisation, which are then realised exactly as intended. Deliberate strategy is thus only possible when the external environment has no influence over the organisation¹⁵.

A detailed review of literature on strategy is beyond the scope of this study. However, for the purpose of this study it is sufficient to recognise that some management theorists view strategy in terms of how it is supposed to be (the normative approach) while others prefer to explore how strategies arise in organisations (the descriptive approach). The normative approach has tended to dominate writing on the design of strategic management accounting systems and techniques, whereas the descriptive perspective has been useful in explaining the process by which such techniques emerged and are operationalised (Horngren *et al.*, 2002). Some modern management writers have maintained the emphasis on military uses of the term to identify essential dimensions of strategy (Quinn, 1980; Porter, 1985). This perspective has been particularly influential in several strategic management accounting writings (Shank and Govindarajan, 1993; Horngren *et al.*, 2002). Adopting this view, we might describe strategy in terms of how organisation matches its own capabilities with the opportunities in the marketplace in order to accomplish its overall objectives.

2.4. The strategic investment decision-making process.

Strategic investment decision-making processes have been addressed by many research projects (e.g. Mintzberg *et al.*, 1976; Fredrickson, 1984; Hickson *et al.*, 1986; Miller, 1987; Bourgeois and Eisenhardt, 1988; Langley, 1990; Langley, 1991; Nutt, 1992; Dean and Sharfman, 1993; Schoemaker, 1993; Papadakis, 1993; Slagmulder *et al.*, 1995; Lord; 1996; Papadakis *et al.* 1998). Some researchers attempt to describe the process using sequential steps. Important step-

¹⁵ However, several researchers have examined strategy as an emergent process rather than a planned one (Mintzberg, 1978; Mintzberg and Waters, 1982, Lord, 1996). They argue that the formal planning perspective often does not always adequately conceptualise and describe implementation of corporate strategy (Papadakis, 1993). Real business strategy is not simply long-term planning in a vacuum; it must also consider the plans of competitors (Lord, 1996).

by-step models are summarised in Table (2.5). The contribution of King (1975) is one of the earliest attempts to outline the major stages of decision-making. King describes the process as a sequence of six stages: (1) triggering the search for an appropriate project, (2) screening investment proposals, because it is impossible to conduct an extensive analysis of all possible projects, (3) definition of the project alternatives, (4) evaluation of the alternatives, (5) transmission of project information, and (6) making the decision. One of the most comprehensive works on the nature of strategic decision-making is Mintzberg, Raisinghani and Theoret, (1976). Their model describes the decision-making processes in three stages: (1) identification, which contains the problem recognition and diagnosis routines, (2) development, which contains the information search and solution design routines and (3) selection, which contains the choice evaluation and authorization routines. They use an in-depth case study to compare and examine the processes used in twenty-five strategic decisions in various organisations. Their work paved the way for more sophisticated decision models but its novelty lay in showing how concentrating on a large number of actual cases can provide a more realistic and rich description of strategic decision-making process. However, they do not identify a rational sequential progression of steps; rather, they stress the complexity which characterises strategic decisions. Janis and Mann (1977) depict the decision-making process as a series of progressive changes in the attitude of the decision maker from initiation to the final commitment to action. Their model consists of five stages: (1) appraising the challenge, (2) surveying for alternatives, (3) comparing the alternatives, (4) deliberation about making a commitment, and (5) adherence to the decision. There are a large number of descriptive models that attempt to clarify steps in the decision making process (see Table: 5.2) ranging from seven stages (e.g. Northcott, 1998) to three (e.g. Mintzberg *et al*, 1976) or four (e.g. Fredrickson, 1984).

Table (2.5): The most important research effort on organisational decision-making process-using sequential steps.

Year	Name of researcher (s)	Stage (1)	Stage (2)	Stage (3)	Stage (4)	Stage (5)	Stage (6)
1975	King	Triggering	Screening	Definition	Evaluation	Transmission	Decision
1976	Mintzberg <i>et al.</i>	Identification -Recognition -Diagnosis	Development -Search. - Design.	Selection -Screen. -Evaluation/ Choice -Authorization			
1977	Janis and Mann	Appraising the Challenge	Surveying for Alternatives	Comparing the Alternatives	Deliberation about making a commitment	Adherence to the Decision	
1977	Simon	Intelligence	Design	Choice	Review		
1984	Fredrickson	Situation Diagnosis	Alternative Generation	Alternative Evaluation	Decision Integration		
1984	Nutt	Formulation	Concept Development	Detailing	Evaluation	Implementation	
1987	Schilit	Problem Identification	Generation of Alternatives	Evaluation of Alternatives	Strategic Choice	Implementation	
1998	Northcott	Identify Objectives or Goals	Search for Investment Opportunities	Gather data about the Possible Future Environnant	Alternative Evaluation	Selection	Implementation Stage (7) Monitoring
1993	Butler <i>et al.</i> ,	Recognition	Diagnosis	Search and design	Choice and Evaluation	Authorization	
1993	Papadakis	Diagnosis of Situation	Generation of Alternatives	Evaluation	Final Choice	Decision Integration	
2002	Horngren <i>et al.</i> ,	Identification	Search	Information-acquisition	Selection	Financing	Implementation and control
2003	Drury	Identify Objectives	Search for Alternative Courses of Action	Gather Data about Alternatives	Select Alternative Courses of Action	Implementation	Monitoring

Normative capital investment theory is based on a single perspective of rational behaviour, derived from economic theory. The ordered, mechanistic process from generating capital investment idea to post auditing them for feed back purposes is a product of an economic rationality perspective. These normative models have no intervention of external or political factors in the process. It is often forgotten that capital investment decision-making is a human activity rather than an objective, mechanical procedure. There are people behind the process. The behavioural literature emphasises that totally comprehensive rational analysis and consequent imitation extending across a major corporate group is impossible to achieve. Authors have suggested that there are many alternative perspectives of rationality which may be equally important. Romelaer and Lambert (2001) present a set of around twenty decision-making rationalities which apply in various contexts¹⁶. Romelaer and Lambert were not the first to identify different decision-making rationalities. For example, March (1978) suggests: substantive rationality, limited rationality, contextual rationality, rationality of games, rationality of process, adaptive rationality, and selected rationality (Cited in Romelaer and Lambert, 2001, p75). Instead of adopting multistage stage model, several studies attempt to dimensionalize strategic decision-making process by creating different dimensions of the process and attaching variables to them (Table, 2.6). It is apparent from Table (2.6) that strategic processes entail not only elements of rationality but also bargaining and negotiations, duration etc. Butler *et al.* (1979) classify strategic decisions process into four dimensions. The first dimension relates to the process occurrence and is comprised of such sub-dimensions as frequency and regularity of appearance. The second, dimension views them as consequentiality and equivocality. The third dimension focuses on the actions taking place during the process such as scrutiny and centrality. The final dimension deals with the efficiency of the process such as rapidity and continuity. Lyles and Mitroff (1980) adopt rationality as a component of three major dimensions: environmental involvement, intuition, and the use of mathematical techniques. An important

¹⁶ Romelaer and Lambert list the following: adaptive rationality, bounded rationality, contextual rationality, ecological rationality, exploratory rationality, incremental rationality, optimising rationality, political rationality, procedural rationality, process rationality, rationality influenced by objectives, rationality influenced by rules, rationality influenced by value and affects, rationality of games, rationality of garbage can processes, strong rationality and substantive rationality.

attempt to dimensionalize the process is Stein (1981) who examined strategic decisions in context but adopted a narrow focus on selected process dimensions, e.g. he focused on process elements like analysis and standardization rather than dimensions like political interests or power relationships.

Table (2.6): The multiplicity of dimensions measuring aspects of strategic decision-making process.				
Rationality dimension				
Complexity of methodology	Degree of inquiry	Scrutiny	Information gathering	Information Processing
Langley (1990)	Lyles (1987)	Cray <i>et al.</i> (1988)	Fahey (1981)	Miller (1989)
Group behaviour dimension				
Politicality		Negotiation/ Bargaining	Power	
(Pettigrew, 1985) Hickson <i>et al.</i> (1986) Lyles (1987)		Pettigrew, (1973) Hickson <i>et al.</i> (1986)	(Fahey, 1981)	
Centralization				
Hickson (1986)	Lyles (1987)		Miller <i>et al.</i> (1988)	
Formalization/Standardization				
King (1975)		Malloy <i>et al.</i> (1983)		
Complexity of the process				
Hickson <i>et al.</i> (1986)		Lyles (1987)		
Need for intuition				
Lyles and Mitroff (1980)		Butler <i>et al.</i> (1992)		

Fredrickson (1984) identified a simple four-phase model (situation diagnosis, alternative generation, alternative evaluation, and integrating the decision into the goals of the company). He focuses not on testing sequential models of strategic decision-making but on trying to detect whether certain contextual factors (e.g. size, performance, etc) influence the comprehensiveness/rationality dimension of strategic decision processes in a controlled environment. He identified critical characteristics in rational and incremental decision-making processes and classified them as: (1) initiation, (2) concept of goals, (3) relationship between means and ends, (4) analytic comprehensiveness, and (5) comprehensiveness in integrating the decision. Fredrickson (1985) argues that people faced with decisions likely to have a major impact on the organisation tend towards a more rational approach. Janis' study (1985) outlines several criteria for assessing the rationality of decision-making processes (cited in Papadakis, 1993, p.114). According to Janis, the process can be characterized as rational when (1) covers a wide range of possible alternatives, (2) takes into account all the objectives sought, (3) evaluates carefully the costs and benefits of each alternative, (4) uses extensive searches for information, (5) remains alert to information and does not hesitate to seek expert judgement, and (6) makes provisions for implementing the chosen course of action, and devises contingency plans covering possible deviations from expected outcomes.

Hickson *et al.*, (1986) redefined their proposed dimensions as a three dimensional frame on which they view a decision process. The first dimension is termed complexity and focuses on the difficulties surrounding the process. The second dimension describes the political aspect of the process. The third dimension relates to other aspects such as, duration, formality, negotiation, authority etc which¹⁷. Lyles and Thomas (1988) argued that rational problem formulations are based on such characteristics as generation of multiple scenarios, strong discussions, decentralized communication channels and valuable past experience of events. The formalization/standardization dimension of the process dimension

¹⁷ Three processes were identified: sporadic, fluid and constricted. Sporadic processes were subject to more problems than the others. The information used is variable in quality, making it "informally spasmodic and protracted" (Hickson *et al.* 1986). Fluid processes are almost the opposite of sporadic ones, being conducted through more formal meetings. This process is "steadily paced, formally channelled and speedy" (Hickson *et al.* 1986). Constricted processes tend to turn around a central figure such as a finance or production director who draws on a wide range of expertise in other departments before reaching a decision.

normally consists of: (1) a formal screening process which helps in deciding whether a specific investment decision should be further examined, (2) written procedures, which guide decision processes and are strictly followed in making the final decision, (3) a hierarchy of approval, (4) a specialized department which evaluates new investment projects, and (5) pre-determined techniques for the evaluation of new investment projects (King, 1975, and Avlonitis, 1980).

Social factors and political factors may well impinge on strategic investment decision-making practice. Studies such as that by Mintzberg (1981) have traced how strategic decisions are made in organisations. They demonstrate how cultural and political processes influence organisational decision-making¹⁸. Jones (1989) proposes a “socio-rational model” which combines a range of concepts of rationality, such as objective rationality, subjective rationality and positional rationality. The objective rationality identified by Jones can be seen to relate to traditional economics notions of capital investment decision-making (cited in Northcott, 1998). Jones notes the need to look beyond this narrow rationality. He suggests that decisions can be understood in technical, personal, social and political terms at the same moment. Butler *et al.* (1993) propose a model of decision-making with feedback loops between the beginning and end of the routines. Their study is based on three case studies based on semi-structured interviewing. It sets out to observe and explain the actual investment behaviour of managers engaged in capital budgeting decisions. Particular attention is given to how complexity and politics influence the process. They contend “different interests will become involved, each pushing a point of view, making a decision in an organisation becomes, in the end, a matter for bargaining between these interests. These are the politicalities of decision-making” (Butler *et al.*, 1991, p. 404). According to this dimension, managers in different functional positions will have different interests and different perceptions of criteria used to evaluate strategic investment decisions (e.g. chief financial officer vs. other chief executive officers). Northcott (1998) based on a case study, viewed investment decision making as integral part of the strategic and operational functioning of an organisation, she examined behavioural and organisational aspects of investment

¹⁸ These cultural and political processes tend to be seen mostly by managers below board level, operating daily within the culture of the organisation (Johnson and Scholes, 1999).

decision-making activity and addressed the complexity of investment decisions as they occur in practice. The behavioural perspective of capital investment decision-making was not designed to detract from the usefulness of appropriate financial analyses. Its function is rather to provide a balanced view. There are other dimensions of the process such as gestation time and the duration process time (e.g. Mintzberg *et al.*, 1976; Fahey, 1981; Hickson *et al.* 1986 Eisenhardt, 1989, and Papadakis, 1993). According to Mintzberg *et al.* (1976) gestation and duration process times are important factors in strategic decision-making processes. Gestation time is the time elapsed between the first recognition of a potential strategic investment decision to the first reference to a deliberate action (Hickson *et al.* 1986). Duration process is the number of months elapsed between the first reference to deliberate action to the time when a specific commitment to act was made (Papadakis, 1993, p. 124).

Marsh *et al.* (1987) provides a fascinating study of how systems, roles, organisation, hierarchy, and the organisation context all influence strategic investment decisions making (cited in Tomkins, 1991). Organisations have their own contexts and procedures and therefore, it is conceivable to expect that capital investment decision made acceptable within the organisational culture and context (Northcott, 1998). The influence of contextual factors on strategic investment decision-making processes is the concern of the next section.

2.5. The influence of contextual factors on strategic investment decision-making processes¹⁹

Contextual factors can refer to environmental conditions, internal power, the organisation's past and current strategy and performance, past experience, future perspectives, and decision-making culture. Langley (1990) identifies contextual factors as organisational structure, leadership style, the nature of the issue faced, ownership (public vs. private), the industrial sector concerned, and the market a

¹⁹ Context can be defined as the combination of interorganisational variables and some notion of organisation (Lewicki, 1977), while in a more extensive definition context incorporate environmental, interorganisational, and socioeconomic variables (Kervasdue and Kimberly, 1979). Miller *et al.* (1988) provide a broader definition of the context as "the challenges and resources, economic as well as human, that surround an organisation". Pettigrew (1990) define context as "not just a stimulate environment but a nested arrangement of structures and processes where the subjective interpretations of actors perceiving comprehending, learning and remembering help shape the process". These definitions quoted from Papadakis (1993, p.65)

company operates in. Papadakis (1993) identifies contextual factors according to how strategic decisions are shaped. His categories are: (1) characteristics of the strategic investment decision, (2) the external corporate environment, (3) the internal corporate environment, (4) top management characteristics, (5) organisational performance levels, and (6) other company characteristics (e.g. size, field of activity, ownership). There is a large body of literature on strategic management and organisational theory regarding the interaction between the organisation and its environment. Dutton *et al.* (1989) addressed the influence of external environment on strategic investment decision-making. He points out that the fundamental assumption behind attempts to understand how decision-makers act is knowing how people interpret the world around them. One of the most recent works is Papadakis *et al.*, (1998). Their study of strategic decision-making processes emphasises on the interaction between the external environment (e.g. dynamism and uncertainty) and the internal context (e.g. planning formality, performance and size). Hambrick (1981 and 1989) and Papadakis (1993) have argued that managers make decisions on the basis of their awareness of various environmental and organisational factors. They point out that strategic decision-making processes are influenced by the context within which decisions are made. Theoretical speculations and empirical work confirms relationships between contextual factors and organisational processes. It is also interesting to note that the inverse relationship has also been reported. For example, Papadakis, (1993) argued that environmental characteristics such as uncertainty and volatility influence the rationality-comprehensiveness with which decisions are made. Researchers (e.g. Lyles and Mitroff, 1980; Fredrickson and Mitchel, 1984) point out that in dynamic environments decision-makers are obliged to take quick, bold decisions, relying on information available, without extensive search and analysis. On the other hand, other researchers (e.g. Bourgeois and Eisenhardt, 1988) contend that the greater the environmental turbulence, the greater the criteria used to guide the strategic decisions and the more rational process will be. Researchers (e.g. Bourgeois, 1981) have argued that superior performance is negatively related to rational decision-making i.e. superior performance is expected to lower the intensity with which organisations will search for and analyse information. Other

studies found that comprehensive processes lead to better performance in rapidly changing environments. The study of Papadakis *et al.* (1998, p.135) supports the existence of significant relationships between corporate performance and strategic decision-making processes. They contend “ROA provides significant positive associations with rationality, financial reporting, and hierarchical decentralization. Profit growth in turn is highly related to politicisation and dissension. So different performance aspects appear to influence different dimensions of the process”. However, these results are inconsistent and therefore cannot be adopted as significant generalizations. Thus, there is a need for further research to examine specific hypotheses regarding the interaction between contextual factors and strategic investment decision-making. This is the focus of Chapter Eight.

The conclusion of the literature review on strategic investment decision-making can be summarised as follows:

1. This review illustrates extensive development in the area. However these models are simplifications explaining small portions of very complex phenomena. Each model has its own assumptions, promotes its own perspective, and utilises varied criteria. Each model represents “pure” typologies, each of which may evoke at any time.
2. Traditional models of investment decision-making (Table, 2.5) tend to share similar characteristics (e.g. project identification, project analysis and acceptance, implementation and post audit), but there is no consistency on what the specific stages are or how many there are. Thus, there cannot be a universally applicable set of stages²⁰. Further, these normative models have no intervention of external or political factors in the process. It is human appreciation of capital investment decision making which appears to be missing from the rational, economic models which have driven normative capital investment theory.
3. Most notable work on strategic investment decisions is based on small sample case study explorations (Table 4.1). To our knowledge, with the

²⁰ The most well documented evidence comes from Witte (1972) who examined 233 decisions concerning data processing systems procurement. He concluded that there was no universally applicable set of stages in the decision making process (cited in Papadakis, 1993, p.50.).

exception of Papadakis (1993), there exists no large-scale empirical research attempting to quantitatively assess the influence of contextual factors on strategic investment decision-making. However, the empirical testing of Papadakis's study (1993) was based solely on industrial companies operating in Greece.

Table (2.7): The most notable research efforts on strategic decision-making.

Year	Name of Researcher(s)	Type of Research	Target Sample	No. of Decisions	Contextual Considerations	Strategic Investment Decisions
1981	Stein	Mailed Questionnaire	Unspecified	64	Yes	NO
1981	Fahey	Case studies	Enterprises from various sectors	Unspecified	NO	NO
1984	Duhaime and Grant	Interviews	Industrial enterprises	40	NO	NO
1984	Nutt	Interviews	Health and service organisation	78	NO	NO
1985	Shrivastava and Grant	Interviews	Enterprises from various sectors	32	NO	NO
1986	Hickson et al. (Bradford Studies)	Structured Interviews	Various sectors	150	NO	NO
1986 a, b.	Nutt	Interviews	Health and service organisation	91	NO	NO
1987	Lyles	Mailed Questionnaire	Enterprises from various sectors	102	NO	NO
1988	Langley	Case studies	Various	Unspecified	Yes	NO
1989	Eisenhardt	Series of cases	Microcomputer industry	Unspecified	NO	NO
1989	Rowe	Case studies	Computer installations	2	Yes	Yes
1990	Langley	In depth case studies	Three state controlled companies	27	Yes	NO
1990	Sinha	Mailed Questionnaire	Enterprises from various sectors	1087	Yes	NO

(Continues)

(Continuation)						
Year	Name of Researcher(s)	Type of Research	Target Sample	No. of Decisions	Contextual Considerations	Strategic Investment Decisions
1991	Butler, Davies, Pike and Sharp	Semi-structured interviews and case studies	Organisations from various sectors	17	Yes	Yes
1993	Dean Jr and Sharfman	Interviews	Manufacturing Industries	57	Yes	NO
1995	Slagmulder, Bruggeman, and Wassenhove	Mailed questionnaire	Manufacturing Industries	Unspecified	Yes	Yes
1996	Van Cauwenbergh Durinck Martens Laveren and Bogaert	Semi-structured interviews	Various sectors	Unspecified	Yes	Yes
1996	Dean Jr And Sharfman	Interviews	Manufacturing Industries	52	Yes	NO
1997	Sharfman, and Dean Jr	Mailed questionnaire	Manufacturing Industries	Unspecified	Yes	NO
1998	Papadakis Lioukas and Chambers	Mailed questionnaire and semi-structured interviews	Manufacturing firms in Greece	70	Yes	Yes
2001	Andersen	Mailed Questionnaire	Various sectors	Unspecified	Yes	NO

This table represent only 'real world' research, i.e. research based on mentoring of actual decisions in a actual situations. Research efforts based on laboratory investigation are excluded.

- Source: Partly derived from Papadakis, 1993.

4. Limited attention paid to examine other stages of strategic investment decision-making process, such as development of proposals into projects and early screening to ensure that they are compatible with strategy development, and selection, which contains the choice evaluation and authorization routines.

5. It is apparent that the complex organisational activity of strategy formulation cannot be separated from the strategic investment decision-making activity. Yet we have limited knowledge of just how strong the link between strategy and strategic investment is in practice.
6. This review on strategic investment decision-making revealed a lack of research relating the process of strategic investment decision-making to the context in which they are made. Theoretical speculations and empirical work confirms relationships between contextual factors and organisational processes. It is also interesting to note that the inverse relationship has also been reported.

2.6. Research framework

Despite strategic investment decision-making processes being multidimensional, most previous studies examine one dimension of the process (e.g. rationality, hierarchical decentralization, or political behaviour). It is often forgotten that decision makers may have the capacity to blend various decision models simultaneously. Lyles and Mittrof (1980, p.141) contend “successful firms might be expected to utilise all of the available decision models as thinking frameworks”.

It is apparent from the literature review that strategic investment decision-making process can be viewed as the interplay of multiple dimensions and contextual factors. The theoretical framework adopted for this study described in Figure (2.2). The design of this study aims to take advantage of a number of generally accepted dimensions of strategic investment decision-making namely:

(1) The procedural rationality dimension: Following Mintzberg *et al.* (1976), Fredrickson (1985), Bourgeois and Eisenhardt (1988) Hitt and Tyler (1991), (Butler *et al.*, 1993) and Dean Jr and Sharfman (1993), rationality for the purpose of this study is defined as the extent to which the decision process involves collecting information relevant to the decision, and the reliance upon analysis of this information in making choices. This implies that executives have the interests of the firm at heart, believe an analytic approach to decision-making is effective, and can make decisions that substantially affect organisational performance. They

search for possible options, to compare and evaluate them and to choose the best option. Further, the research model adopted here assumes that decision-makers act with bounded rationality where full information regarding the consequences of possible actions is not available. This is consistent with the behavioural theorists (e.g. Cyert and March; 1963) which reject the assumption of certainty and suggest that most organisations are so complex that the individuals within them have only limited information regarding the organisation's environment²¹.

As uncertainty is inherent in organisational life, decision makers virtually never have access to all the relevant information, nor can they generate all the possible alternatives and accurately anticipate all the consequences. The researcher adopts the view that decision-makers are incapable of making completely rational decisions seek to satisfy because they do not have the knowledge, or ability to maximize. Accordingly, decision-makers are rational, but their rationality is limited. For example, their cognitive limitations prevent them from (1) knowing all the choices and opportunities, (2) remembering all the previous optimal choices, and (3) knowing all the consequences of the alternatives from which they have to choose. Procedural rationality is the extent to which the decision-making process reflects a desire to make the best decision possible under the circumstances.

(2) The political / power dimension: The research model adopted here assumes that strategic investment decision-making processes are influenced by the use of power among decision-making group members. Strategic investment decisions are the result of a process in which decision-makers having different goals form coalitions through negotiation. The aim of integrating the behavioural perspective into the research model is to provide a balanced view of strategic investment decision-making. Behaviour dimension (politicality, negotiation/bargaining, and power) is directly present as a solid dimension in the work of Pettigrew (1973, and 1985), Mintzberg *et al.* (1976), Fredrickson (1984), Hickson *et al.* (1986) Eisenhardt and Bourgeois (1988), Eisenhardt and Zbaracki, (1992), Hart (1992), and Butler *et al* (1993). "The political model provides a highly dynamic model of decision-making (Butler *et al.*, 1993, p.14)".

²¹ The complexity of the problem and the conflict among the decision makers often influence strategic investment decision making (see Eisenhardt and Zbaracki, 1992).

(3) The strategy formulation dimension: Since strategic investment decision-making is vital for the long-term strategic direction of an organisation, it cannot be seen as a separate independent activity but as an integral part of organisation's strategy. This assumption is supported by the empirical findings of Sinha (1990) and Andersen (2001)²². Hence, strategic investment projects must be evaluated in a way consistent with the firm's objectives. Although financial analyses have an important part to play, they cannot produce meaningful answers without a consideration of the organisation's strategic objectives. Good analysis ties the details of strategy to the financial implications. Decision-makers need to treat financial analysis of strategic investment projects as a part of a broader strategic analysis (Barwise, Marsh and Wensley, 1989). Butler *et al.*, (1991) reported a significant unanimity among managers about the considerable importance of achieving fit between the strategic decisions and business strategy. Quantitative accounting control systems may fail entirely to connect with the kind of successful investment decision-making that is required to bring real success. For the more successful companies, the strategic investment debate is recognised as involving so many uncertainties and complexities (Carr *et al.*, 1994, Horngren *et al.*, 2002). The research model adopted here view strategy as the manner in which an organisation attempts to match its own capabilities with the opportunities in the marketplace to accomplish its overall objectives. In formulating its strategy under this view, an organisation would seek to understand the industry in which it operates²³. The research model assumes that decision-makers have strategic intent and objectives and seek investments accordingly. For example, investment to increase production capacity, efficiency, new product lines, the acquisition of or merger with another company. In each case there is an explicit criterion against which alternatives will be compared. Decision-makers cohere some strategic investment projects with other investments and activities of firm and will take into consideration competition and markets: market structure, consumers' life-styles

²² Sinha shows that when decisions are perceived to be important, formal strategic planning systems are perceived as important, are extensively utilised, and formal analysis is conducted in formulating and implementing the decision (cited in Papadakis, 1993, p.152). Andersen contends that strategic investment decision-making process is formulated through a centralised strategic planning approach.

²³ Industry analysis focuses on five forces (a) competitors, (b) potential entrants into the market, (c) equivalent products, (d) bargaining power of customers, and (e) bargaining power of input suppliers. These five dimensions addressed by Porter (1980, 1985, 1996 and 2001)²³.

and preferences, technological evolution, and possible “windows of opportunity”²⁴. Hence, we expect that decision-makers will prefer investment project that fit the strategy of the company to any project which is not, even for investments that are more profitable and/or less risky.

Figure (2.2) shows a simple four-phase model (strategic diagnosis, alternatives evaluation, strategic selection, and implementation and monitoring), and focuses not on testing sequential model of strategic decision-making but on demonstrating how procedural rationality, political/power and strategy formulation influence organisational decision-making process. This incremental approach reflects a realistic approach to complexities and uncertainties associated with strategic investment decision-making. It assumes that the setting of objectives and generating alternatives are not separate but emerge simultaneously. Secondly, decision-makers do not have all the information they need yet they act deliberately. Thirdly, decision-makers who use their experience to generate alternatives are confident of likely consequences and the most effective decisions are those consistent with the overall strategy of the organisation. Finally, it assumes that uncertainty and scarce information are the rule not the exception. Because choices are uncertain, decision-makers are always prepared to reverse their decisions if results are inconsistent with corporate strategy. Adopting such a framework (i.e. creating different dimensions of the process and attaching variables to them) provides an extensive perspective on decision-making processes, and enables the researcher to examine different dimensions of strategic investment decision-making process, and test several hypotheses concerning their possible interrelationships with various contextual factors.

²⁴ In real life, these elements are ambiguous, not well understood, and difficult to incorporate into cash-flow predictions (Romelaer and Lambert, 2001). According to Carr *et al.* (1991), the critical point is that managers contemplating strategic investment must have a model of what it takes to be successful in their market. Measures of the appropriate model must be developed from the ‘market model’, which, in turn, requires a deep understanding of the workings of the market itself (Carr *et al.*, 1991).

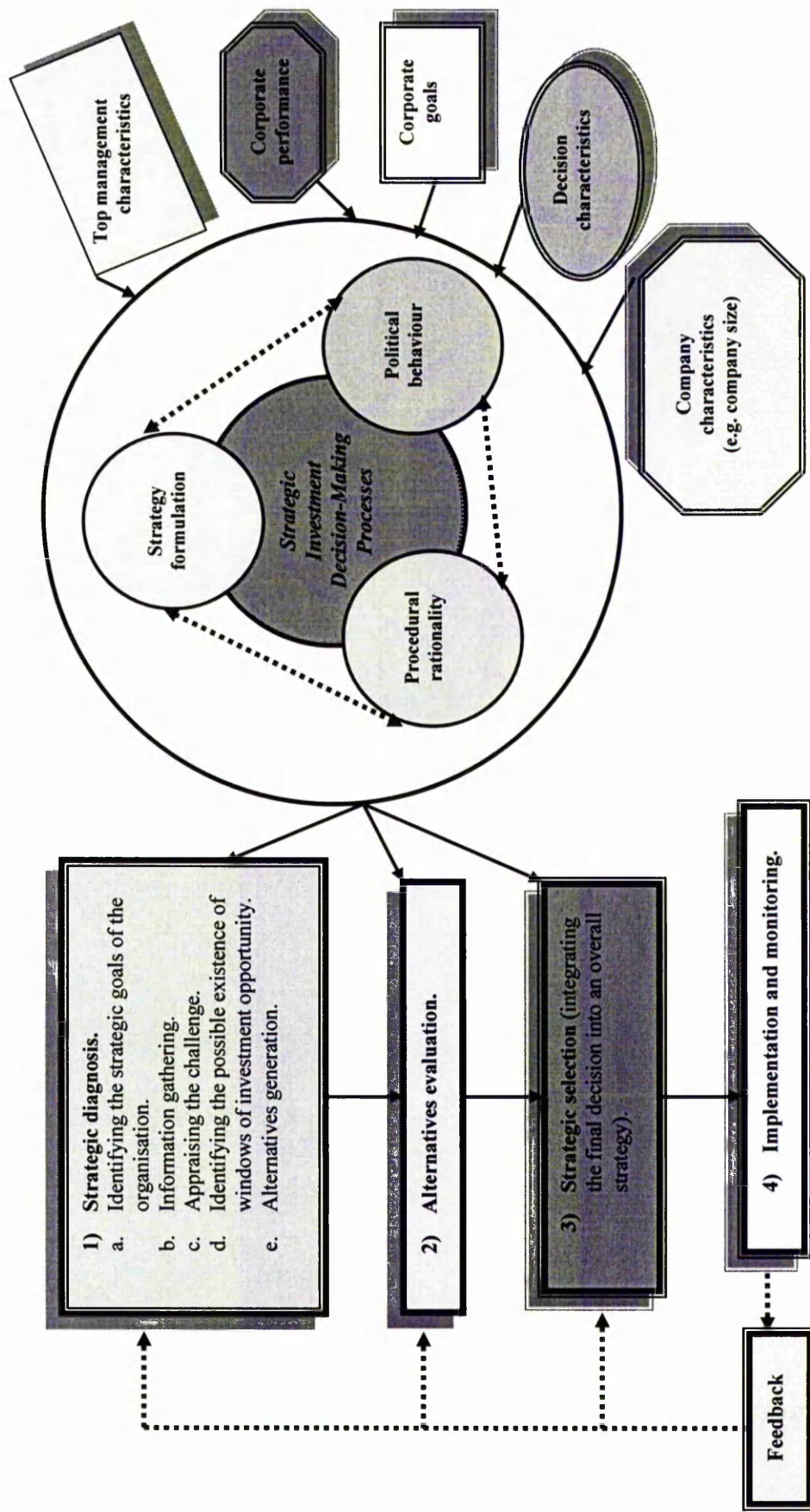


Figure (2.2) Theoretical model of strategic investment decision-making processes (Incremental-adaptive model)

This framework draws upon Quinn (1978, 1980), Mintzberg (1978), Jones (1989), Tomkins (1991), Hitt and Tyler (1991) and Papadakis (1993). It is somewhat based on contingency theory, a sub-part of organisational theory²⁵. The corner stone of contingency theory is that there is no universally acceptable model that explains the diversity of organisational decision-making. Organisational design depends on the contingent or contextual factors relevant to the situation. Under contingency theory, therefore, strategic investment decision-making processes should vary according to the situations or circumstances (i.e. contextual factors) in which the organisation operates.

2.7. Summary

This chapter identifies the most significant empirical research in the field of strategic decision-making, and draws some conclusions about the state of research in the area, especially the need for contextual and integrative research in the area. A research design which adequately takes into account and integrate various contextual factors which have been found to bear on strategic investment decision-making processes, and assesses the role and significance of each one of them. These constitute the fundamental objectives of the thesis.

An important aspect of procedural rationality is the degree of evaluating investment projects. The last six decades have witnessed substantial evolution in accounting and finance of the theory and practice of evaluating investment projects (e.g. NPV). There are several basic approaches to financially analysing capital investment projects, of varying degrees of technical sophistication.

Chapter Three reviews the literature on strategic investment appraisal and outlines several approaches suggested for integrating strategic and financial aspects when evaluating strategic investment projects.

²⁵ Scholars (e.g. Hopper and Powell, 1985) have expressed reservations concerning a contingency approach. Contingency theory is criticised on the grounds that it is difficult to use in organisations with an extensive interaction of variables and with continuous changes. Hopper and Powell (1985) mention that the conceptualisation, definitions and measurement of key variables within contingency theory have not been adequately clarified. The historical views of organisations provide limited insight into processes. Further, causality is problematic, ignores managerial choice and power, and neglects processual issues of meaning and culture. Furthermore, contingency theory fails to incorporate the wider context of the organisation, in particular, the social, political, and institutional aspects. They have also argued that the correlations reported in most contingency studies are small and not always consistent.

Chapter Four determine the scope and aspects of this research effort and set the guidelines for the rest of the thesis. More specifically, it clarifies the focus of the research and its methodology.

Chapter Three
Strategic Investment Appraisal
(Literature Review)

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Chapter Three

Strategic Investment Appraisal

(Literature Review)

3.1. Introduction

The strategic investment decision-making process is arguably one of managers' greatest challenges. There is a critical need to get these decisions right. On the one hand, if the decision proves successful, the company reaps major strategic advantages. On the other hand, if it proves unsuccessful, either an important opportunity is forever lost or has needlessly squandered substantial resources. Managers should be aware of Investment Appraisal Techniques (IATs) and the consequences of their use. According to normative assumptions underlying investment theory, investment projects should be accepted if and only if their value exceeds their cost, so that their acceptance increases the wealth of shareholders. The quantitative financial analysis of proposals has been the focus of much of the perspective capital investment literature. There are several basic approaches to financially analysing capital investment projects, of varying degrees of technical sophistication. Academicians and practitioners accept that capital budgeting models that assess investments by analysing cash flows represent a sound approach to investment decisions. However, traditional approaches to

strategic investment appraisal have been criticized on a number of grounds. Some of the key criticisms are their narrow perspective, exclusion of non-financial benefits, and overemphasis on the short-term. Conventional financial analysis techniques may be limiting and misleading when used to evaluate strategic investments such as Advanced Manufacturing Technology (AMT). These criticisms will be discussed in this chapter.

Dissatisfaction with DCF techniques has led to a call for more sophisticated approaches. These new approaches do not necessarily neglect the potential usefulness of DCF models but they introduce variations for viewing the strategic context and constructing assumptions.

This chapter reviews conventional investment appraisal techniques used by U.K. companies, traces their development and examines their potential and limitations. It emphasises the importance of strategic considerations in evaluating strategic investment decisions. Finally, it reviews recent approaches (real options approach, value chain analysis, the balanced scorecard) suggested for integrating financial and strategic criteria.

3.2. Conventional IATs

The basic concept underlying the theory of finance is that required return on investment is positive function of the degree of risk to be faced in undertaking that investment. The main component in the manager's toolkit for evaluating investment opportunities are: (1) the payback rule (PB), (2) the accounting rate of return (ARR), (3) the net present value (NPV), and (4) the internal rate of return (IRR). Discounted cash flow (DCF) methods are classified as 'sophisticated' while PB and ARR are classified as 'unsophisticated' (Pike, 1988; Klammer and Wilner, 1991; Chen, 1995, Keat and Young, 2000).

PB and ARR are the two main techniques within traditional accounting. PB is one of the simplest and more frequently used methods for appraising investment projects. It is concerned with liquidity. It is a short-term oriented method which considers how soon an investment project will pay itself back. PB rules ask how many periods management must wait before cumulative cash flows from the project exceed its cost. If the periods are less than or equal to the firm's

benchmark, the project gets the go-ahead. This method supports decision-making in two ways. First, it can provide a rule for accepting investment projects. They are only accepted if they pay back the initial investment outlay within a certain time. Second, it can compare the relative desirability of several investment projects. The faster paying back project is the most preferred. Decision-makers are usually concerned about how long it will take the investment project to break-even point in the face of uncertain forecasting. PB has two major deficiencies. First, it ignores cashflows which occur after the project's payback period. Second, it ignores the time value of money. Like NPV and IRR, PB does not distinguish the sources of cash inflows (operational, disposal of equipment or recovery of working capital) (Horngren *et al.*, 2002).

The ARR is an accounting measure of income divided by an accounting measure of investment. It is also called the return on investment (ROI). This method compares an investment project's profitability to the capital employed in the investment. Like the PB method is not without substantial flaws. The ARR considers profitability but ignores the time value of money. This method uses accounting profit rather than cashflows as a measure of return on an investment. Also, accounting profits suffer from "distortion" such as depreciation expenses and gains and losses on the sale of fixed assets, which are not cashflows and therefore have no real impact on the wealth of the investors (Northcott, 1998).

Although both methods are used in practice, they have serious shortcomings, and can lead to incorrect investment decisions. These techniques have fallen from favour in the literature and have been replaced with "sophisticated" techniques whose roots are in economic theory such DCF methods. DCF measures the cash inflows and outflows of a project as if they occurred at a single point in time so that they can be compared in appropriate way. DCF a theoretically superior appraisal technique developed to take into account of the time value of money. The DCF methods recognise that that the use of money has an opportunity cost-return foregone. Because the DCF methods explicitly and routinely weight cash flows by the time value of money, they are often considered as better methods to use for long-run decisions. DCF focuses on cash inflows and outflows rather than on operating profits as used in conventional accounting. Cash is invested now

with the expectation of receiving a greater amount of cash in the future. NPV and IRR are the two main DCF methods.

Shareholder value is created when the present value of a project's expected cash inflows exceeds the present value of its cash outflows, resulting in a positive net present value (NPV). NPV is calculated using the required rate of return, which is the minimum acceptable rate of return on investment. It is the return that the organisation could expect to receive elsewhere for an investment of comparable risk. This rate is also called the discount rate, hurdle rate or opportunity cost of capital because it typically must exceed the cost of funds as determined by the return expected by those who provide the funds. In other words, the NPV method calculates the expected net monetary gain or loss from a project by discounting all expected future cash inflows and outflows to the present point in time, using the required rate of return. Only projects with a positive NPV are acceptable because the return from these projects exceeds the cost of capital (the return available by investing the capital elsewhere). Managers prefer projects with higher NPVs to projects with lower NPVs, if all other things are equal (Horngren *et al.*, 2002). The most problematic input is the selection of an appropriate discount rate. This is crucial to the outcome of NPV analysis, as it determines the relative values of cashflows occurring in different time periods. Criticisms of NPV by many researchers (e.g. Pike, 1996; Drury, 1997; and Lefley 1994 and 1996) include the unrealistic assumption of a fixed/uniform discount rate over time.

IRR is obtained by discounting cash flows. It is the interest rate that equates the present value of inflows with the present value of outflows. It causes the net present value of the project to equal zero. IRR is sometimes called the time-adjusted rate of return. As in the NPV method, the sources of cash flows and the accounting treatment of individual cash flows are irrelevant to IRR calculations (Horngren *et al.*, 2002). IRR has a high sensitivity to errors in forecasted cash flows. Although, it is argued that NPV is more correct than the IRR, IRR is still popular DCF method used in industry.

The use of IATs has been a major focus of studies on capital budgeting practices. Surveys have shown general increases in the use of DCF techniques in U.K. and U.S.A. companies (Klammer, 1972; Kim and Farragher, 1981; Klammer and

Walker, 1984; Kim and Crick, 1986; Pike, 1983, 1988, and 1996; and Arnold and Hatzopoulos, 2000).

3.3. Development of financial IATs in large U.K. companies

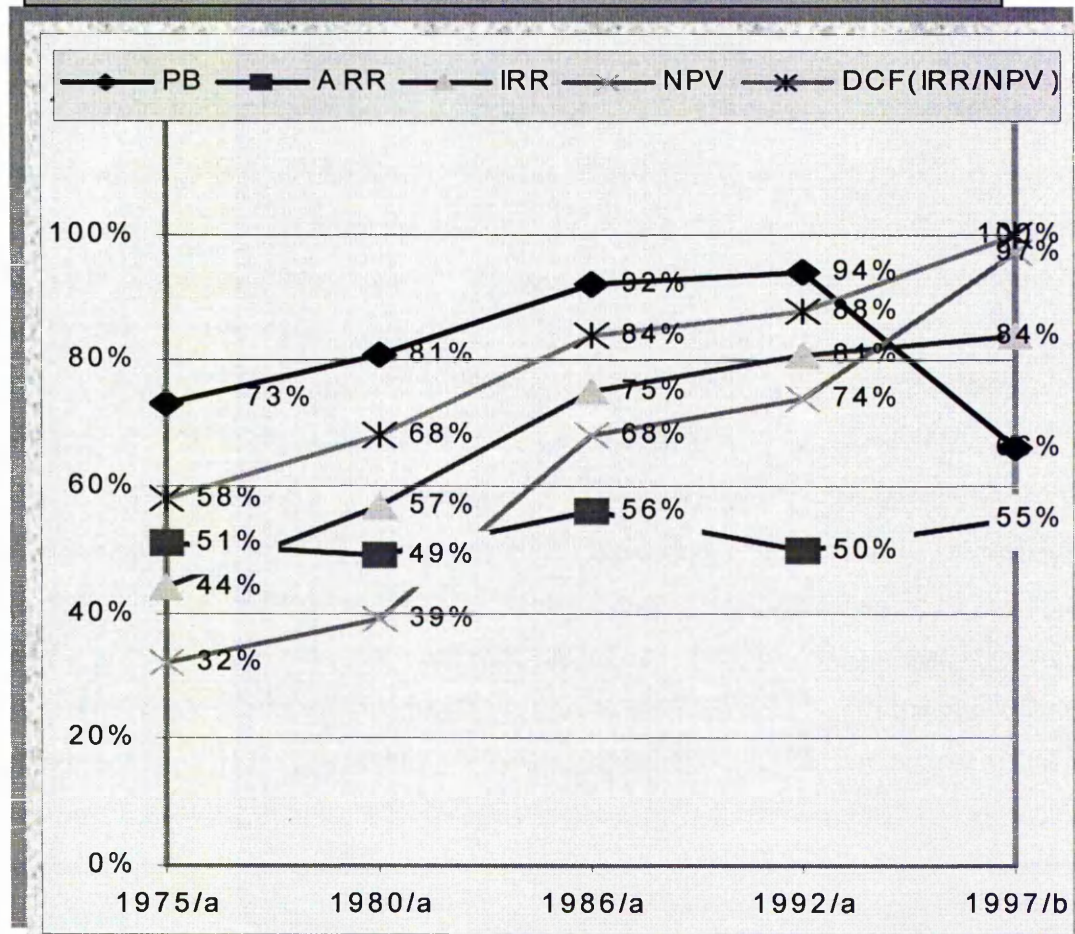
In 1975 DCF methods were used by only 58% of large U.K. companies (see Table 3.1 and Figure 3.1). However, most large U.K. companies adopted this technique by 1997. Pike's (1986) shows that 23% of large U.K. companies always used NPV whereas 42% always used IRR. However, finance theorists prefer NPV. Pike (1996) argues that the popular view is that academics prefer NPV while practitioners have a predilection for IRR is rapidly becoming part of financial folklore, as is the oft cited "theory practice" gap problem. In contrast, Arnold and Hatzopoulos (2000) show that in large U.K. companies NPV has overtaken IRR as the most widely used method, 97% of these companies used NPV compared with 84% that employ IRR. Pike (1996) concurs with Northcott (1998) that while the theory- practice gap may be narrowing, we know little about how managers use DCF information. The increased use of DCF would be due to the growth of computing power, which makes the calculation easy and at low cost (Pike, 1996, and Arnold and Hatzopoulos, 2000).

Table (3.1): Financial analysis techniques used for investment appraisal in large U.K. companies.

	1975/a	1980/a	1986/a	1992/a	1997/b
PB	73%	81%	92%	94%	66%
ARR	51%	49%	56%	50%	55%
IRR	44%	57%	75%	81%	84%
NPV	32%	39%	68%	74%	97%
DCF(IRR/NPV)	58%	68%	84%	88%	100%

a: Pike (1996) 100 firms, b: Arnold and Hatzopoulos(2000) 100 firms.

Figure (3.1): Development of financial analysis techniques used for investment appraisal in large U.K. firms.



In 1996 Tomkins and Carr found that in the U.K motor industry DCF was not widely used. They relate this to the strategic nature of many investments in the motor components industry. Carr and Tomkins (1998) examined whether companies used DCF techniques on particular types of investment decision. They found that only approximately half of their U.K. sample utilised DCF techniques at all. PB method is widely used by companies either as a primary or secondary evaluation technique (Lefley, 1994).

The use of multiple techniques has expanded during the last decade. In 1986 approximately one third of large U.K. companies used three or more methods

(Pike, 1988). By 1997 this percentage had increased to 76% (Arnold and Hatzopoulos, 2000)²⁶.

According to Pike (1984), firms that work in an environment of uncertainty use more sophisticated IATs than those working in more stable environments. On the other hand, Kim and Farragher (1981) found a negative relationship between environmental uncertainty and the use of sophisticated IATs.

3.4. Development of techniques to assess risk of major investment projects in large U.K. companies

There are three attributes of knowledge that a decision-maker can have about the occurrence of each state of nature: certainty, risk and uncertainty. Certainty exists if the decision-maker has complete knowledge of every relevant aspect of the decision and knows which outcome will result from each action.

Risk is as a decision-making situation with several possible outcomes with material statistical evidence relating to them. Risk in capital budgeting analysis refers to the decision-maker being uncertain about cash flows from the investment, which may involve undesirable consequences.

Uncertainty exists where there are several possible outcomes but there is little previous statistical evidence to help the decision-maker predict them. Business decision-makers do not live in a deterministic (certain) world. They live in a world of uncertainty - a world of probabilities (Arnold and Hope, 1983). Uncertainty arises from ignorance (resulting from a lack of information or knowledge) as well as from perceived changes that are hard to assess. As such, uncertainty is not only related to the consequences of investment alternatives but also to the possible alternatives themselves.

According to Slagmulder *et al.*, (1995), risk-handling methods can take two approaches. One is the simple risk-adjustment method, which is based on deterministic assessment and intuitive adjustments such as increasing the discount rate or shortening the required payback period. The second is risk analysis from management science, which includes probability analysis, computer simulation

²⁶ Because the true NPV is unknown, the astute financial manager seeks cues to assess whether the estimated NPV is reliable. For this reason, companies may use multiple techniques in evaluating investments Ross (1995).

and sensitivity analysis (Klammer *et al*, 1991). Probability analysis requires investment decision-makers to foresee possible outcomes and estimate the probability of each occurring. The weakness of the probability assignment approach is its subjectivity. Different probabilities can lead to different expected NPVs but it is an improvement on single-outcome assessment. Using probability distributions of possible outcome is a simple way of ensuring that risk is not ignored.

Simulation techniques are an extension of the probability approach. Several factors influence the final result of most investment projects including projected costs and revenues, the required rate of return, the life of investment, and its expected salvage value. Simulation allows each of these inputs to be treated as risky. Using a simulation approach (sometimes called "Monte Carlo Simulation", a decision-maker must: (1) identify the key variables of the investment project, (2) consider the range of values these variables might assume, (3) assign probabilities to each of these possible values, and (4) set up a computer application to conduct the simulation. The success of simulation ultimately depends on the decision-maker, who must ensure that key variables have been identified and that the range of values and probabilities attached to them are realistic (Northcott, 1998).

Sensitivity analysis is similar to simulation but is less comprehensive and complex. This approach identifies inputs to the investment decision with a significant impact on the outcome. Northcott (1998) argued that if changes in the value of a variable have little effect on the NPV outcome, then a correct investment decision is unlikely to depend on the accuracy of that variable's estimated value. She states that if a change in a variable does have a significant impact on the NPV result, "the capital investment is said to be highly "sensitive" to that variable, as the variable is making a significant contribution to the project's riskness".

Table (3.2) summarises the development of techniques used to assess the risk of major projects. It shows the most widely used risk technique is sensitivity/scenario analysis [used by (71%), (88%), and (89%) of large U.K. companies in (1986), (1992) and (1997) respectively]. However, this is often used

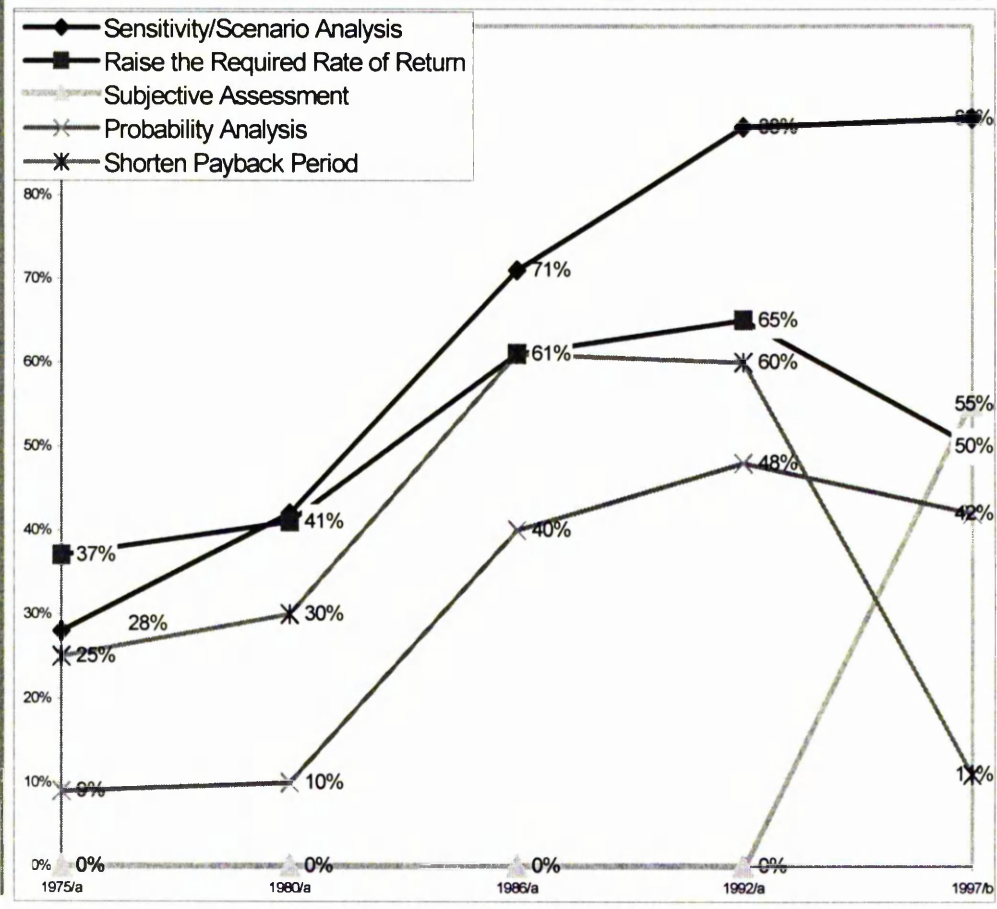
in conjunction with raising the required rate of return and/or subjective risk assessment.

Table (3.2): Development of techniques used when assessing the risk of major projects in large U.K. companies

	1975/a	1980/a	1986/a	1992/a	1997/b
Sensitivity/Scenario Analysis	28%	42%	71%	88%	89%
Raise the Required Rate of Return	37%	41%	61%	65%	50%
Subjective Assessment	n/a	n/a	n/a	n/a	55%
Probability Analysis	9%	10%	40%	48%	42%
Shorten Payback Period	25%	30%	61%	60%	11%
Beta Analysis	0	0	16%	20%	5%

a: Pike (1996) 100 firms, b: Arnold and Hatzopoulos's survey (1997) 100 firms.

Figure (3.2): Development of techniques used when assessing the risk of major projects in large U.K. companies.



For AMT investment project risk calculations sensitivity analysis is less important (Lefley, 1994). On the other hand, studies (e.g. Slagmulder and Bruggeman, 1992; Nixon, 1995; and Abdel-Kader and Dugdale, 1998) indicate sophisticated techniques of risk analysis are not employed for AMT and the only really popular technique is sensitivity analysis²⁷. Beta analysis and shortened payback periods are rarely used to adjust for risk. The CAPM is based on the principle that there is a relationship between risk and return. The more risky the investment, the higher will be the required return. The required rate of return on a stock is a function of the volatility (market risk) of its return relative to the return on a total stock market portfolio. This volatility is referred to as beta and is calculated by regression analysis. The CAPM involves forecasting all the cash flows of investment projects and then arriving at an appropriate discount rate to discount them to their NPV. However, setting discount rates at the right level is almost impossible in practical terms. Furthermore, the CAPM assumes a constant risk factor beta, which is surely encountered in practice because volatility changes through time. A detailed review of the empirical evidence with regard to the CAPM is beyond the scope of this study but it is worth noting that while it is a sophisticated approach in theory, it has significant practical difficulties. As shown in Table (3.2), shortening the payback period was only used by (11%) of large companies in 1997 compared to (60) % in 1992. Probability analysis was used by 42% of large U.K. companies in 1997.

Many scholars have investigated the application of capital budgeting techniques including Pike and Wolfe (1988), Pike (1988), Pike and Sharp (1989), Ho and Pike (1991 and 1992), Lefley (1994), Pike (1996) and Arnold and Hatzopoulos (2000). However, their findings are inconsistent regarding how capital budgeting techniques are implemented in the UK. For example, Lefley's (1994) study reported that the most popular technique of investment appraisal was the payback technique, used by 93.85% of the companies while 69.45% of respondents used either IRR or NPV²⁸. Lefley's study (1994) also suggests that the payback method was the most popular method of assessing risk in AMT investments, being used

²⁷ Abdel-Kader and Dugdale (1998) point out that sensitivity analysis is not a technique for risk analysis at all, since it merely indicates the most sensitive variables, not their probability of occurrence.

²⁸ Lefley's study was based on a sample of 134 large UK manufacturing firms

by 71.5% of the companies. The second most popular method was sensitivity analysis, which was used by 56.3% of the companies. In contrast, the studies of Pike (1996), Abdel-Kader and Dugdale(1998) and Arnold and Hatzopoulos (2000) reported that sensitivity analysis is the most widely used technique for dealing with investment project risk (88% and 89% of the companies respectively).

The studies of Pike (1996), and Abdel-Kader and Dugdale (1998) report that most companies use more than one technique in investment appraisal. They suggest an increasingly widespread use of sophisticated investment appraisal techniques such as NPV and IRR, with a preference for IRR over NPV. For example, Abdel-Kader and Dugdale (1998, p.273) point out that practitioners give the highest importance to the less sophisticated methods: “with the exception of discounted payback, all the measures of financial performance were seen as important, with the unsophisticated methods (PB and ROI) rating marginally more important than the sophisticated, DCF, methods”. On the other hand, studies such as that by Arnold and Hatzopoulos (2000, p.605) found that practitioners give the highest importance to the discounting techniques (NPV and IRR) and that NPV was rated higher than the IRR (97% of large firms use NPV and 84% use IRR, whereas only 66% use payback).

These results are inconsistent and reflect the need for further research to examine the extent to which decision-makers rely on financial evaluation techniques, and to examine the differences, if any, between the investment appraisal techniques used for evaluating strategic and non-strategic investments.

3.5. The role of financial evaluation

Researchers in the accounting literature are persuaded that conventional capital budgeting analysis is still important in strategic investment decision-making (Abdel-Kader and Dugdale, 1998). Most evaluation techniques are oriented to financial analysis. Northcott (1998) indicated that financial information is used by decision-makers to pursue “rationality”. Financial appraisal is seen as a formal part of the decision-making process (Finnie, 1988). Langley (1990, and 1991)

conducted research examining the process of investment projects and the applicability of formal analysis. She found that the significance of formal analysis of investment proposals was questionable. Other researchers (e.g. King; 1975, Finnie; 1988, and Accola, 1994) have argued that the role of financial appraisal is to rationalise judgements of managers on capital expenditure proposals. Strategic investment decision-making process involves available information, general strategic considerations, and environment factors, together with qualitative judgements. Therefore, some researchers considered that although financial analysis techniques might constitute a framework on which to formalise investment decisions, the techniques were unlikely to determine the decision outcomes. While financial analyses have an important part to play, they cannot produce meaningful answers without a consideration of the organisation's strategic objectives. Good analysis ties the details of strategy to the financial implications. Decision-makers need to treat financial analysis of capital investment projects as a part of a broader strategic analysis (Barwise, Marsh and Wensley, 1989). Quantitative accounting control systems may fail entirely to connect with the kind of successful investment decision-making that is required to bring real success. For the more successful companies, the strategic investment debate is recognised as involving so many uncertainties and complexities, that is almost tend to be qualitative (Carr *et al.*, 1994, Horngren *et al.*, 2002).

3.6. The limitations of conventional investment appraisal techniques

DCF model has long been considered the most effective technique for evaluating investment alternatives²⁹ but commentators have attacked DCF techniques for their theoretical and implementation problems in the real world over the last twenty years. The risky/uncertain nature of strategic investments creates problems with using conventional IATs. Ross (1994) (cited in Flatto, 1996), said: "I have become convinced that it is time to revisit the usefulness of NPV (net present value) and to reconsider just how much stock we want to place in it". He added:

²⁹ It is important to point out that the past decade has seen the emergence of three popular techniques for evaluating value creation. These are the equity spread model, the shareholder value approach, and the economic value-added model. For all their differences in implementation, each approach is fundamentally based on the DCF model.

“For most investments, the usefulness of the NPV rule is severely limited, if modern finance is to have major investment decisions as option pricing problems”.

The limitations of conventional financial appraisal techniques for strategic-investment decision-making can be summarised as:

1. Critics argue that financial criteria, particularly DCF models, are biased towards short-term investments whose benefits are more easily quantified than longer-term projects. Strategic investments may take years to become fully operational. For example, a flexible manufacturing system requires that several interactive interfaces be associated with one another before full system performance is achieved (Adler, 2000). Issues such as increased manufacturing flexibility or being more efficient at providing information are seen as esoteric and are unable to be fitted into the financial calculations of conventional appraisal models.
2. Researchers argued that DCF techniques are not inappropriate but are often improperly applied³⁰. For example, Kaplan (1986) stated that the challenge for managers is to enhance their ability to estimate costs and benefits of new manufacturing technologies in financial analysis. Further, he argued that it is impractical to quantify all of a new technology investment's tangible and intangible benefits such as manufacturing flexibility and better product quality. Where PB is used the target periods are often 2 to 3 years. Both militate against strategic investments such as AMT and problems are exacerbated when risk is dealt with by increasing discount rates or reducing PB periods³¹.
3. Conventional financial evaluations do not give enough weight to long-term benefits from better quality. For example, ROI measures do not link well with long-term strategy and market advantage considerations. Financial analysis is too narrow and does not improve the manager's ability to make important strategic decisions in accordance with the long-

³⁰ Kaplan (1986) stated “it may surprise managers that the real cost of capital may be in the neighbourhood of 8%.....many U.S. companies use hurdle rates of 15% or higher”.

³¹ Further, performance is evaluated on the basis of short-term accounting criteria, which do not match the long-term goals and strategies of firms (Slagmulder et al., 1995).

term goals of the organization. Consequently, U.K. and U.S.A. managers are often the targets of criticism regarding their strategic investment practices (Carr and Tomkins, 1996).

4. Conventional IATs cannot usefully contribute to strategic investment decision-making due to difficulties in capturing all the relevant information within financial information (Finnie, 1988). Traditional investment appraisal techniques are developed for capital investments whose future cash flows are predictable, and they rely heavily on the accuracy of the future forecasted cash flows. Strategic investments such as investments in AMT cannot produce as reliable cash flow forecasts as non-strategic investment projects. Further, risk associated with investment in AMT is difficult to assess due to the intangible benefits from the new project and the lack of past historical data for comparison.
5. Valuing irreversible investment opportunities under uncertainty using NPV does not take account of managerial options and treats capital assets as passively held. Conventional DCF methods fail to model the volatility of the market properly. Using constant risk-adjusted rates can lead to significant errors. DCF cannot be a reliable guide to strategic investment decision-making because of the unreliability of cash-flow forecasts.
6. Traditional capital budgeting techniques fail to capture the future flexibility embedded within projects. Operating policy may change as conditions change and managers receive new information (Cornel, 1993). NPV and IRR analyses do not recognise the value of management in responding to changing circumstances as they rely on information that is known at the time of the appraisal. Further, they assume a static environment where decisions are reversible without penalty. If an investment is not undertaken now it can be undertaken later with no restriction on one's options. This assumption is unrealistic in a competitive environment. DCF is incomplete if it fails capture important benefits from AMT (e.g. flexibility). DCF techniques are basically sound but flexibility is a highly desirable attribute in manufacturing systems is not easy to value in cash flow terms (Myers, 1984).

Yet, despite of the above flaws with traditional investment appraisal techniques, such techniques continue to be relied upon. As a consequence, there is the possibility not only for misguided investment decisions, but the possibility of a distortion of managers' business imperative.

To sum up, the literature on capital budgeting and formal strategic analysis suggests that finance theory offers only limited guidance for strategic investment decision-making. Strategic investment often depends on broader strategic considerations rather than financial analysis. Evidence on the calculation of numbers is not sufficient to declare a more 'rational' process (Pike *et al.*, 1989; Slagmulder *et al.*, 1995; Carr and Tomkins, 1996, and 1998). Elements other than financial evaluation techniques should be taken into account when making decisions about strategic investment, which is the concern of the following sections.

3.7. Evaluating strategic investment decisions

If decision models do not completely capture and represent all factors relevant to the investment decision managers may reject alternatives that should be accepted and/or accept those that should be rejected. Recently, an increasing number of companies have been struggling to rationalise strategic investments such as AMT investments³². AMT offer a wide range of attractive benefits over conventional technologies. These may be tangible or intangible and are interrelated. Tangible benefits can include labour cost savings which can be quantified in monetary value. Intangible benefits are not easily quantified in monetary value (Mensah and Miranti, 1989; Bromwich and Bhimani, 1991; Abdel-Kader and Dugdale, 1998). Mensah and Miranti (1989) classify the benefits of computer-integrated manufacturing into two categories: primary and secondary. Primary benefits include direct labour and direct material savings, which can be estimated from historical data. Secondary benefits include increased market demand due to improved process control and product reliability, and additional manufacturing capabilities and flexibility. Finnie (1988) mentions other advantages offered by

³² AMT is a manufacturing technology which has been developed in recent years with the primary objective of optimising production. Appendix (1) list the definitions provided by the U.S. Department of Commerce (1988) for a host of AMTs.

AMT such as higher market penetration due to short, reliable lead times, process dependability, protection from future inflation of labour costs and volume flexibility for market response. These benefits are difficult to capture by conventional appraisal models.

Researchers (e.g. Carr *et al.*, 1991; Bromwich and Bhimani, 1991; Kaplan and Norton, 1992; and 1996; Abdel Kader and Dugdale, 1998; Adler, 2000; and Covin, 2001) argued that the existing accounting-based decision models such as NPV and IRR ignore the importance of intangible benefits and are therefore no longer fully adequate for evaluating AMT investments. They contended that conventional IATs penalise strategic investments through high discount rates and short payback targets. The traditional rule suggests that a company should invest whenever the rate of return of a project is higher than cost of capital but there is evidence that firms do not invest until the rate of return rises substantially higher (Stark, 1990). Raising discount rates randomly may penalise investments with long-term benefits such as strategic investment in AMT and R&D (Slagmulder *et al.*, 1995; Abdel-Kader and Dugdale, 1998; and Atkinson *et al.*, 2001). Kaplan and Atkinson (1998) believe that the appropriate discount factor should be between 8% and 10%). On the other hand, 36% of UK manufacturing companies used discounts factors between 13% and 19%, while 30% used a rate in excess of 19% (Drury, 1990). Clear evidence can be found to explain why U.K. companies have such high costs of capital. Management compensation plans may be one reason, as may specific risk adjustments associated with strategic investments (Adler, 2000).

Since conventional capital budgeting models fail to adequately measure qualitative benefits, some authors recommend that some investments be classified as strategic and implemented regardless of financial justification. The best alternative is not necessarily the optimal one as ranked by net present value or internal rate of return, but the one that enables the firm to survive threats from competitors (cited in Accola, 1994). Criticism about managers' strategic investment practices continue to be voiced. Often Anglo-American managers are the target of this criticism. Carr and Tomkins (1996) recount how one German Chief Executive described American managers as more financial engineer, who had lost any feel or intuition for the products that they sell and market they serve.

Accola stated that criteria must be developed to determine whether an investment contributes to the firm's survival. Slagmulder *et al.* (1995) and Abdel- Kader and Dugdale (1998) have argued that investment in AMT should not be based on its economic value for the investing organisation but also on its consistency with the competitive strategy. Strategic considerations, especially the investment's fit with the competitive strategy and long-term strategic vision of top management play a significant role in decisions to acquire AMT when the expected financial return does not meet the minimum requirement. Decision-makers must take into account the coherence of types of strategic investment projects with other investments and activities which the firm has and may develop in the future. They must consider the present and future states of competition and markets: evaluations of market structure, changes in consumers' life-styles and preferences, the speed of technological evaluation, and possible 'windows of opportunity'; but these issues are ambiguous and it is difficult to incorporate them into reliable cash-flow predictions (Romelaer and Lambert, 2001). Information traditionally supplied to decision-makers limits them to a narrow view of the business because it fails to provide sufficient data on non-financial and external factors. Porter (1985) argued that traditional accounting may be a good source of information on absolute costs and value within an organisation but fails to provide equivalent facts about competitors (cited in, Carr and Tomkins, 1998). The study by Pike *et al.* (1989) addresses the importance of 16 factors in arriving at investment decisions. These factors are divided into four groups: strategic, quantifiable performance, qualitative performance and risk factors, and it was found that process industry firms assigned a higher average weight to strategic factors than general manufacturing and non-manufacturing firms. It was concluded that the most important factors for process industries were: "degree of fit with business strategy", "growth rate of market related to the project", "sensitivity to change in key assumptions" and "effect on product quality". The 'intangible' benefits generated from strategic investments are difficult to evaluate using conventional financial techniques. Butler *et al.* (1991, p.402) state that "in making decisions on strategic investments, quantifiable financial performance factors (whether measured by discount cash flow techniques, payback period, or impact on sale and

profits) were viewed as of secondary importance by most respondents [...] product quality, fit with business strategy and improving the competitive position of the firm were the most important factors considered by all informants". The capital budgeting techniques have less effect on final strategic investment decisions than strategic outcomes of formal decision-making processes (Carr *et al.*, (1994). Slagmulder and Burggeman (1992) investigated the investment analysis and justification processes of investment in AMT in six Belgian manufacturing companies. They reported that the quality of strategic analysis is an important factor in making decisions regarding AMT investments; the outcome of the financial analysis was not the key decision criterion in all cases. Some companies went ahead with projects even though the calculated return was lower than the hurdle rate.

3.8. The role of intuition and judgement in evaluating strategic investment decisions

Superior intuition is often developed through varied experiences in which relationships between phenomena can be more fully appreciated (Simon, 1987). Some researchers (e.g. Mintzberg and Waters, 1982; Simon, 1987) have linked intuition to a firm's success. Similar conclusions were reached by Eisenhardt (1990), who observed that decision-makers who could keep their organisations abreast with change in their operating environments performed better. He argued that the fast decision-makers were willing to rely on intuition as a primary basis for making key strategic decisions. In contrast, slower decision-makers, who were less effective managers in these environments, tended to emphasise formal, technical approaches to decision making.

Information for strategic investment decisions invariably has both quantitative and qualitative characteristics. Because uncertainty and complexity affect strategic investment decisions, managers should use their judgement. Judgement refers to the use of more qualitative and intuitive types of data than is provided by computation (Butler *et al.*1993, p.39). Judgement is a capacity for successful strategic investment decisions when no obviously correct model or rule is available or when relevant data is unreliable or incomplete (Hitt *et al.*, 1997).

Intuition based on experience is argued to provide a better basis for strategic decision-making than a purely rational approach (cited in Covin *et al.* 2001). Judgement rather than analysis is advocated as a normative approach for strategic decision-making. For example, Butler *et al.* (1993, p.92) noticed that for some companies “judgement is the dominant strategy of the decision strategies (rating even slightly above the computation strategy), with concerns about product quality and company image looming large”. They point out that “the decision regarding a new product may, even after all the costings have been carried out, rely upon the judgement of one manager according to a ‘feel’ for the direction of movement in the market. By drawing upon a reservoir of previous successful and unsuccessful practice a manager can judge the correct action to take although it may not be possible to explicate fully the reasons” (Butler *et al.*, 1993, p.9).

It is apparent that intuition can play a major and justifiable role in decision-making, particularly among decision-makers whose firms operate in a high-tech environment such as AMT. Thus, strategic investment decision-making must not be based entirely on financial analysis; qualitative intuitive judgement is a crucial factor in strategic decision-making. Ignoring either may make decision-making less effective. This is consistent with Cornel (1993), who argues that strategic investment is neither an art nor a science but both. There is enough science that decision-makers are not left to rely exclusively on experience but there is enough art that without experience and judgement, collapse is guaranteed.

Dissatisfaction with DCF techniques has led some researchers (e.g. Lefley, 1996) to raise a call for more sophisticated approaches to appraising strategic investment projects whose benefits are apparent only in the long run. There are two basic approaches that can be taken to developing alternative strategic investment appraisal techniques. The first approach involves reliance on analytical frameworks that represent significant departures from the conventional approach. Among these approaches are “activity-based costing”, “value chain accounting” and the “balanced scorecard. The second approach involves modifying the traditional investment analysis framework. In particular, its various technical shortcomings are corrected and expanded to include neglected benefits (e.g.

flexibility, improvements in information quality). Among these approaches are real option valuation techniques. Each of these alternative approaches to evaluating and selecting strategic investment decisions is discussed in more detail below.

3.9. Strategic methods for appraising strategic investment projects

An important function of any management accounting system is to provide managers with models that evaluate all relevant information needed for making investment decisions (Accola, 1994). Management accounting defined as a value adding improvement process of planning, designing, measuring, and operating non-financial and financial information systems that guides management action, motivates behaviour, and supports and creates the cultural values necessary to achieve an organisation's strategic, tactical, and operating objectives (Atkinson *et al.*, 2001). Management accounting identifies, collects, measures, and report information that helps managers in planning, controlling, and decision-making. This is commonly known as the technical-rational role of management accounting. Researchers such as Johnson and Kaplan (1987), Kaplan and Norton, (1992,1996), Ashton *et al.* (1995) and Butler *et al.* (1997) have highlighted the inability of traditional management accounting techniques to link a company's long-term strategy with its short-term actions. Further, they concentrate on the importance of including strategic non-financial measures in the management accounting system. Conventional approaches to management accounting are no longer adequate to deal with today's complex and uncertain business environment given their emphasis on financial, quantitative and historical information focuses mainly on short-run decisions³³.

Strategic Management Accounting (SMA) can be defined as the provision and analysis of financial information on the firm's product markets and competitor's costs and cost structures and the monitoring of the enterprise's strategies and those of its competitors in these markets over a number of periods (Guilding *et al.*,

³³ The limitations of management accounting systems can be summarized as follows:

1. Technical orientation: placing more emphasis on computational aspects of accounting.
2. Ignoring human-relations aspects such as motivation and perceptions.

2000 and Hoque, 2001)³⁴. CIMA in the UK defines SMA in its “Official Terminology” (CIMA, 2000, p.50) as “a form of management accounting in which emphasis is placed on information which relates to factors external to the firm, as well as non-financial information and internally generated information” (cited in Horngren *et al.*, 2002, p.745). Although no agreed comprehensive conceptual framework for SMA currently exists (Tomkins and Carr, 1996; Roslender and Hart, 2001), the applied literature suggests that SMA should incorporate strategic product costing and performance measurement, analyses of the firm’s product markets and competitive market forces, and the assessment of organisational strategies over extended periods of time (see Bhimani and Keshtvarz, 1999 and Bhimani 2001). While conventional management accounting adopts a historical orientation coupled with a focus on single decisions, single periods and single entities, SMA is oriented toward the future, and it seeks to emphasize the consistency of macro and micro level activities and short and long-term decisions (Horngren *et al.*, 2002).

Burns and Yazdifar. (2001) point out that changes in management accounting practices are producing new systems, based on techniques of SMA include “activity-based costing”, “value chain accounting” and the “balanced scorecard”.

Recently there has been considerable interest regarding the issue of competitor accounting. Several accounting academics and practitioners have argued that competitors accounting puts an organisation in the position of identifying opportunities as well as threats and arms the organisation with the knowledge that the organisation needs to make effective strategic investment decisions (Hoque, 2001). Contemporary management accounting literature has recognized competitors accounting as one of the key components of management accounting and control systems in organisations. Top US companies are now spending hundreds of million dollars on competitors accounting or competitor analysis (Guilding, 1999). Guilding (1999) documented the frequency and perceived

³⁴ In 1981 Simmonds coined the expression 'strategic management accounting' (SMA) for the accounting information that would assist strategic investment decisions-makers (Lord, 1996). Guilding *et al.*, (2000) reported the results of a questionnaire survey that investigated the incidence and perceived merit of 12 SMA practices in New Zealand, the UK, and the USA. They found that most of the SMA practices appraised are not widely used. As Bhimani points out, the term strategic management accounting is not presently widely used or understood in practice. According to Roslender and Hart (2000) who refer to Shields (1997), the term SMA is completely absent from the contemporary North American management accounting literature.

usefulness of competitors accounting in light of the insights taken from contingency theory literature using a mail-out survey in New Zealand's 230 largest companies. His survey focused on competitors accounting practices. His study found significant relationships between competitor accounting practices and competitive strategy, strategic mission and company size. The competitor analysis approach assumes that the company with high emphasis on competitor analysis will perform better in their strategic investment decision making than the company with no emphasis on competitor analysis. This study examines best practice benchmarking and value chain analysis as ingredients of competitor accounting. Best practice benchmarking and value chain analysis adopted, here, as two key ingredients of competitor accounting/ competitor analysis approach where the focus of the paper on strategic relevance.

Management accounting can supply useful data for benchmarking analysis. In benchmarking it is not sufficient to look only at traditional cost and budget data. It is necessary to look at a wide range of external information on the company customers, suppliers and competitors. Management accounting literature labels them as 'broad-scope' management accounting system information which combines a measurement of quantitative and qualitative information (Hoque, 2001). Benchmarking is an integral part of the organisational improvement process, and it looks for ideas to borrow from those who are doing better. Benchmarking analysis helps the organisation to increase its productivity growth further and to 'Breakthrough' to a higher standard of performance. Benchmarking literature identifies numerous advantages; (1) indicates early warning of competitive disadvantage, (2) promotes competitive awareness, (3) identifies the best practice, (4) links operational tactics to corporate strategy, (5) exposes performance gaps, and (6) helps companies redefine their objectives (Elenathan, Lin and Young, 1996; Bendell, Boutler, and Goodstadt, 1998; Digman, 1999).

Value chain analysis helps understand where and how a firm adds value. Within such an exercise the amount of value added, rather than costs, are assigned to each activity. The value chain is the basic tool for systematically examining the activities a business performs and how they interact, and are necessary in order to determine its resources of competitive advantage. Porter (1985) presents value

chain analysis as a means to gaining competitive advantage. Value chain analysis owes much to Porter's (1980, 1985) books on competitive strategy, which draw attention to strategies for cost leadership and differentiation leadership. According to Shank and Govindarajan (1992), value chain analysis is essential to determine exactly where, in the firm's segment of the chain from design to distribution, customer value can be enhanced or costs lowered (cited in Carr and Tomkins, 1996).

Shank and Govindarajan have used accounting inputs to value chain analysis within a strategic cost management approach. They give several examples of how value chain analysis results in different decisions to those obtained by using traditional management accounting techniques. Shank (1996) builds his empirical analysis on a case study of a company in the U.S.A., highlighting the limitations of traditional financial analysis and showing that, by adopting a systematic analysis of strategic implications, one can see the project in a different way. SCM attempts to substantially broaden the traditional financial analysis with an explicit consideration of strategic issues. Shank addressed the following three strategic cost management (SCM) themes, which should be considered in AMT appraisal; "value chain analysis", "cost driver analysis" and "competitive advantage analysis". These three themes can readily be discerned in practitioners' concerns with the quality and reliability of outputs, the requirements of customers, greater manufacturing flexibility, and keeping up with the competition (Carr and Tomkins, 1996). SCM seeks to manage costs for both financial and competitive advantage and for both long-and short-term control. The success of this aim is supported by its integration of the fields of management accounting, production, and strategic planning. As such SCM provides the informational fuel for powering the organisation's formulation of strategies, and development and implementation of strategic controls. From the three SCM themes, managers begin to gain insights into such important questions as "What will be the effect of strategic investment decision on the firm's ability to enhance the value chain?" and "What competitive advantages can be gained from adoption of the strategic investment decision".

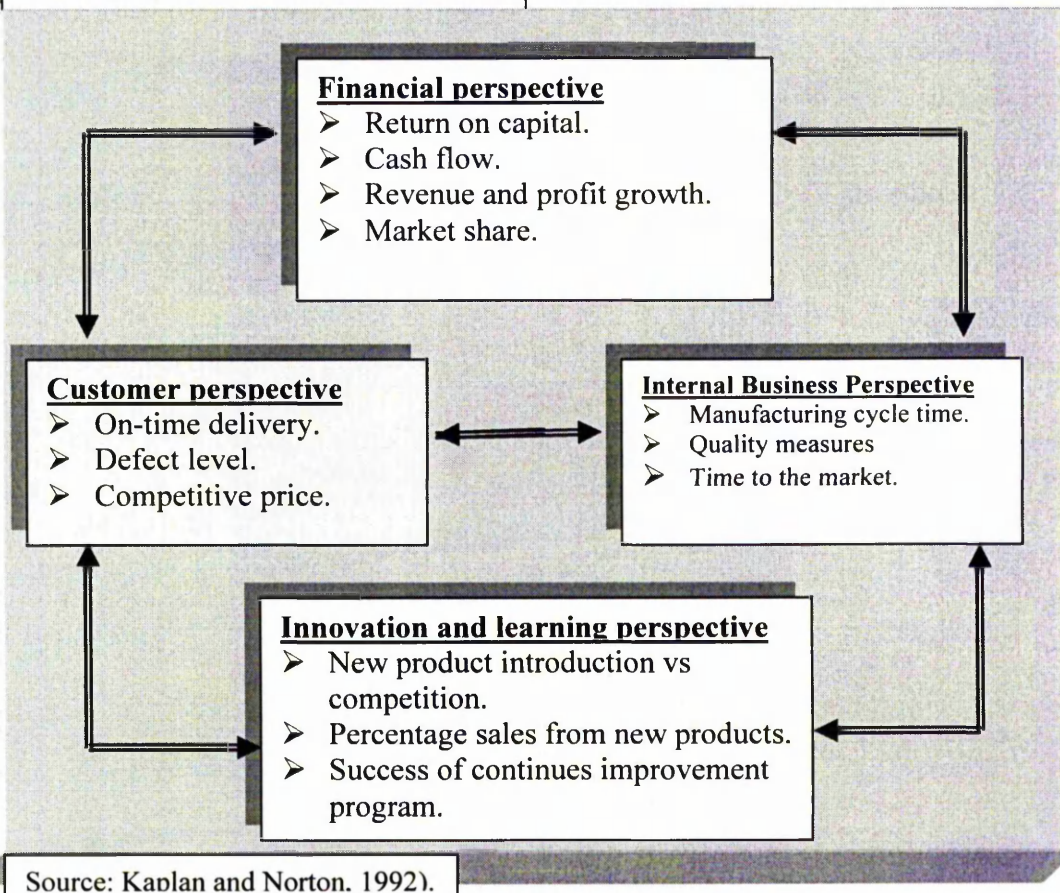
Technology roadmap is a planning process that is driven by the projected needs of tomorrow's markets. It helps companies to identify, select and develop technology

alternatives to satisfy future service, product or operational needs. It brings together a team of experts to develop a framework for organizing and presenting the information to make the right technology investment decisions. And it provides a way to leverage those investments. The concept has gained widespread recognition in U. S. business. The American firm Motorola, for example, has seen tremendous returns on the technology roadmap in the late 1980s. Canadian companies are now beginning to realize just how powerful this planning tool can be. Technology roadmap; (1) helps an industry predict the market's future technology and product needs, defines the "road" that industry must take to compete successfully in tomorrow's markets, (3) guides technology R&D decisions, (4) increases collaboration, shared knowledge and new partnerships, (5) reduces the risk of costly investment in technology, and (6) helps the industry seize future marketing opportunities. (Willyard and Mc Cless, 1987; Barker and Smith, 1995; Groenveld, 1997; Peet, 1998; Banigan. 2000).

Researchers (e.g. Kaplan, 1986) argued that the criticised of traditional appraisal techniques are in truth a function of the user and not the technique itself. For example, the use of statistic discount rate is surely the mistake of the NPV user. Likewise, the adoption of a narrow organisational perspective and the overemphasis on the short-term is again the mistakes of the user. Kaplan and Norton (1992, 1996) devised the 'balanced scorecard', this is a set of measures that link financial and non-financial measures of performance and give managers a comprehensive view of business (Drury, 1997). Figure (3.3) illustrates how the balanced scorecard links performance measures. It allows managers to look at the business from four different perspectives: customer, internal business process, the innovation and learning and the financial. Thus, the balanced scorecard does not focus solely on achieving financial objectives. It also highlights the non-financial objectives that an organisation must achieve in order to meet its financial objectives. Strong improvements in non-financial measures signal the prospect of creating economic value in the future. For example, an increase in customer satisfaction signals higher sales and income in the future. The balanced scorecard focuses on short-term and long-term performance. In other words, it translates an

organisation's mission and strategy into a comprehensive set of performance measures that provides the framework for implementing its strategy.

Figure (3.3): The balanced scorecard.



Source: Kaplan and Norton. 1992).

Other frameworks have been advocated for appraising strategic investment projects. For example, Abdel-Kader and Dugdale (2001) propose a framework for the evaluation of investment in AMT which integrates both financial and non-financial factors. They demonstrate that can be done using mathematics of the analytic hierarchy process and fuzzy set theory. They are not the first try to and integrate both financial and non-financial factors in evaluation. For example, Bromwich and Bhimani (1991) developed a structured approach to the appraisal of strategic investment in AMT. The focus of their model was on evaluating a company's strategic plan and how new technologies could exploit strategic

opportunities. Tomkins (1991) argues that the finance theory adopts DCF methods as an accepted evaluation criterion for any assets. But whilst the portfolio management analysis of corporate strategy may take some account of DCF, it is not a central concept. A major element of strategic investment decision-making may depend on the place of investment in total strategic plan for the company. Finance theorists tend to disregard this and suggest quite simply that all positive NPV projects should be accepted. Tomkins provides a framework for understanding effective corporate resource allocation decisions and attempts to create a multi-disciplinary model capable of describing how a range of business disciplines must come together.

Thus, strategic investment decision-making entails the strategic evaluation of organisational issues. Many diverse factors may thus be relevant in the provision of strategically oriented management accounting information include financial and non-financial information. The findings of Burns and Yazdifar (2001)³⁵ show that traditional tools and techniques are more popular among practitioners than new techniques such as economic value added, balanced scorecard, activity-based costing and target costing, whose importance is often undervalued. Accordingly, one of the major concerns of this study is to examine to what extent recently developed analysis techniques are employed in the evaluation of strategic investment decisions.

Dissatisfaction with DCF techniques has led to a growing literature focusing on the theoretical development of capital budgeting with more emphasis on the value of managerial flexibility in handling asset investments. The literature suggests that strategic benefits cannot be captured by financial measures but can be captured, to some degree, using real option valuation techniques³⁶. Combining qualitative insights from strategic options analysis with quantitative outputs from a DCF analysis provides managers with a rich body of information to make decisions.

3.10. The real options approach (ROA), the new frontier

³⁵ A survey based on questionnaire (1000 qualified *CIMA* members).

³⁶ The linking of real options theory in Finance with strategic options offers an interface between Finance and Strategic Management (Dempsey, 2003).

Conventional DCF has failed to capture the essence of strategic investment decision-making. In the last two decades, attention has been directed to the problems of traditional DCF analysis to evaluate projects involving uncertainty and decision flexibility. The conventional NPV model ignores the option properties of the investment opportunity and the “variability of outcome” (Lumby, 1995). This can result in the underestimation of the value of an investment when price uncertainty and decision flexibility are present. Such a model assumes that management’s ability to re-evaluate their decisions based on the availability of new information remains inflexible (i.e. a decision can only be made on the basis of information available at the time of the decision). Difficulties are caused by simultaneous interrelations between the expected cash flow, the risk-adjusted discount rate, the optimal strategy, and the values obtained. Various authors have argued for option-pricing models to evaluate strategic investments (e.g. Dixit and Pindyck, 1993 and 1995; Trigeorgies, 1993,1997 and 1999; Luchrman, 1998a,b; Perlitz *et al.*, 1999; Anderson, 2000; and MacDougall and Pike, 2003).

3.10.1. What is ROA? ROA is revolutionising decision-making because it is a new technique used in strategic investment decision-making that allows flexible decisions to be made under conditions of uncertainty. It focuses on the total risk of the investment, which is what managers worry about and act on (Amram and Kulatilaka, 1999).

MacDougall and Pike (2003, p.2) define strategic options as “the opportunities latent in an investment, which, if exercised, enhance competitive advantage”. They offer as examples “the option to take advantage of changes in consumer demand, respond to or curtail competitors’ actions or to make subsequent, contingent investments which add potential and value to the initial investment”. The term ‘real options’ was coined by Myers (1984) to address the gap between strategic planning and finance. The basic principle of the option approach is to think of any future investment opportunity as a ‘growth option’, which is analogous to a call option on securities. The focus of the real options approach is on value enhancement, and it integrates strategic considerations logically and systematically into the capital budgeting process. As argued by Amram and

Kulatilaka (1999), present value calculations are needed as a check on strategic analysis and vice versa. A real option is the right but not the obligation to acquire the gross present value of expected cash flows by making an irreversible investment on or before the date the opportunity ceases to be available. Although this sounds similar to NPV, real options only have value when investment involves an irreversible cost in an uncertain environment. The beneficial asymmetry between the right and the obligation to invest under these conditions is what generates the option's value.³⁷

Real options value the ability to invest now and make follow-up investments later if the original project is a success (a growth option). This kind of option characterises pharmaceutical R&D rather well, for example. Real options can also value the ability to abandon the project if it is unsuccessful. Furthermore, they can value the ability to wait and learn, resolving uncertainty before investing (a timing option). ROA is the extension of financial option theory to options on real assets. While financial options are detailed in the contract, real options are embedded in strategic investments. Like financial options, there is an underlying asset, but, unlike financial options, real options are not commonly traded and may involve more complex methods of valuation. There are two fundamental assumptions behind ROA. First, investment decisions are characterised by uncertainty. Second, decision-makers can benefit from managerial flexibility to adapt to uncertain developments, so that the degree of managerial flexibility becomes a necessary competitive instrument in achieving the goal of value creation (Trigeorgis 1999). ROA provides means of incorporating the impact of uncertainty inherent in the project, and guides decision-makers on the different strategic alternatives regarding long-term strategy. There are a number of different valuation formulas for the analysis of investment decisions involving real options, derived from models that were developed to value financial options, the most common being the Black-Scholes formula and the binomial model.

³⁷ There are two basic types of financial options: call options and put options. A call option gives the holder the right to buy the underlying asset by a certain date for a certain price. A put option gives the holder the right to sell the underlying asset by a certain date for a certain price. Options can also have different exercise and expiry features. "European options can be exercised only on the expiration date itself. American options can be exercised at any time up to the expiration date" (Hull, 1997).

3.10.2. Project flexibility and ROA: When and where can ROA add value?

To maximise a firm's value its managers must match internal capabilities to external opportunities. Flexibility in the timing of decisions about the firm's capabilities and opportunities give managers 'real options'. It is how real options deal with uncertainty and flexibility that generates their value. Real options are not just about 'getting a number'; they also provide a useful framework for strategic decision-making. The key idea of real options is to measure flexibility quantitatively. ROA has been applied to a wide variety of project characteristics including deferring investment commitments, choices in selection, sequential alternative actions, and follow-on investment opportunities. Thus, it tackles some of the problems that traditional methods cannot address.

Companies may decide to invest in market research to estimate the probability of a given product's acceptance by consumers. Investments in market research, like those in R&D, thus have a value linked to future opportunities; such investments cannot be measured merely in terms of the cash flows directly connected with the project. Although the costs for this type of investment may be relatively well known, the benefits are highly uncertain. Nonetheless, a decision-maker may decide to proceed with the investment if his/her estimation of the value of future opportunities satisfies the costs (even if the NPV is negative). An emerging trend in R&D project valuation is the use of a real options approach, which permits a more flexible assessment of future growth opportunities. R&D projects typically have high associated uncertainties with no immediate payoffs. Indeed, such investments are not made on the expectation of immediate payoffs but on that of creating future profitable investment opportunities. Myers (1984) was the first to emphasise that conventional DCF techniques are not suited to the valuation of R&D projects because the total economic value of such investments includes an option value associated with future opportunities. This argument leads to a conclusion which decision-makers seem to understand already: that there is something wrong with the simple NPV rule as it is taught, in that there is value in waiting for more information and this value is not reflected in the standard NPV calculation.

Conventional investment appraisal techniques work well when there are no options at all, or when there are options but little uncertainty. However, Amram and Kulatilaka (1999) address different situations where the ROA can be used, including (1) when uncertainty is large enough that it is sensible to wait for more information, avoiding regret over irreversible investments and (2) when there is a contingent investment decision with flexibility associated with it.

The concept of real options is thus an extension of the concept of flexibility. Strategic flexibility is especially critical in high technology areas because products, manufacturing processes, markets, distribution channels and competitive boundaries are in a state of continuous flux³⁸.

When dealing with flexibility, an 'option' can be described in qualitative and subjective terms; flexibility is typically measured qualitatively. The key idea of ROA, however, is to measure flexibility quantitatively. To take advantage of the conceptual link between real options and financial options when considering an investment appraisal with flexibility, it is important to identify the options associated with it.

Most previous research into real options applications classify real options into six categories based upon the type of flexibility provided. The categories are: an option to defer; a time to-build option; an option to contract; expand or temporarily shut down; an option to switch input or output; a growth option and interactions among multiple real options (Perlitz *et al.* 1999).

According to Triantis and Hodder (1990), Myers (1977) showed that options analysis is an appropriate valuation technique for a firm's growth opportunities. By understanding the drivers of option value and using insight from financial option pricing, stronger intuitions can be applied to value-enhancing strategic decisions.

Real options focus on 'dynamic complexity': the evolution over time of a few complex factors that determine the value of investment and cash flows. The following are factors about which decisions can be taken at any time over a

³⁸ There are two types of flexibility associated with a project. The first type is the flexibility internal to the project itself. Such flexibility allows the project to be modified as future conditions change (These changes can include expansion, alteration and even abandonment of the project). The other type of flexibility is external. This type of flexibility means that performing this project will now allow us to perform another project that may not have been possible originally (Flato, 1996).

period: the current value of the underlying asset (the present value of cashflows from the investment under consideration), the exercise price (the investment cost paid when the option is exercised), the time to maturity of the option (how long the opportunity exists to delay the investment decision), the volatility (the risk) of the underlying investment measured by the standard deviation of the rate of return on the underlying investment, the risk-free interest rate and the payout on the underlying asset (e.g. dividend rate). To enhance the value of a growth option, the present value of the underlying investment opportunity needs to be increased through better product design, while the investment cost (or exercise price) should be decreased. Similarly, the value of a put option increases with its exercise price. When one has to decide today whether or not to invest, an option provides the ability to wait for additional information before making the investment decision. What makes an option valuable is the amount of relevant information that can be obtained during its life. It is important to point out that how information is acquired can have a significant effect on the value of the option to the firm. To increase the information available to make a future decision, a firm could try to lengthen the maturity of its option, or speed up the rate of acquiring information. A defining element of the new economy is the facility with which information can be gathered quickly and accurately. The speed and accuracy with which firms can now acquire information means that they can make informed decisions much more quickly. This underscores the importance of investing in information acquisition technologies as a competitive tool to allow earlier exercise of a firm's growth options. Also, one of the important strategic decisions that may face a firm is the decision to kill a project: should it be abandoned as soon as it becomes unprofitable or should abandonment be delayed?, (which is similar to the rational behind waiting to invest). The trade-off between immediate exercise and delayed exercise can be formulated using a binomial option-pricing model.

Having explained the concept of real options, and when and where ROA can add value, it is worthwhile to highlight the gap between the theory and the practice of ROA. The researcher interested to see whether ROA is entering practice or whether it is still just a theory. This will be the major concern of the next section.

In an increasingly uncertain and dynamic global market place, strategic adaptability has become essential if firms are to successfully take advantage of favourable future investment opportunities. In this regard, both theoretical analysis and empirical evidence lead to the conclusion that the NPV rule does not properly evaluate the strategic impact of investment decisions. There is growing interest in using theoretical perspectives of real options to guide both capital budgeting and strategic decisions in dynamic environments. ROA is coming to be seen not merely as a new investment appraisal technique but as a management process (Trigeorgis, 1999). The insights it provides help bridge the gap between business strategy and finance, since it recognises the importance of active managerial flexibility in both adapting to a changing market environment and reacting to competitive moves. In contrast to the conventional use of discounted cash flows in capital budgeting and competitive analysis, a strategic options perspective provides a more proactive assessment of future business opportunities in circumstances of uncertainty.

Many papers published in the area of ROA in the early 1980s focused primarily on the modelling aspect. Later, the emphasis shifted to decision-making processes, following an approach involving both finance and strategy. With respect to decision-making processes, different areas such as company valuation, financial structure decisions and competitive strategy are currently under examination (Trigeorgis, 1999). Yet although, a few companies have recently started to employ ROA, it has not so far been widely used to analyse business opportunities and adaptability in strategic investment decisions. There is also an inconsistency between the mathematical sophistication of option pricing models developed in financial economics and their theoretical application in strategic management.

In general, the literature regarding ROA can be divided into two categories. First, there are studies which provide the theory underlying ROA and give examples of how it can be used to recognise the value of projects (Brennan and Schwartz; 1985, Sick, 1989; and Dixit and Pindyck, 1993 and 1995). Second, there are those which develop quantitative models to demonstrate how ROA can impact on a project's overall value (Majd and Pindyck, 1987; Bjerksund and Ekern, 1990; and

Trigeorgis, 1993, 1997, and 1999). Alkaraan (1999) reviews the main research efforts in ROA and gives examples of different kinds of options.

ROA is moving from early applications in natural resources and real estate to new product development in pharmaceuticals and valuation in high tech industries. Applications are now seen in transportation, power, information technology, telecommunications, R&D, and corporate restructuring (Trigeorgis, 1999).

ROA can support the strategy creation process because it expands the vision and alternatives considered in strategy creation, and it translates a strategic vision into a tactical investment plan. The main economic forces that create the need for a ROA to strategy creation are the shortcomings of conventional tools in capturing the upside potential and trade-offs required in strategic decisions (Amram and Kulatilaka, 1999). Dixit and Pindyck (1994) point out that the literature on real options suggests that uncertainty (risk) is an important factor influencing the value of different options. They argue that the total risk and the degree of irreversibility of an investment opportunity are important factors in real option values. They further conclude that almost all investment opportunities are partially or completely irreversible, with some degree of uncertainty attached to them, so investment decision-makers can influence the timing of the investment.

Thinking about future investment opportunities based on ROA has provided powerful new insights and has already enabled substantial progress in modern corporate resource allocation. For example, ROA stresses the importance of 'wait-and-see' flexibility, suggesting that managers should wait until the project is more clearly successful before committing themselves. During postponement, new information may be revealed that might affect the desirability of the project. Trigeorgis (1999) discusses how these opportunities could be created through strategic investment. Appendix (2) lists examples of growth and flexibility options from a variety of different industries.

3.10.3. Can the ROA literature fill the gap between traditional capital budgeting techniques and the qualitative strategic way of thinking?

Many traditional issues in business strategy are being revisited from the ROA perspective, combining the underlying options logic with principles from industrial organisation and game theory. It is important to point out that ROA allows a reconciliation of strategy and finance under what may be called 'strategic capital budgeting'. Strategic considerations become an element that interacts with other aspects which together define a firm's optimal strategy. ROA highlights the role of managerial flexibility in a context of uncertainty, and different elements contribute at different levels to the investment's implementation. The appearance of ROA, as a model appropriately modified to reflect the need for managerial operating flexibility and strategic interactions was a reaction to the dissatisfaction of corporate practitioners and strategists who were trapped intuitively with indefinable elements of such interactions. The literature on ROA provides an important bridge between conventional quantitative capital budgeting methods and qualitative ways of thinking about strategic investment decisions.

ROA does not provide a complete set of solutions for many problems that arise from strategic investment decision-making:

- a) ROA provides a framework that quantitatively supports intuition. It gives a better understanding of flexibility by placing a value on it but this is not easy to calculate, and it is not possible to give useful rules of thumb on valuation because of the variety and complexity of possible solutions. There are various factors affecting the input variables in real options.
- b) The complex nature of ROA needed to analyse flexibility in strategic investment decisions makes the detailed application of these principles difficult and, as a result, the typical firm is likely to need specialised help in using such ideas. Different types of real options need different models, which require a high level of mathematics. The solution of such complex mathematical models normally requires numerical methods together with computing techniques. The mathematics of real options is, therefore, likely to be used only in large investments when the cost of using specialists can be justified.
- c) Alternatively, using ROA without full specialist input requires making a number of simplifying assumptions that may not be particularly realistic.

- d) An investment project often contains more than one real option. It is difficult to value each option separately because most real options are correlated and must therefore be valued as compound options (Perlitz *et al.*1999; Trigeorgis, 1997 and 1999).
- e) Strategic options exist whenever management has any flexibility regarding the implementation of a project but flexibility is not always seen as desirable and may be unavailable as a result of legislation, regulation or commercial commitments (see Busby and Pitts, 1998).

Despite these shortcomings, ROA provides a systematic way of modelling investment opportunities and supporting management decisions regarding flexibility and strategic options. It is necessary to bear in mind that its use for analysis of strategic investment decisions is relatively new. Even with a growing body of knowledge, the majority of work that has been done remains confined within the academic community. As pointed out by Busby and Pitts (1998), most survey respondents were not aware of the term 'real options' the expression frequently used by researchers to describe investment flexibility. Few decision-makers were aware of academic research in this field, and they believe that it should be made more accessible to managers before it would be used. The findings of Busby and Pitts show a gulf between practitioners in the business community and researchers. Therefore, ROA must be seen as largely untested; it is very early to make any final judgement on the importance of its contribution to strategic investment decision-making.

On balance, however, despite the considerable recent interest in ROA, it is difficult to commend it definitively as better than conventional IATs for the evaluation of strategic investment decisions. These difficulties lie in the characteristics of ROA itself.

3.11. Summary

Many scholars have investigated the application of capital budgeting techniques but their findings are somewhat questionable concerning how capital budgeting techniques are implemented in the UK. This reflects the need to examine the extent to which decision-makers rely on financial evaluation techniques, and to

examine the differences, if any, between the investment appraisal techniques used for evaluating strategic and non-strategic investments. The capital budgeting techniques have less effect on final strategic investment decisions than strategic outcomes of formal decision-making processes. Investment decisions are not always determined by financial evaluations. Often they are used merely to provide *post hoc* quantitative support for a particular decision. Non-financial criteria such as product quality, fit with business strategy and improving the competitive position of the firm are important factors influencing strategic investment decision-making. Decision-makers must take into account the compatibility and coherence of investment project with the other investment and activities the company has today and may develop in the future. This involves scanning the present and future states of competition and markets: changes in consumers' life styles and preferences and possible existence of windows of opportunity; but these issues are ambiguous and it is difficult to incorporate them in reliable cash-flow predictions. From these imperfections it results that decision-makers must be experienced who also use judgement and intuition, and not just technocrat anchored on financial calculations. Thus, strategic investment decision-making must not be based entirely on financial analysis; qualitative intuitive judgement is crucial. Ignoring either would make decision-making less effective.

The next chapter further describes the research framework and discusses the major objectives of the research. It provides a link between the literature presented in the previous chapters and the empirical research design. The research strategy and data collection methods will be selected, discussed and justified.

Chapter Four

Empirical Research Design:

A Survey of Large UK Manufacturing Companies' Practices

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Chapter Four

Empirical Research Design:

A Survey of Large UK Manufacturing Companies' Practices

4.1. Introduction

Most research on strategic investment decision-making processes describes them as a sequence of phases or steps based on a rational economic perspective (Chapter Two). This perspective has dominated normative capital investment theory and the techniques and approaches (Chapter Three). It is apparent that there is a clear theory-practice gap. It is often forgotten that capital investment decision-making is a human activity rather than an objective, mechanical procedure (see section 2.4). Indeed, the way investment decisions happen in the organisation depends on who has access to the decision, what biases and information sources they have, and which decision procedures and methods take place to harmonise different views or solve conflicts, etc. As discussed in Chapter Two, there are people behind the process. It is human

appreciation of capital investment decision making which appears to be missing from the rational, economic models. All these indicate that it is misleading to focus only on the quantitative financial tools used in capital investment analysis (see section 3.6).

This chapter links the literature discussed in earlier chapters with the aims of this empirical study. It outlines the motivations underlying the research questions, and it justifies the research strategy and collection methods. It determines the underlying research hypotheses, which form the focus of this thesis, together with a summary of the questionnaire format, sample frame and size, and responses to the questionnaire.

4.2. Research motivations

The major motivation underlying this study is to achieve an enhanced understanding of strategic investment decision-making and investment appraisal. Previous studies reveal that capital budgeting techniques have become increasingly popular during the past decades and that DCF methods and PB are the most popular techniques (see section 3.3); however, they ignore the importance of non-financial factors (see section 3.6). Exceptions are the studies of Pike 1988, Pike *et al.*, (1989) and Abdel-Kader and Dugdale (1998).

Strategic investment decision-making entails the strategic evaluation of organisational issues, here many diverse factors may be relevant, include financial and non-financial information. Part of this study will examine the extent to which such information types are relevant to strategic investment decision-making (see section 3.9).

Most previous research on capital budgeting practice focuses on the rational economic analysis of investment proposals and ignores the dependence of investment decisions upon organisational context. Researchers (e.g. Arnold and Hatzopoulos, 2000) argued that limited attention is paid to other stages of investment decision-making process, such as development of proposals into projects, early screening to ensure that they are compatible with strategy development, and selection, which contains the choice evaluation and authorization routines. It is becoming apparent that the complex organisational activity of strategy formulation cannot be separated from

the strategic investment decision-making activity (see section 2.6). Yet we have limited knowledge of just how strong the link between strategy and strategic investment is in practice.

Theoretical speculations and empirical work confirms relationships between contextual factors and organisational processes. It is also interesting to note that an inverse relationship has also been reported (see section 2.5). Thus, there is a need for further research which adequately integrates the various contextual factors that bear on strategic investment decision-making processes, and assesses the role and significance of each.

Researchers (e.g. Fredrickson, 1985; Papadakis, 1993) have argued that little attention has been directed toward empirical studies. Most notable work on strategic investment decisions is based on small sample case study explorations (Table, 2.7). Undoubtedly, the case study approach to examining organisational decision-making has provided a thorough insight into process, opening a rich avenue of inquiry for researchers tempted to explore this area (Papadakis, 1993). Simon (1979, p.508) points out that " case studies of organisational decision making represent the natural history stage of scientific inquiry. They provide us with a multitude of facts about the decision making process. But we do not yet know how to use these facts to test the model in any formal way. Nor do we quite know what to do with the observation that the specific decision making procedures used by organisations differ from one organisation to another".

To our knowledge, with the exception of Papadakis (1993), there exists no large-scale empirical research attempting to quantitatively assess the influence of contextual factors on strategic investment decision-making. Moreover, the empirical testing of Papadakis's study (1993) was based solely on industrial companies operating in Greece.

4.3. Research objectives

The proposed research focuses on how strategic investment decisions are taken and the factors influencing the dimensions of strategic investment decision-making

process (Figure, 2.2). The main aim of this empirical study, as set out in Chapter One, is to contribute to the literature on strategic investment decision-making. To that end, it concentrates on four aspects of strategic investment decision-making: the decision-making process, strategic (i.e. non-financial) factors, conventional and strategic appraisal methods, paying particular attention to the following research questions:

- 1) To what extent do decision-makers rely on financial evaluation techniques and to what extent do they rely on standard capital budgeting methods to justify them?
- 2) What are the differences, if any, between investment appraisal techniques used when evaluating strategic investments and those used in the case of non-strategic investments?
- 3) How do financial decision-makers in U.K. companies analyse the external environment, including information about markets, and how is non-financial information taken into account?
- 4) To what extent are recently developed analytical techniques and information (e.g. the application of real option valuation theory, benchmarking, and a balanced scorecard) employed in the evaluation of strategic investment decisions?
- 5) To what extent do decision-makers use their experience, intuition and judgement when making strategic investment decisions and to what extent does strategy formulation shape strategic investment decision-making processes?
- 6) To what extent do contextual factors influence strategic investment decision-making processes?

These questions result from reviewing the literature on strategic investment decision-making and investment appraisal.

The underlying hypothesis of this research is that strategic investment decision-making processes can be viewed as the interplay of multiple perspectives such as procedural rationality, strategy formulation and political behaviour. This hypothesis was derived from reviewing the literature on strategic investment decision-making

process. Support for this is widespread either implicitly or explicitly in the literature on management accounting, strategic management accounting and strategic management.

The research aims to integrate the contextual influence into an overall model and to test the relative significance of each contextual domain in determining strategic processes (see section 2.6). Attention will be paid to the following contextual factors believed to influence strategic investment decision-making processes: (1) decision characteristics (e.g. type of strategic investment decision, decision uncertainty), (2) corporate goals, (3) objective measures of corporate performance, (4) subjective measures of corporate performance, (5) firm characteristics (e.g. size), and (6) top management characteristics (e.g. managers' standard of education)(see section 2.5).

As discussed in Chapter Two, adopting such a framework (i.e. creating different dimensions of the process and attaching variables to them) provides an extensive perspective on decision-making processes, and enables the researcher to examine different dimensions of strategic investment decision-making processes and their interaction with other contextual factors. These constitute the fundamental objectives of the thesis.

This study brings together several strands of existing work, namely:

1. Tomkins (1991), who provides a framework for understanding effective corporate resource allocation decisions. He attempts to draw together the key strands to create a multi-disciplinary model capable of describing how a range of business disciplines must come together in this crucial area.
2. Hitt and Tyler (1991), who examine decision-making by U.S. managers, and find that internal and external environmental factors explain the largest part of the variance in strategic decisions. Also, Papadakis (1993), who examines the linkages between the process of strategic decision-making and the context in which decisions are taken. His study is based on a sample drawn from 38 industrial enterprises operating in Greece.
3. Butler *et al.* (1993), who examine strategic investment decisions in a wide range of UK companies. Their perspective is organisational decision-making

theory, which addresses the importance of qualitative factors (i.e. factors relating to judgement, negotiation and inspiration).

4. Van Cauwenbergh *et al.*, who investigate the role and function of formal analysis in strategic investment decision-making processes in Belgium.
5. Slagmulder *et al.* (1995) and Abdel-Kader and Dugdale (1998), who examine capital budgeting practices for strategic investments in AMT and address the importance of non-financial criteria.
6. Northcott (1998) who examines capital investment decision-making as an integral part of the strategic and operational functioning of an organisation. Her study focuses on behavioural and organisational aspects of capital investment decision-making. She concludes that there is a clear dearth of empirical information relating to qualitative aspects of capital investment decisions.
7. Arnold and Hatzopoulos (2000) who argue that attention would be better directed to the organisational context of decision-making, taking into consideration such factors as identification of investment opportunities, the development of proposals into projects and the screening of proposals at an early stage to ensure a close fit with strategy.

Although the above mentioned studies may not have the scope of the present research, the characteristics they identify remain relevant. It is hoped that this work will contribute towards enriching our understanding of strategic investment decisions and investment appraisal.

4.4. Research hypotheses

The main research questions were formulated as hypotheses (Table 4.1).

Table (4.1): Summary of the hypotheses and the relevant literature.

	Hypothesis	Source
H1	Unsophisticated methods (payback and ROI) are rated as marginally more important than the sophisticated (DCF) methods.	Abdel-Kader and Dugdale (1998).
H2	Sophisticated (DCF) methods of investment appraisal are now more important than unsophisticated methods in large companies.	Arnold and Hatzopoulos (2000)
H3	There is increasing use of DCF techniques, with a preference of IRR over NPV.	Abdel-Kader and Dugdale (1998).
H4	There is increasing use of DCF techniques, with a preference of NPV over IRR.	Arnold and Hatzopoulos (2000)
H5	The same financial criteria apply to strategic investments as other (non-strategic) investments.	Abdel-Kader and Dugdale (1998).
H6	The same risk analysis applies to strategic investments as other (non-strategic) investments.	Abdel-Kader and Dugdale (1998).
H7	A gap exists between practitioners in the business community and researchers regarding the adoption of advanced methods/techniques of capital budgeting.	Busby and Pitts (1998) Arnold and Hatzopoulos (2000) Burns and Yazdifar (2001)
H8	The evaluation of projected financial returns is important when evaluating strategic or non-strategic investment projects.	Abdel-Kader and Dugdale (1998).
H9	Less reliance is placed on financial analysis for strategic investments.	Butler <i>at al</i> (1991), Slagmulder and Bruggeman (1992), Van Cauwenbergh <i>et al</i> (1996)
H10	Product quality, fit with business strategy and improving the competitive position of the firm are the most important factors considered by all informants.	Butler <i>et al</i> (1991) Slagmulder <i>et al</i> (1995)

4.5. Research strategy -Triangulation methods for data collection

A problem facing social science researchers, including those in the accounting and finance disciplines, is the selection of the research strategy that appropriately confers both validity and credibility on the conclusions of a given investigation³⁹.

The functional approach is the most appropriate to the conduct of empirical analysis based on large databases. The aim of functionalists is to obtain objective (statistical) and causal relationships between the research variables investigated. The scientific method of investigation involves several steps: problem identification, formulation of hypotheses, collection of data and the statistical analysis of the data. Questionnaire surveys and laboratory experiments are some of the data collection methods used. The purpose of data analysis is to confirm or disconfirm theories based on the rejection or acceptance of the stated hypotheses⁴⁰.

The research questions could be addressed using various methods of data collection including case or field studies and surveys. According to Yin (1994, p.19), surveys are the preferred strategy when questions of "what or its derivatives" are being posed, when the researcher has no control over behavioural events, and when the focus is on a contemporary event within a real life context. The present study meets these conditions, hence the use of a survey strategy to investigate strategic investment decisions and investment appraisal in UK companies.

A positivist approach is adopted because the central concern of this research is to provide quantitative, statistically significant results which clinical research does not provide. Further, the mailed questionnaire method is chosen because it offers size of sample. The questionnaire provides a range of information regarding strategic investment decision-making practices and enables the researcher to identify areas for

³⁹ Ryan *et al.* (2002) argue that the selection of an appropriate methodology should consider all underlying assumptions, both ontological and epistemological. Ontology refers to the nature of social reality and the way it is perceived. Social reality is considered to be either objective and independent from human cognition, or subjective and dependent on individual consciousness. The nature of reality determines the epistemology, i.e. the way in which knowledge is seen to arise. When reality is conceived as objective, experience and is not merely the result of a causal relationship between variables existing independently from the researcher.

⁴⁰ Since the scientific approach used in the functional perspective is based on abstraction, reductionism and statistical method, its ability to reflect the reality of the everyday life of management accountants is being questioned (Tomkins and Groves, 1983).

further research that require a more in-depth case study approach (Drury and Tayles, 1995).

It can be argued that mathematical analyses, modelling, and statistical testing do not adequately relate to specific strategic investment decision contexts, due to the lack of records on what was happening in the setting within which decisions were made and action occurred (Hopper and Powell, 1985; Kaplan, 1986; Scapens, 1990, Humphrey and Scapens, 1996 and Ryan *et al.*, 2002). Therefore, a qualitative method of data collection, by means of interviews, was also chosen to enable the researcher to examine further aspects underlying strategic investment decisions which could not be examined using questionnaires.

Taken together, the semi-structured interviews and questionnaire will provide an insight into the current practice of strategic investment decision-making within U.K. companies. The process of collecting multiple sources of evidence on a particular issue is known as 'triangulation' (Ryan *et al.*, 2002). "Triangulation refers to the use of different data collection methods within one study in order to ensure that the data are telling you what you think they are telling you. For example, semi structured group interviews may be a valuable way of triangulating data collected by other means such as questionnaires" (Saunders *et al.*, 1997, p.80). Underpinning triangulation usage is the issue of the credibility and reliability of research findings (Saunders *et al.*, 1997, p.81). The triangulation of data collection methods can maximise the amount of data collection and improve the validity and reliability of the research results. Neuman (1991) has argued that triangulation not only increases the "sophisticated rigor" of the data collection and analysis, but also helps to disclose the "richness" of the social setting of a qualitative inquiry. Miles and Huberman (1994, p. 266) state that "stripped to its basics, triangulation is supposed to support a finding by showing that independent measures of it agree with it or at least do not contradict it". Thus, the combination of data collection methods enables the researcher to overcome some of the inherent disadvantages of each individual method because triangulation involves shifting the evidence and observing it from different viewpoints. The

validity of each piece of evidence can thus be assessed by comparing it with other kinds of evidence on the same issue.

The majority of existing studies have been based on only one method of data collection (questionnaire, interviews or case study). Therefore, the researcher believes that the triangulation of data collection by a systematic combination of questionnaires and semi-structured group interviews and analysis will introduce a new research methodology into the strategic investment decision-making literature.

4.6. Survey based on questionnaires

In the previous chapters, it was established that scholars can examine strategic investment decision-making and investment appraisal techniques by using either a normative approach (theoretical perspective) or a descriptive approach (empirical perspective). The research strategy adopted is a survey, based on questionnaires and semi-structured interviews⁴¹. In order to answer the research questions introduced in the previous section, a questionnaire survey was chosen as the primary research method because it has the advantage of reaching a large and widely dispersed group of individuals, while being efficient in terms of time and cost of data collection and processing, and avoiding interviewer bias that could have happened if interviews had been relied on exclusively (Oppenheim, 2000). The use of questionnaires also enables comparison of the results of this study with those of existing studies.

A structured survey approach was adopted because it helps to collect the information in a systematic way. The survey method is a popular and common strategy in accounting, business and management research. The selection of a research method based on a postal questionnaire provides an efficient way of collecting responses from a large sample prior to quantitative analysis. It allows the collection of a large amount of data from sizeable populations in a highly economical way (Saunders *et al*, 1997). A cross-sectional survey aims to collect quantitative data by using a structured questionnaire. A cross-sectional survey based on a mail questionnaire is considered as

⁴¹ The term 'survey' implies the gathering of data or other relevant information from a sample or a specific population, usually by means of mailed questionnaires, personal interviews or telephone calls (Saunders *et al*, 1997).

the most appropriate research methodology because the researcher need a large sample of companies in order to generalise conclusions regarding the practices of evaluating strategic investment projects in large UK manufacturing companies. The mailed questionnaire method is very popular, due to its considerable saving of money and time. On the other hand, one of the major disadvantages of mail surveys is the poor response rate; furthermore, if the questionnaires are not properly designed, they may produce biased information.

4.6.1. The questionnaire format

The layout of the questionnaire is crucial and, therefore, much time was spent in designing and piloting it. The layout was clear and attractive. A blank copy of the questionnaire appears in Appendix (3). The questionnaire was typed in 10 point using a pure font, and printed on good quality paper. According to Saunders *et al* (1997), warm pastel shades such as pink generate more responses. The length of the questionnaire was four A4 pages of closed questions which were not too complex.

The questionnaire was mainly based on structured multi-choice questions. Most questions were scoring questions which requested respondents to give a score on a five-point equal distance scale. Therefore, most of the questions were category questions (where only one response can be selected from a given set of categories) and closed in the form of a five-point equal distance scale with two extreme end points (e.g. strongly disagree/strongly agree or not important/very important). The use of closed questions was advocated because they allow all respondents to answer the same questions in a limited number of ways, so that their answers can be meaningfully compared. Respondents also find closed questions much easier to answer. Further, closed questions produce less variable answers and are much easier to computerise and analyse (Foddy, 1993). The five-point Likert scale was used to facilitate the quantification of responses so that statistical analysis could be undertaken and differences in evaluating strategic and non-strategic investment projects could be observed and generalised.

This survey seeks to contribute to the extant literature by exploring the current practices of strategic investment decision-making. It attempts to capture the general dimensions of strategic investment decision-making and cover the main areas of debate on this issue in the UK context. The questionnaire used was developed after reviewing the extant literature on strategic investment decision-making (Chapter Two) and investment appraisal techniques (Chapter Three). I developed my own questions, adopting or adapting other questions from previous related surveys. This was necessary to compare our finding with previous related studies (e.g. Pike, 1988; Ho and Pike, 1991; Butler *et al*, 1991; Pike, 1996; Abdel-Kader and Dugdale, 1998 and Arnold and Hatzopoulos, 2000) and to allow reliability to be assessed.

The respondents were asked to answer 13 questions as follows:

✦ **Q1:** Question 1 was aimed at determining the types of strategic investment projects that the company had invested in over the last five years:

- Substantial increase in production capacity.
- Acquisition of another company.
- Introduction of electronically integrated operations.
- Introduction of electronic commerce capabilities.
- Introduction of computerised production processes.
- Introduction of fundamentally new product lines.
- Merger with another company.

✦ **Q2:** Question 2 was designed to provide information regarding the strategic investment decision-making process. Respondents were asked to provide their personal opinions of different statements that can refer to different perspectives of the strategic investment decision-making process (political, negotiation, centralisation, formalisation, etc). Consistent with Dean and Sharfman (1996), no acceptable scales can be found in the literature regarding the measurement of procedural rationality and political behaviour. To measure these, the researcher derived scales from Mintzberge *et al* (1976), Fredrickson (1984), Hickson *et al* (1986), Bourgeois and Eisenhardt (1988) and Langley (1989).

✦ **Q3, Q4, Q5 and Q6:** Respondents were asked to indicate which evaluation techniques they use when making two different types of investment decisions, strategic (e.g. expansion into new product projects) and non-strategic (e.g. routine

asset replacement projects). Also, they aimed to provide information regarding the importance of various financial appraisal techniques, non-financial criteria and risk analysis techniques.

- ✦ **Q7 and Q8:** These questions were designed to provide information regarding the required payback period most frequently used in evaluating strategic and non-strategic investment decisions and the range of minimum rates of return or discount rates required by the company.
- ✦ **Q9:** This question was designed to determine how respondents see the importance of non-financial criteria or factors. Emphasis will be placed on (1) Consistency with corporate strategy, (2) Improved company image, (3) Requirements of customers, (4) Keeping up with competition, (5) Obtaining greater manufacturing flexibility, (6) The ability to expand in the future, (7) Quality and reliability of outputs, (8) Reduced lead-times, (9) Reduced inventory levels, and (10) Experience with new technology. These factors have been derived from Accola (1994) and Abdel-Kader and Dugdale (1998).
- ✦ **Q10:** Question 10 asked respondents to what extent recently developed analysis techniques/information are used in the evaluation of strategic investment decisions. Emphasis will be placed on coordination with investment decisions of other firms (e.g. through the use of industry level data or technology roadmaps), real options approach, balanced scorecard, benchmarking, and value chain analysis (see section 3.9).
- ✦ **Q11:** In question 11, respondents will be asked to determine the importance of various indications of the company's success over the last five years. These are: (1) profitability (net profit), (2) efficiency (low costs), (3), growth (increase in total assets sales), (4), shareholder wealth (dividends plus stock price appreciation), (5) utilisation of resources (ROI), (6) economic value added (EVA). (7) market leadership (market share), (8) technological leadership (innovation, creativity), and (9) survival (avoiding bankruptcy).

✦ **Q12:** This question was designed to determine how the company considers the benefits of strategic projects (in financial terms, non-financial terms, equal balance of financial / non-financial terms, or not at all).

✦ **Q13:** The aim of this question was to collect demographic data regarding the respondents' background / position and their company.

✦ **Finally,** respondents were asked if they were willing to participate in interviews and would like to receive a summary of the survey results.

The purpose of the pilot test was to refine the questionnaire so that respondents would have no difficulty in answering the questions (i.e. they would have the necessary knowledge to answer the questions) and there would be no problem in recording the data. To obtain some assessment of the questions and of the validity and reliability of the data collected, a number of academic staff (particularly those who, like Professor Pike, have experience in industry or conducted similar research) kindly agreed to comment on the design of the questionnaire. Researchers have pointed out that the messages enclosed in a self-administered questionnaire's covering letter would affect the response rate, so, in an attempt to achieve an acceptable response rate compared to previous related surveys, a covering letter was attached to the questionnaire. A brief official headed letter was used, with a 12-point font size. A copy of this covering letter is in Appendix (4). The letter deals with the following issues:

(1) the subject of the research, (2) why the recipient is important, (3) how long it will take to complete, and (4) other issues that relate to the confidentiality of the information that will be provided by the respondents.

4.6.2. Target population-sample frame and size (Why the sample was selected from the largest UK manufacturing companies)

Before deciding on the sampling frame, it is useful to examine the sampling frames used by other researchers in the field of strategic decision-making. Most used a comparison of many different types of enterprises (industrial and service organisations, private and public, small and large). Obviously, their aim has been to examine strategic decision-making in various contexts. Only a few (e.g. Nutt, 1984)

have chosen organisations from specific sectors such as universities or health and service organisations. By focusing on specific categories of strategic investment decisions, the researcher succeeds in achieving a solid description of these strategic investment decision processes. The counterpoints to these advantages, however, are several (Papadakis, 1993):

■ By focusing on only a specific topic such as new product introductions, the first problem the researcher may face is that not all the new introductions are strategic. As Mintzberg et al., (1976; p.60) state, “No decision is inherently strategic; decisions are strategic only in context. The decision to introduce a new product may be a major event in a brewery, but hardly worth mentioning in a toy company”.

■ By focusing on a very specific subset of strategic investment decisions, the researcher is, to some extent, in direct contradiction with the stream of research on strategic decisions that has emerged during the last two decades. To conclude, it seems reasonable not to focus on specific categories of strategic investment decisions. This view is consistent with Papadakis (1993).

Taking into consideration different perspectives concerning the identification of strategic investment decisions (see section 2.3) the following types of investments are included in the sample:

- The introduction of electronic commerce capabilities;
- The introduction of fundamentally new product lines;
- Acquisition of another company;
- Merger with another company;
- Substantial increase in production capacity;
- Introduction of electronically integrated operations;
- Introduction of computerised production processes⁴²;

⁴² Any type of computerised manufacturing processes such as computer aided design, computer numerical control, automated material handling, computer aided manufacturing, robotics, computer integrated manufacturing and flexible manufacturing systems.

These types are recognised as strategic in their nature (e.g. Slagmulder *et al*, 1995; Carr *et al*, 1991; Carr and Tomkins, 1996; and Van Cauwenbergh *et al*, 1996). Such investments refer to capital spending to protect, enhance or alter a firm's competitive capabilities, e.g. introducing major new product lines, installing new manufacturing processes, acquisitions or mergers. Such investments may be distinguished from routine asset-replacement decisions. To some extent, they are similar to those introduced by Mintzberge *et al* (1976), Hickson *et al* (1986) and Dean Jr and Sharfman (1996)⁴³.

The reasons for selecting these types of investment projects can be summarised as follows:

- 1) Such investments have a significant potential for improving corporate performance.
- 2) They are important in term of actions taken and/or resources allocated.
- 3) There are difficulties associated with the cash flow estimation for new investment projects. Companies are more familiar with replacement projects since they already have conducted such investment projects.
- 4) These types of investment projects enable organisations to achieve the required strategic advantage over their competitors. Porter details two ways in which managers can position their firms to have a strategic advantage over competitors: (1) Firms need to differentiate their products by providing something unique of advantage to the purchaser (e.g. better quality, or features that are not included in the competitors' products); and (2) they need to achieve a position of cost leadership, i.e. competitive advantage is achieved by having lower costs than all competitors.
- 5) Strategic flexibility is especially critical in high technology arenas because products, manufacturing processes, markets, distribution channels and competitive boundaries are in a state of continuous flux.

⁴³ E.g. restructuring, new product, organisational change, new process technology, marketing strategy, geographic expansion, diversification, new facility, human resource strategy.

In accordance with the literature (e.g. Abdel-Kader and Dugdale, 1998), the researcher believes that the most appropriate companies to include in the sample are the largest UK manufacturing companies. Manufacturing firms that desire to survive need to lower production costs for small batch sizes and greater product-mix complexity, while producing consistently better quality products. Strategic investments should help to achieve all of these.

The sample came from the largest UK manufacturing companies because they have the large investment expenditures and therefore should exercise strategic investment selection procedures more often than small or medium firms. On the other hand, they may be more likely to adopt strategic methods in evaluating different types of strategic investments.

4.6.3. Database: after reviewing a number of available databases, the researcher concluded that Financial Analysis Made Easy (FAME) is the appropriate database because it includes extensive information; in particular⁴⁴:

- Access to 440,000 British and Irish company reports for public and private operations.
- Reports that include detailed annual accounts and financial ratios for the past 10 years in addition to descriptive information for 60,000 additional holdings and subsidiaries.
- Identification of companies by industry, geographical area, turnover, number of employees and such like, enabling comparisons of those companies;
- Ownership information and trade descriptions.
- Monthly updated information.

Before selecting the industry to be studied, a careful examination of the industrial sector in the UK was made (e.g. type of industry, relative size) and the final sample was drawn from eight different manufacturing groups shown in Table (4.2). These

⁴⁴ The FAME database is a computerised service provided by *CD-ROM Publishing Co Ltd (1 Great Scotland Yard, London SW1A 2HN)* and *Jordan & Sons Ltd (21 St Thomas Street, Bristol BS1 6JS)* and available through the computer network at Manchester Business School (MBS).

companies are selected for their diversity, since they represent different industries, technologies, and markets. However, within each sector they operate under similar environmental circumstances (e.g. competition, uncertainty).

Taking into account the above, eight different groups of manufacturing companies were selected from the standard industrial classification (SIC), UK-code-1992 (industry codes of two digits) as shown in Table (4.2). This stage resulted in the selection of more than 15000 companies. So, in an attempt to restrict the number of companies, the researcher included only large companies that satisfied the following criteria:

- I. Minimum turnover of £100 million for the year ended 2001;
- II. Minimum number of 1000 employees for the year 2001;
- III. Minimum total assets of £50 million for the year 2001.

This stage resulted in the selection of 320 companies as shown in Table (4.2). It was considered that large UK manufacturing companies would take strategic investment decisions more often than smaller companies would (Abdel-Kader, 1996).

Table (4.2): Criteria used in selecting companies to include in the sample.

Manufacture	Industry Code	Number of companies selected
Manufacture of motors vehicles, trailers and semi-trailers.	44	21
Manufacture of radio, television, and communication equipment and apparatus.	32	31
Manufacture of computer and related products	72	51
Manufacture of electrical machinery.	31, 33	56
Manufacture of chemicals and chemical products	24	55
Manufacture of wood, rubber and plastic products	20, 25	27
Manufacture of food products and beverages	15, 16	46
Extraction of crude petroleum and natural gas, mining of metal, uranium and other mining	11, 12, 13, 14	33

On 29th November 2002, questionnaires were sent to the finance directors of 320 companies. Questionnaires were sent out to the named finance directors at their company addresses as participants in the decision-making. This is consistent with most previous related surveys, which addressed the questionnaires to finance directors⁴⁵. It was argued that finance directors are more likely to be involved in evaluating investment projects than other people (Chen, 1995; Abdel-Kader and Dugdale, 1998). A covering letter was attached to each questionnaire to serve as an introduction to the survey in general and to other issues relating to the confidentiality of the information supplied by each respondent. The questionnaires were addressed either to the finance director by name (282 companies) or job title (38 companies). It was stated in the literature that addressing the finance directors by their names, rather than by their job title, would motivate them to respond to the questionnaire. The financial directors' names were obtained as follows:

⊕ Some of their names were obtained directly from the Hoover Database (145 companies).

⊕ The remaining financial directors' names (175 companies) were obtained from the annual report (board of directors) through the companies' websites addresses (116 companies; the websites addresses obtained from the FAME database) or through the free service available from the Financial Times database (59 companies).

A follow-up fax was sent to some of the non-respondents on 12th December 2002 and reminders were sent out on 17th December to motivate finance directors to respond to the questionnaire. Another covering letter was also attached to each follow-up questionnaire. Fax numbers were obtained from the Hoover Database. Table (4.3) summarises the procedure used in sending and following up the questionnaire.

By the end of January 2003, altogether 132 questionnaires were received, giving a response rate of 41.25 % (132/320).

⁴⁵ Pike (1982, 1988 and 1992): Finance directors or equivalent.
Klammer *et al* (1991): Chief financial officers.
Van Cawenbergh *et al.* (1996) Finance positions, non-finance positions.
Abdel-Kader and Dugdale(1996) Finance directors.
Arnold and Hatzopoulos (2000) Chief financial officers.
Graham and Harvey (2001) Chief financial officers.

The number of the sample companies dropped from 320 to 271 because 49 questionnaires were returned unanswered. These included:

- ⊕ Questionnaires returned from the Post Office, having not been delivered (18 companies);

Table (4.3): Procedure used in sending / following up the questionnaire.

Group of respondents	Financial directors.
No. of questionnaires addressed to the financial directors by their names.	282
No. of questionnaires addressed for the attention of financial director (i.e. their job title)	38
Method used to obtain the financial directors' names	-Hoover Database. -Annual reports available from companies' websites. -Annual reports available through Financial Times database
Total number of questionnaires sent out to the financial directors at their company addresses.	320 questionnaires were sent out on the last working day of November (Friday-29) 2002.
The expected response rate	30%
Follow-up procedure to all non-respondents	Fax on 12 th December 2002 and reminders on 17 th December 2002
Responses to the questionnaire	132 companies
Response rate	41.25 % (132/320)
Of those received questionnaires	49 questionnaires were returned unanswered because: <ul style="list-style-type: none"> • The company policy was not to respond to surveys (20 companies). • They were returned from the Post Office, having not been delivered (18 companies) • Of lack of time (4 companies). • The named finance director had left the company (7 companies).
Net usable response rate.	83 usable completed questionnaires to be used in the analysis, giving a net usable response rate of 30.63% (83 Completed questionnaires/271 potential respondents).

⊕ Questionnaires returned from the companies to the sender because the named finance director had left the company (7 companies);

⊕ Questionnaires returned from the companies because the company policy was not to respond to surveys (20 companies) (For example, one of the financial directors stated, "In recent times the increase in requests to participate in questionnaires and survey has grown enormously and, unfortunately, due to the volume of such requests for information and surveys received at our office, it has become necessary to make it a company policy not to participate in any surveys".);

⊕ Questionnaires returned from the companies because of lack of time (4 companies). For example, one of the financial directors stated: "I am sure you will understand, we receive a large number of requests each week, and, unfortunately due to pressure of work we are unable to find the time to respond to requests such as taking part in surveys or research".

Consequently, 83 completed questionnaires could be used in the analysis, giving a net usable response rate of 30.63% (83 completed questionnaires/271 potential respondents). This response rate is acceptable and comparable with other similar surveys such as those of Lefley (1994), Chen (1995), Slagmulder, Bruggeman, and Wassenhove (1995), Joseph, Turley, Burns, Lewis, Scapens and Southworth (1996), Abdel-Kader and Dugdale (1998), Arnold and Hatzopoulos (2000) and Graham and Harvey (2001), which had response rates of 28.8%, 20%, 20%, 31%, 23%, 32.43%, and 9% respectively, as shown in Table (4.4).

According to Saunders *et al* (1997), a response rate of 30% is reasonable. The expected time to complete data collection was 6-10 weeks. According to the literature, such response rates are acceptable because of the pressure under which the financial directors work and the large number of research projects they are invited to participate in and questionnaires they are asked to complete.

4.7. Summary

When reality is objective and human behaviour is deterministic, knowledge is gained through observation and therefore scientific methods will be appropriate, but where

reality is grounded in subjective experience and individual free will, knowledge is gained through interpretation.

Table (4.4): Comparison of sample frames and response rates between the current survey and other similar surveys.

Author(s)	Topic	Sample companies	Response rate
Lefley, 1994	Capital investment appraisal of advanced manufacturing	134 Large UK manufacturing firms	28.8%
Chen, 1995	An empirical examination of capital budgeting techniques: impact of investment types and firm characteristics.	115 large US manufacturing firms	20%
Slagmulder, Bruggeman and Wassenhove, 1995.	An empirical study of capital budgeting practices for strategic investments in CIM technologies.	200 European manufacturing companies	20% (40/200)
Joseph, Turley, Burns, Lewis, Scapens and Southworth, 1996	External financial reporting and management information: a survey of U.K. management accountants.	U.K. industrial and commercial firms. (1000 qualified members of CIMA)	31% (308/1000)
Abdel-Kader and Dugdale, 1998	Investment in advanced manufacturing technology	430 Large UK companies	23% (99/430)
Arnold and Hatzopoulos, 2000	The theory-practice gap in capital budgeting: evidence from the United Kingdom	296 Large, medium and small companies	32.43% (96/296)
Graham and Harvey, 2001	The theory and practice of corporate finance	4440 firms USA	9% (392/4440)
Alkaraan 2002 (The current survey)	Strategic investment decision-making and investment appraisal techniques	320 Large UK companies	30.63% (83/271)

As the present survey study aims to obtain objective, statistically valuable data in an area where subjective considerations cannot safely be ignored, it is was decided to obtain the initial data through the use of questionnaires and to complement this by semi-structured interviews. The combination of data collection methods enables the researcher to overcome some of the inherent disadvantages with each individual method because the triangulation involves shifting the evidence, and viewing it from different viewpoints or observations.

This chapter has examined issues relevant to the format and application of the questionnaire. The method of data collection, including the procedure used in sending and following up the questionnaire, was outlined and the sample frame and size were justified. Finally, the questionnaire format was summarised and explained.

Having dealt with the basic framework of the empirical research design in this chapter, the subsequent chapter, Chapter Five, presents the outcomes of the survey analysis. To ensure that relevant issues regarding the research questions were covered, an explanatory study by means of interviews was conducted with selected individuals from several companies connected to strategic investment decision-making. Details of this explanatory study are presented in Chapter Six. Chapter Seven advances and tests specific hypotheses regarding the association between contextual factors and strategic investment decision-making process.

Chapter Five

Analysis of the Survey Results

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Chapter Five

Analysis of the Survey Results

5.1. Introduction

Every survey has some merit, telling us something of the practices at the date of the survey for those responding firms (Pike, 1996). Graham and Harvey (2001, p.189) point out that “the survey approach is not without potential problems. Surveys measure beliefs and not necessarily actions”. Some degree of caution is needed, then, in generalising the results of any sample-based survey to a wider population of firms (Scapens, 1990). However, the high response level in this case reduces this potential problem to a degree. Caution is needed when comparing its findings with previous surveys, due to variations ranging from different sample-sizes to changes in questions asked. Nevertheless, there is considerable comparability, particularly with the results of the research conducted by Pike (1982, 1988, and 1996), Abdel-Kader and Dugdale (1998), and Arnold and Hatzopoulos (2000). These results are presented where possible as benchmarks for comparison.

The literature suggests that there is an inappropriate balance between attention given to strategic as opposed to traditional capital budgeting considerations. In this empirical work, the researcher conducts a comprehensive survey that describes the current practice of strategic investment decision-making and investment appraisal techniques in the large U.K. companies.

The survey results confirm the conclusion of the existing literature that investment projects (strategic or non-strategic) appear to be affected mainly by financial return measures, risk measures and non-financial criteria. The survey results suggest that decision-makers in large UK companies are experienced executives who also use judgment and intuition. They propose strategic investment projects that go beyond the traditional discounted cash flows (DCF) calculation and take into account the strategic issues of investment projects. In other words, it is appears that financial evaluation techniques and the strategy of the company together with intuition judgments constitute the basic elements of strategic investment decision-making processes.

Discussing the survey results is the concern of this chapter.

5.2. Non-response bias tests

To assess the possibility of the existence of a non-response bias, the 83 responding companies and the total sample of 320 companies were compared. The size of the company (measured by turnover, number of employees and total assets for the year ended 2001) was the criterion that was used for this comparison.

Two types of statistical test were used to compare the responding companies and the total sample: (1) parametric independent sample t-tests, (2) non-parametric Mann-Whitney independent samples (Z-test).

The parametric statistical tests were used to compare the means of sets of scores. The null hypothesis was that there is no significant difference between the actual sample (the responding companies) and the total sample. Accepting the null hypothesis (H₀)

means that, most probably, the two samples represent the same population. Table (5.1) provides a summary of the null hypotheses and their alternatives.

Table (5.1): The null hypotheses and their alternatives for tests on the company size.

Turnover	H0	There is no significant difference in firm size between the actual sample and the total sample measured by the turnover for the year ended 2001.
	H1	There is a significant difference in firm size between the actual sample and the total sample measured by the turnover for the year ended 2001.
Total assets	H0	There is no significant difference in firm size between the actual sample and the total sample measured by the number of employees for the year 2001.
	H1	There is a significant difference in firm size between the actual sample and the total sample measured by the number of employees for the year 2001
Number of employees	H0	There is no significant difference in firm size between the actual sample and the total sample measured by the total assets for the year ended 2001.
	H1	There is a significant difference in firm size between the actual sample and the total sample measured by the total assets for the year ended 2001.

The results of parametric independent sample t-tests and non-parametric Mann-Whitney tests for company size (measured by turnover, total assets and number of employees) are summarised in Table (5.2).

The results of parametric t-tests indicate that there is no statistically significant difference between the means of the responding companies and the total sample in terms of turnover (P-value = 0.651), total assets (P-value = 0.414) or number of employees (P-value = 0.587). This is because the probability level of t mean difference statistics has a value greater than 0.05 at a 95% confidence level. Also, the results of the non-parametric Mann-Whitney (Z-test) indicate P-values of 0.308, 0.819, and 0.976 for the turnover, total assets and number of employees respectively.

Table (5.2): A summary of statistical tests on company size.

A: Parametric independent samples t-tests.

		Sample frame	Responding companies	Statistical comparison
Turnover	Mean	554338.7934	608343.2776	
	Std. Deviation	938891.2533	938050.3594	
				t-value (0.452)
				P-value (0.651) (95% confidence level).
Total assets	Mean	569184.9668	732908.7948	
	Std. Deviation	1516273.7144	1750889.7117	
				t-value(0.818)
				P-value (0.414) (95% confidence level).
Number of employees	Mean	4645.7380	13903.5878	
	Std. Deviation	5567.0937	11089.9233	
				t-value(0.544)
				P-value (0.587) (95% confidence level).

B: Non-parametric Mann-Whitney (Z-test) independent samples.

	Z- value	P-value
Turnover	1.019	0.308
Total assets	0.228	0.819
Number of employees	0.030	0.976

The results of both parametric independent samples t-tests and non-parametric Mann-Whitney (Z-test) for the turnover, total assets and number of employees demonstrate that the alternative hypotheses (H1) are rejected and the null hypotheses (H0) are accepted because of the large P-value (greater than 0.05 at a 95% confidence level). Hence, it can be concluded that the responding companies are representative of the total sample and that more respondents would not change the results of the study.

To further examine the effect of the non-response bias, the answers to the main questions in the questionnaire from respondents who replied without a follow-up reminder (62 companies) were compared with the answers from respondents who replied only after the reminder (21 respondents).

There was no significant difference between the two groups of answers, as shown in Table (5.3). For example, the non-parametric Mann-Whitney test for the importance of NPV, adjustment of forecast cash flows to allow for risk and benchmarking indicate P-values of 0.832, 0.550, and 0.477 respectively. These results also reveal that more respondents would not change the results of the study.

Table (5.3): A summary of statistical tests (the answers from respondents who replied without the follow-up compared to respondents who replied after the follow-up).

Non-parametric Mann-Whitney (Z-test) independent samples.

	P-value
Financial evaluation techniques are often used in the final choice of strategic investments	0.810
Net present value	0.832
Adjust forecast cash flows to allow for risk	0.550
Benchmarking	0.477

5.3. Summary statistics and data issues of respondents

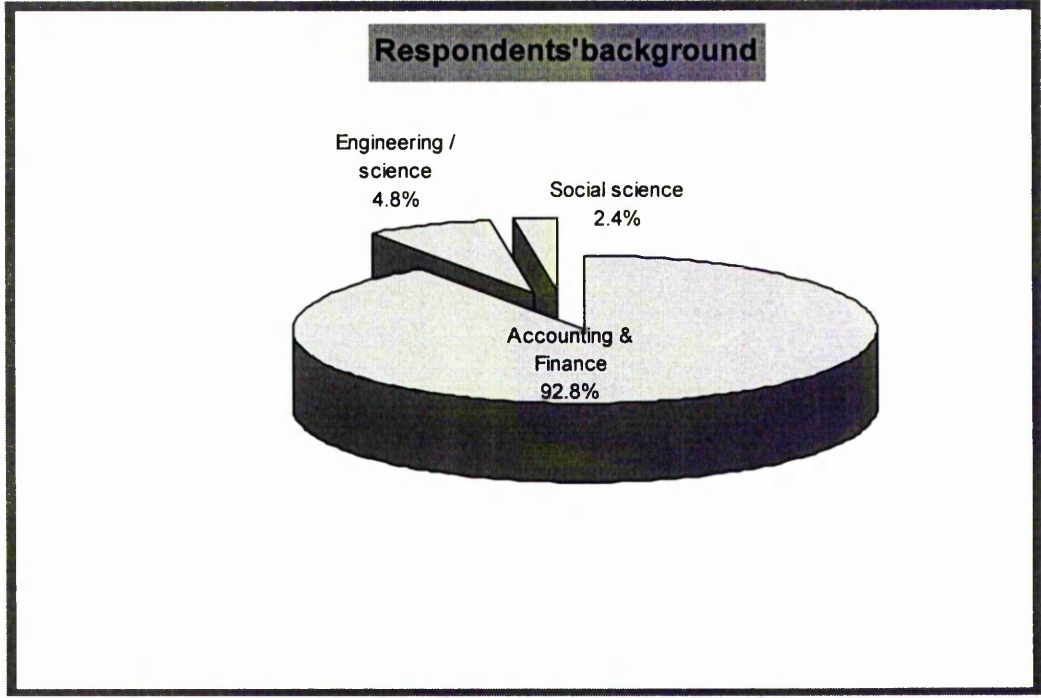
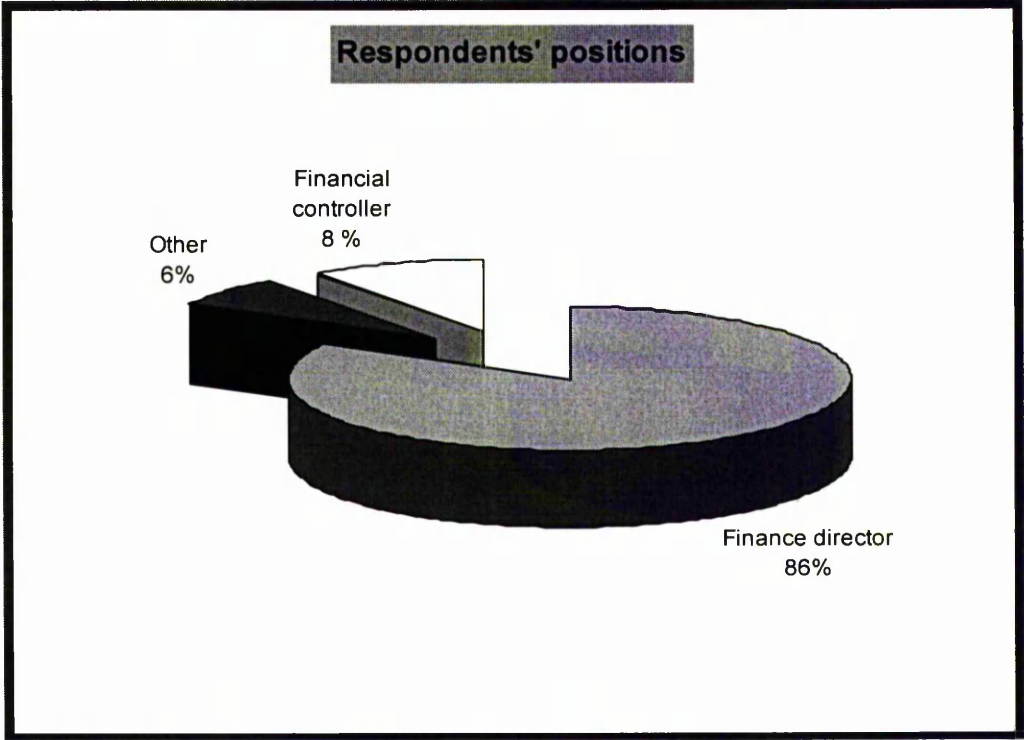
The demographic information of respondents is provided by Table (5.4) and Figure (5.1). Most of the respondents were financial directors (86%), financial controllers (8%) and the remainder (6%) were financial analysts, heads of treasury, heads of strategy, or heads of corporate development. Most of the respondents had an accounting and finance background (92.8%) and the remainder had a background in engineering / science (4.8%) or social science (2.4%).

Table (5.4): Demographic information of respondents.

Respondents' positions		
	Frequency	Percent
Finance director	72	86%
Financial controller	6	8%
Other	5	6%
Total	83	100%

Respondents' background		
	Frequency	Percent
Accounting & Finance	77	92.8%
Engineering / science	4	4.8%
Social science	2	2.4%
Total	83	100%

Figure (5.1): Demographic information of respondents.



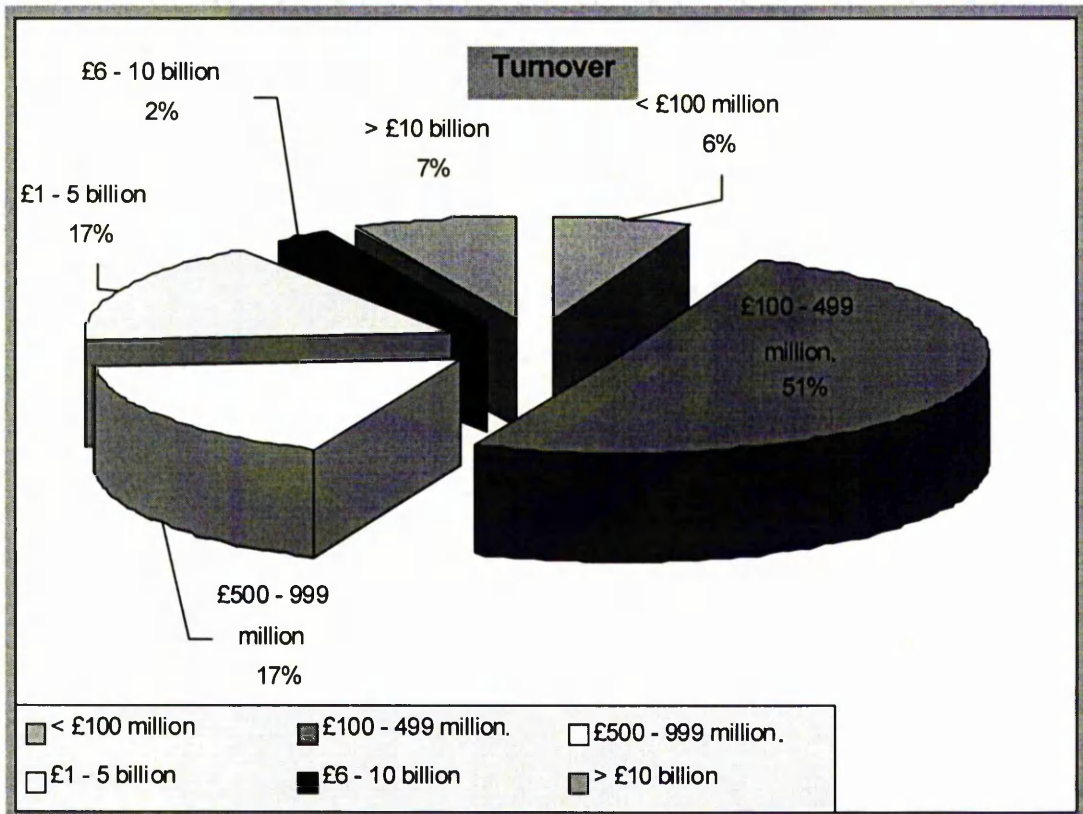
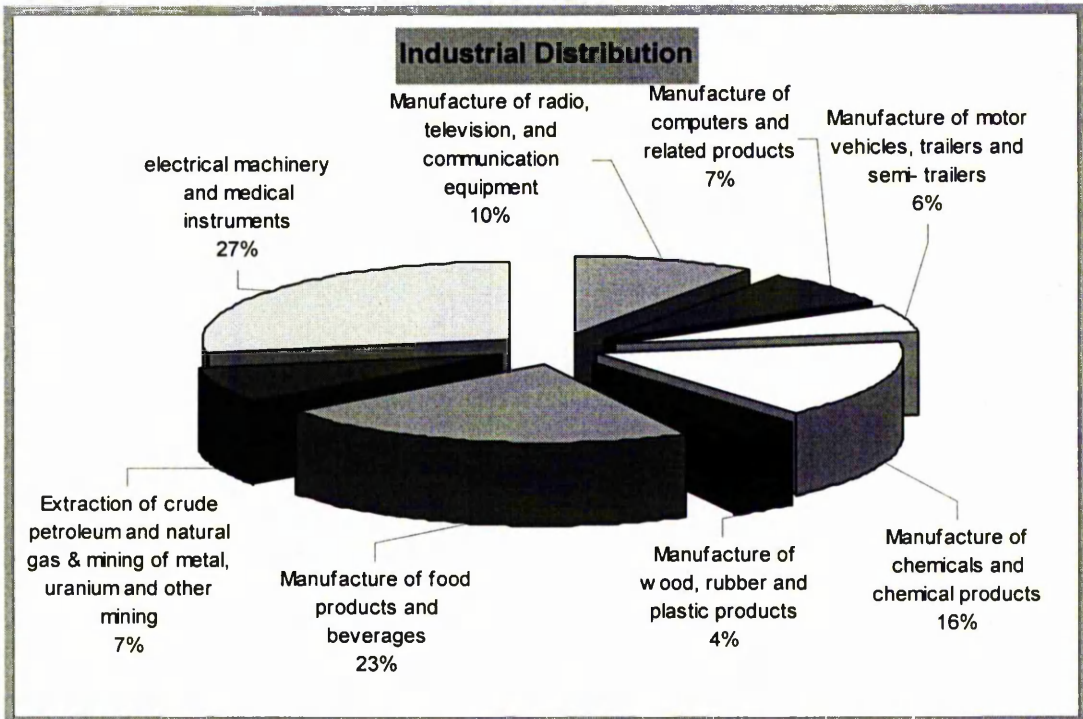
Information about the industrial distribution and turnover for the companies surveyed is described in Table (5.5) and Figure (5.2).

Table (5.5): Information about the industrial distribution for the companies surveyed.

Industry	Frequency	Percent
Manufacture of electrical machinery and medical instruments	23	27.7%
Manufacture of radio, television, and communication equipment.	8	9.6 %
Manufacture of computers and related products.	6	7.2 %
Manufacture of motor vehicles, trailers and semi- trailers	5	6 %
Manufacture of chemicals and chemical products.	13	15.7 %
Manufacture of wood, rubber and plastic products	3	3.6%
Manufacture of food products and beverages	19	22.9%
Extraction of crude petroleum and natural gas & mining of metal, uranium and other mining.	6	7.2%
Total	83	100 %

Turnover	Frequency	Percent
< £100 million	5	6.0
£100 - 499 million.	42	50.6
£500 - 999 million.	14	16.9
£1 - 5 billion	14	16.9
£6 - 10 billion	2	2.4
>£10 billion	6	7.2
Total	83	100

Figure (5.2): Information about the industrial distribution turnover for the companies surveyed.



The industrial distribution of the companies surveyed is as follows:

- ❑ 27.7% of the sample companies are manufacturers of electrical machinery and medical instruments.
- ❑ 22.9% of the sample companies are manufacturers of food products and beverages.
- ❑ 15.7% of the companies are manufacturers of wood, rubber and plastic products
- ❑ 9.6% of the companies surveyed are manufacturers of radio, television, and communication equipment.
- ❑ 7.2 % of the companies are manufacturers of computers and related products.
- ❑ 7.2 % of the companies surveyed are involved in the extraction of crude petroleum and natural gas and mining of metal, uranium and other mining.
- ❑ 6% of the companies are manufacturers of motor vehicles, trailers and semi-trailers.

The majority of the sample companies (50.6%) have a turnover range from £100-£500 million. 6% of the sample companies have a turnover of less than £100 million. 16.9% of the companies have a turnover range from £500-£999 million. 16.9% of the companies have a turnover range from £1-£5 billion. 2.4% of the companies have a turnover range from £6-£10 billion. 7.2 % of the companies have a turnover of more than £10 billion.

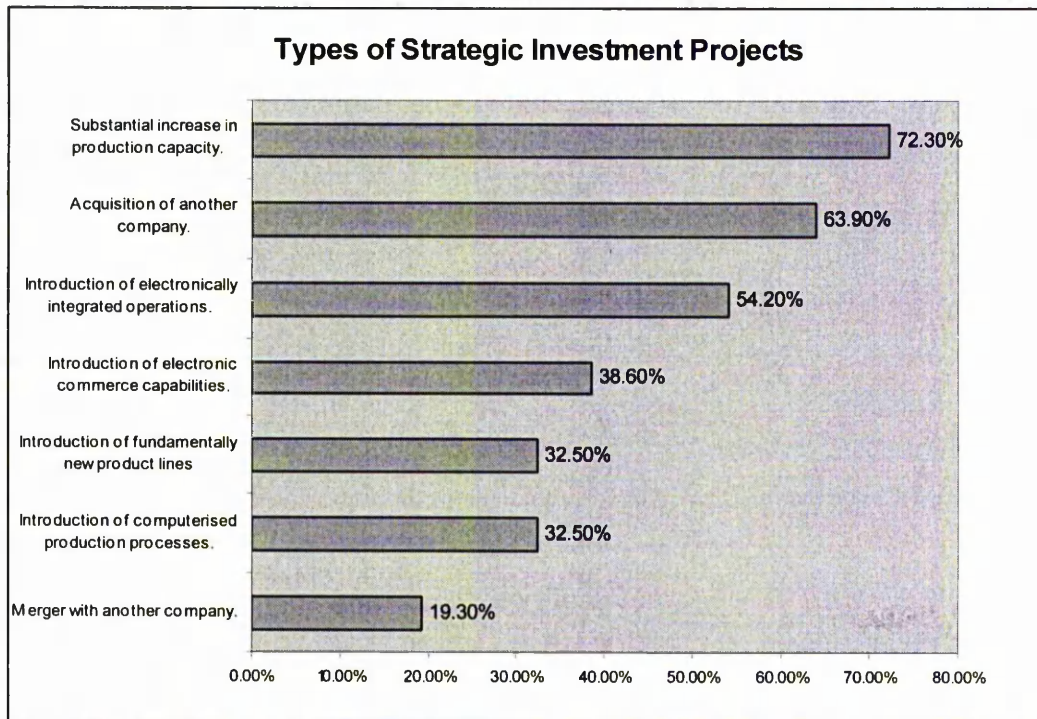
5.4. Types of strategic investment projects

The term strategic investment is used to refer to capital spending to protect, enhance or alter a firm's competitive capabilities, e.g. introducing major new product lines, installing new manufacturing processes, engaging in acquisitions or mergers. Such investments may be distinguished from routine asset-replacement decisions. Respondents were asked to specify the types of strategic investment projects they launched in the last five years. Table (5.6) provides the number and the percentage of

companies that invested in each type of strategic investment project. The majority of the companies have invested in a substantial increase in production capacity (72.3 %), the acquisition of another company (63.9%), and the introduction of electronically integrated operation. The lowest percentages, relatively, are the introduction of electronic commerce capabilities (38.6%), the introduction of computerised production processes (32.5 %), the introduction of fundamentally new product lines (32.5%), and a merger with another company (19.3 %).

Table (5.6): Types of strategic investment projects.

Type	Number	Percentage
Substantial increase in production capacity.	60	72.3%
Acquisition of another company.	53	63.9%
Introduction of electronically integrated operations.	45	54.2%
Introduction of electronic commerce capabilities.	32	38.6%
Introduction of computerised production processes.	27	32.5%
Introduction of fundamentally new product lines.	27	32.5%
Merger with another company.	16	19.3%



5.5. Strategic investment decision-making processes

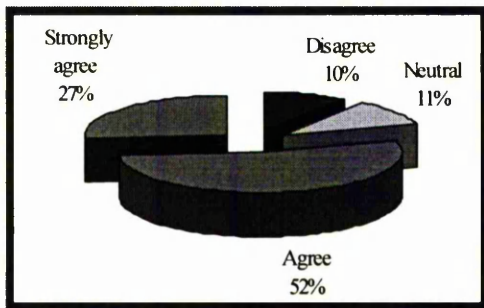
In this study, practitioners (finance directors) were asked to agree/disagree on some statements regarding strategic investment processes on a Likert scale from 1 to 5 (1 and 2 indicated disagree, whereas 4 and 5 denoted agree). Different statements derived from the literature adopted because of their consistency with the objective of this study. These statements reflect different dimensions/aspects of strategic investment decision-making process (e.g. formal procedure, formal analysis, intuition judgment, fit with business strategy)(Figure: 5.3).

5.5.1. The use of formal procedure: With regards to the use of formal procedure, the survey results reveal that strategic investment decisions are made within the context of a long-term view or vision. For example, over three quarters of the large UK companies in the sample confirm that strategic investment decisions derive from an explicit corporate strategy and emerge through the formal planning processes (79.5%of the companies). According to this perspective, strategic investment decision-making is concurrent with the long-term strategic direction of an organisation, and therefore cannot be seen as a separate independent activity. In this regard, respondents agreed with the statement “investment opportunities are identified and proposed by top management” (57.8% of the companies).

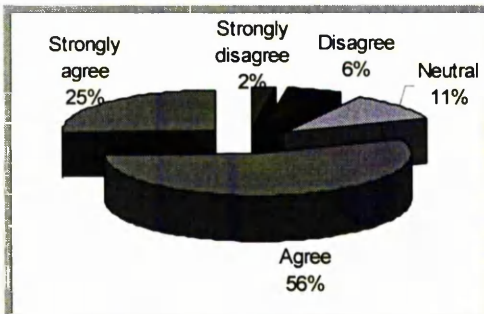
In this study, 89% of the respondents indicated that each company has its own formal procedures for evaluating strategic investment decisions. This result is not surprising because strategic investment decisions require a solid understanding of the organisation’s objectives, as well as an understanding of the environment in which the organisation operates. Therefore, they are usually authorised by the most senior executives at the top level of the organisation’s hierarchy.

Figure (5.3): The main dimensions/aspects of strategic investment decision-making process.

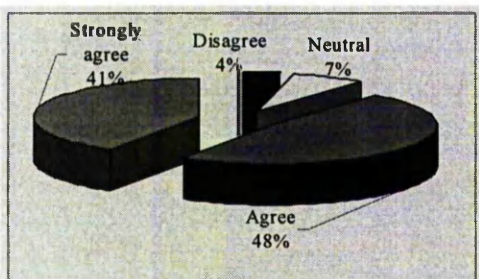
Strategic investment decisions emerge through the formal planning processes.



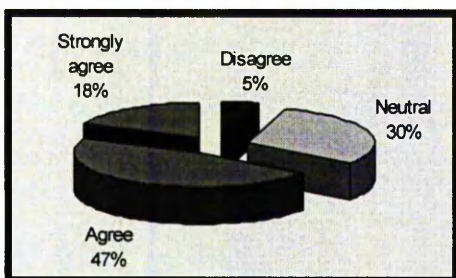
Strategic investment decisions derive from explicit corporate strategy.



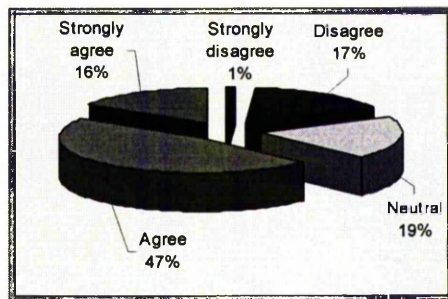
We have formal procedures for evaluating strategic investment decisions.



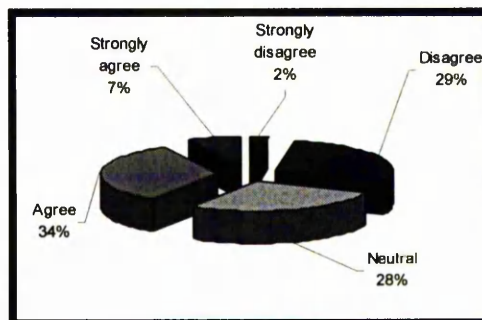
Investment opportunities are identified and proposed by top management.



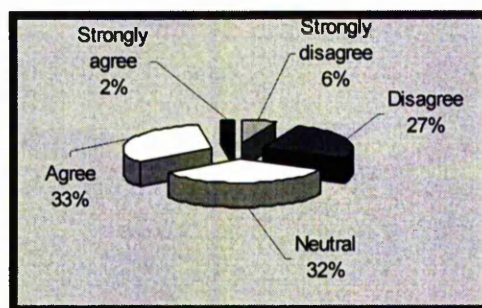
Lower level managers in the organization are involved in strategic investment decisions.



The evaluation of strategic investments is left to the judgment of top management.



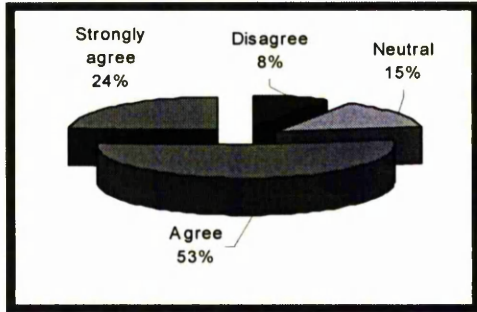
Strategic investment decisions are influenced by the relative power of various groups in the firm.



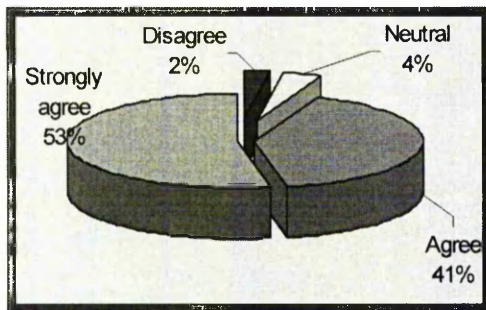
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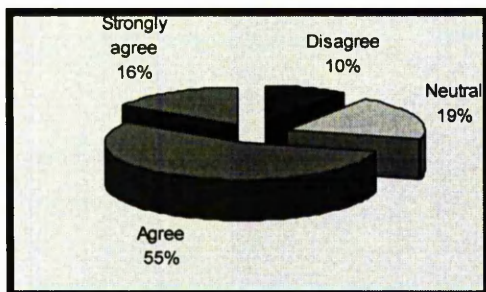
✚ Financial evaluation techniques are often used in the early analysis of strategic investments.



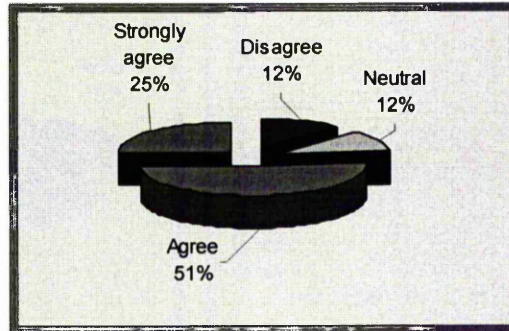
✚ Financial evaluation techniques are often used in the final choice of strategic investments.



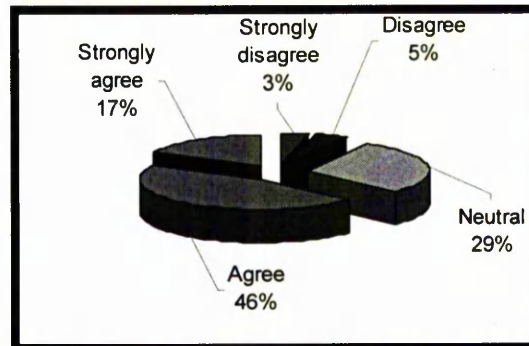
✚ A strategic investment proposal whose expected financial return meets the minimum requirements of return on investment can be rejected if it does not satisfy the expectations and intuition of the top managers.



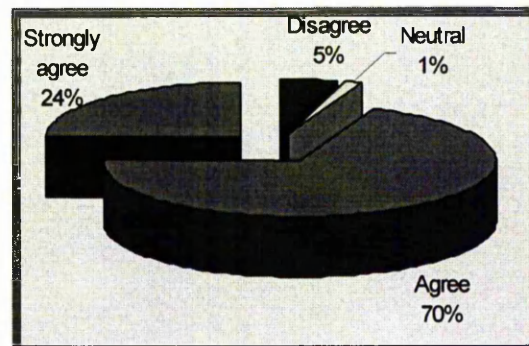
✚ A strategic investment proposal will be rejected if its expected financial return does not meet the minimum requirements of return on investment.



✚ A strategic investment proposal whose expected returns fall below the required level can still be accepted for strategic reasons.



✚ A strategic investment proposal whose expected financial return meets the minimum requirements can be rejected if it does not fit with the firm's competitive strategy.



5.5.2. The importance of financial appraisal: An important instrument within formal analysis is financial evaluation by means of techniques such as NPV, IRR, PB, and ARR. (Van Cauwenbergh et al., 1996). The survey results suggest that the expected financial return of strategic investment projects (or non-strategic projects) will remain valuable and play an important role in strategic (or non-strategic) investment decision-making. For example, respondents indicate that financial evaluation techniques are used in the early analysis (77.1% of the companies in the sample) and in the final choice of strategic investments decision (94% of the respondents). Further, 79.9% of the respondents indicated that a strategic investment proposal would be rejected if its expected financial return does not meet the minimum requirements of return on investment. This conclusion confirms the observations made by Slagmulder *et al.*, 1995, Abdel-Kader and Dugdale, 1998.

Respondents were also asked to comment on the importance of the primary indication of their company's success over the last five years. Namely, profitability (net profit), efficiency (low costs), growth (increase in total assets, sales), shareholder wealth (dividends plus stock price appreciation), utilisation of resources (e.g. ROI), economic value added (EVA), market leadership (market share), technological leadership (innovation, creativity), and survival (avoiding bankruptcy). The survey results show that profitability (net profit), efficiency (low costs), growth (increase in total assets, sales), shareholder wealth (dividends plus stock price appreciation) were rated as important or very important by 96.4%, 83.1%, 72.3% and 54.2% of respondents respectively (Table, 5.7).

Survival (avoiding bankruptcy) as an indication of a company's success was not considered important by 76.5% of the companies in the sample.

These results, however, may be not surprising because short-term profits are a crucial factor shaping strategic investment decision-making in UK companies⁴⁶.

⁴⁶ One German Chief Executive rightly criticized the short-term financial orientation of U.K. and U.S.A. companies: "The normal U.K. or U.S.A. companies have to report to their shareholders, on a quarterly basis, good

5.5.3. Strategic versus financial considerations: The survey results suggest that large UK companies propose strategic investment projects that go beyond financial appraisal and reflect the strategic issues of strategic investment projects. The survey results provide evidence regarding the importance of strategic considerations as criterion when evaluating strategic investment projects. Although, respondents confirmed that a strategic investment proposal will be rejected if its expected financial return does not meet the minimum requirements of return on investment (75.9%), the high percentage of respondents (94%) confirms that a strategic investment proposal whose expected financial return meets the minimum requirements could be rejected if it does not fit with the firm's competitive strategy. Vice versa a strategic investment proposal whose expected returns fall below the required level can still be accepted for strategic reasons (75.1%). These results suggest that decision-makers have a strategic intent, an objective, and they look for the best investment corresponding to this intention. An investment may aim at increasing production capacity, at efficiency, and at the introduction of fundamentally new product lines. In each case there is a unique criterion against which the alternatives will be compared. In other words, from strategic intents companies deduce investment projects. Thus, it seems that business strategy is an important criterion in strategic investment choices. The above findings confirm observations made by Butler *et al.*, (1991), Slagmulder and Bruggeman (1992), Carr *et al.*, (1994) Slagmulder *et al.* (1995); and Van Cauwenbergh *et al.*, (1996).

5.5.4. The role of intuition and judgement: Decision-makers place emphasis upon the present and future states of competition and markets: the evaluation of market structure, changes in consumers' life-styles and preferences, the speed of

or growing profits to prevent their share price from falling. I don't care less. I am not on the stock market: I don't have to report to the outside world...always watching the share price, U.S.A./U.K. companies cannot afford to hold on to an unprofitable product which has a good future for a long time" (Carr and Tomkins, 1996). Strategic decision-making is shaped by context and culture (see Carr and Tomkins, 1998).

technological evolution, and the possible existence of “windows of opportunity”. These issues are ambiguous, and difficult to incorporate in cash-flow predictions. Strategic investments commonly use qualitative processes of judgement, negotiation, and inspiration (Butler *et al.*, 1991). In this regard, the survey results suggest that experienced decision-makers also use judgement and intuition, and are not just technocrats anchored on financial calculations. In this study, 71.1% of the respondents agreed that a strategic investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of the top managers.

Table (5.7): The importance of primary indicators of a company’s success over the last 5 years.

	(1) Not important	(2) Below average importance	(3) Average importance	(4) Important	(5) Very important
↓ Profitability (net profit).	-	2.4%	1.2%	42.2%	54.2%
↓ Efficiency (low costs).	-	3.6%	13.3%	60.2%	22.9%
↓ Growth (increase in total assets, sales).	3.6%	4.8%	19.3%	51.8%	20.5%
↓ Shareholder wealth (dividends plus stock price appreciation).	4.8%	2.4%	38.6%	33.7%	20.5%
↓ Utilisation of resources (ROI).	2.4%	42.2%	22.9%	24.1%	8.4%
↓ Economic value added (EVA).	8.4%	41.0%	22.9%	18.1%	9.6%
↓ Market leadership (market share).	1.2%	44.6%	16.9%	26.5%	10.8%
↓ Technological leadership (innovation, creativity).	3.6%	44.6%	30.1%	16.9%	4.8%
↓ Survival (avoiding bankruptcy).	67.5%	18.1%	4.8%	7.2%	2.4%

The above-results suggest that intuition based on experience plays a major significantly role in decision-making processes of decision-makers in large UK companies. Accordingly, decision-makers combine qualitative intuitive judgement with systematic analysis (financial analysis), facts and figures to evaluate the proposal of strategic investment project. Ignoring one of them would make the evaluation of a strategic investment proposal less effective. This finding confirms observations made by Butler *et al.* (1991) and Van Cauwenbergh *et al.*, (1996).

Since the consequences of strategic investment decisions are important to the future of organisations and the expectations of investors, it is crucial that managers should be aware of investment appraisal techniques and the consequences of their use. Discussing the survey results regarding the use of investment appraisal techniques when evaluating strategic (or non-strategic investment projects) is the concern of the next section.

5.6. Financial analysis techniques

This section considers the extent to which conventional financial techniques are employed by large UK manufacturing companies. Respondents were asked to assess the importance of the conventional financial techniques on a five point rating scale. Responses to the question concerning financial analysis techniques used for evaluating investment projects are presented in Table (5.8) and Figure (5.4). The current survey suggest that:

1. The use of multiple techniques has greatly expanded in recent years

According to Pike's study (1988), approximately one third (32%) of large U.K. companies used three or more methods of financial appraisal. In 1997, this percentage increased to 76% (Arnold and Hatzopoulos, 2000). According to Ross *et al.*, (1995, P.218), "because the true NPV is unknown, the astute financial manager seeks clues to assess whether the estimated NPV is reliable. For this reason, firms would typically use multiple criteria for evaluating a proposal". The survey results provide evidence consistent with Pike (1988) and Arnold and Hatzopoulos (2000). For example, the

current survey shows that 98% of large UK companies use more than one financial analysis technique when evaluating strategic/non-strategic investment projects and 88% of large companies used three or more techniques.

Table (5.8): Frequency use of financial analysis techniques.

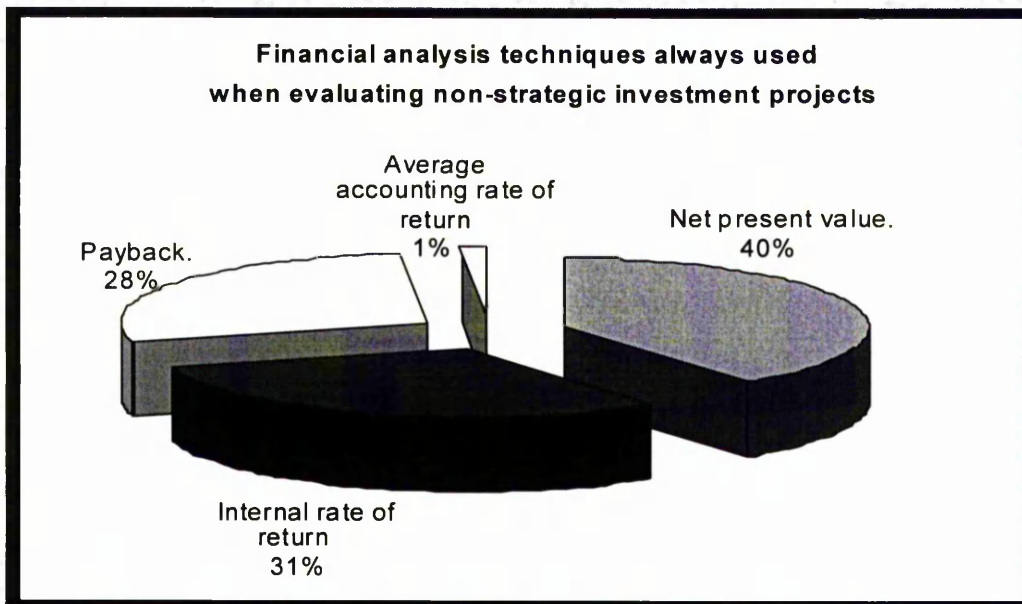
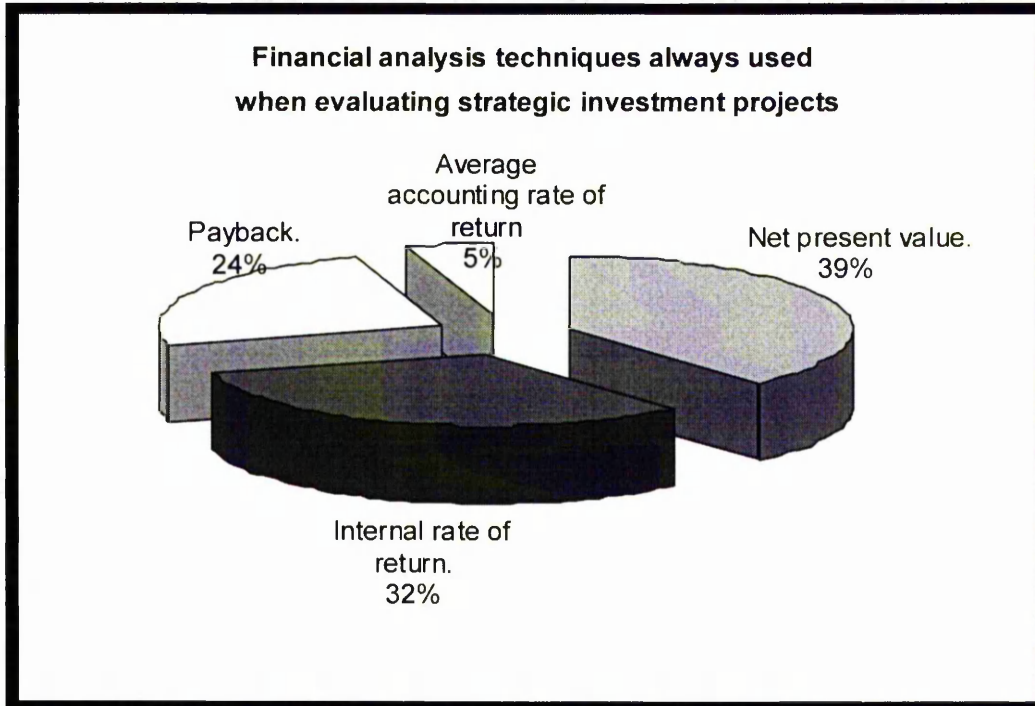
Strategic investment projects	Never %	Rarely %	Often %	Mostly %	Always %
Net present value.	1.2	13.3	18.1	21.7	45.8
Internal rate of return.	3.6	20.5	15.7	20.5	38.6
Payback.	1.2	19.3	25.3	24.1	28.9
Average accounting rate of return	24.1	38.6	13.3	8.4	6

Non-strategic investment projects	Never %	Rarely %	Often %	Mostly %	Always %
Net present value.	2.3	22	16.9	25.3	32.5
Internal rate of return.	9.6	18.1	26.5	19.3	25.3
Payback.	2.4	22.9	26.5	24.1	22.9
Average accounting rate of return	30.1	39.8	13.3	6.0	1.2

2. Sophisticated discounted cash flow (DCF) methods of investment appraisal are now more important than unsophisticated methods in large companies.

The study of Abdel-Kader and Dugdale (1998, P.273) reported that “With the exception of discounted payback, all the measures of financial performance were seen as important, with the unsophisticated methods (payback and ROI) rating marginally more important than the sophisticated, DCF, methods”.

Figure (5.4): Financial evaluation techniques used when evaluating strategic/ non-strategic investment projects.



Arnold and Hatzopoulos (2000, P.605) reported that the adoption of DCF techniques has been at the expense of the payback method (97% of large firms use NPV, 84% use IRR whereas 66% of large firms use payback). However, this not support the findings of Abdel-Kader and Dugdale (1998). Consistent with the findings of Arnold and Hatzopoulos (2000), the current study shows that the sophisticated DCF methods (NPV, IRR) are more widely used than the unsophisticated methods of investment appraisal (PB, ARR) as illustrated in Table (5.9). Accordingly, the sophisticated DCF methods (NPV, IRR) are more important than the unsophisticated methods (PB, ARR)

Table (5.9): Descriptive statistics of the financial analysis techniques.

Strategic investment projects					
	Mean	Std. Deviation	Median	Minimum	Maximum
Net present value.	3.9759	1.1367	4	1.00	5.00
Internal rate of return.	3.7073	1.2813	4	1.00	5.00
Payback.	3.6098	1.1413	4	1.00	5.00
Average accounting rate of return	2.2667	1.1547	2	1.00	5.00

Non-strategic investment projects					
	Mean	Std. Deviation	Median	Minimum	Maximum
Net present value.	3.6829	1.2754	3	1.00	5.00
Internal rate of return.	3.3293	1.3058	4	1.00	5.00
Payback.	3.4268	1.1550	3	1.00	5.00
Average accounting rate of return	1.9867	.9371	2	1.00	5.00

3. The theory-practice gap has been greatly narrowed regarding the adoption of DCF techniques.

Generally surveys have reported increasingly widespread use of sophisticated DCF methods (Klammer *et al.*, 1991; Pike, 1988, 1996; and Arnold and Hatzopoulos, 2000). It is worth mentioning that DCF methods were used by only 58% of large companies in 1975. As shown by Figure (5.5) 99% of large UK companies primarily or secondarily adopted NPV when evaluating strategic investment projects (97% when evaluating non-strategic investment projects) and 95% employed IRR when evaluating strategic investment projects (89% when evaluating non-strategic investment projects). These results suggest that practitioners give the highest importance to the discounting techniques (NPV or IRR). According to the literature, the widespread use of DCF has been assisted by technological development, particularly the growth of computing power, which makes the calculation easy and at low cost (Klammer and Walker, 1984; Pike, 1988; and Arnold and Hatzopoulos, 2000).

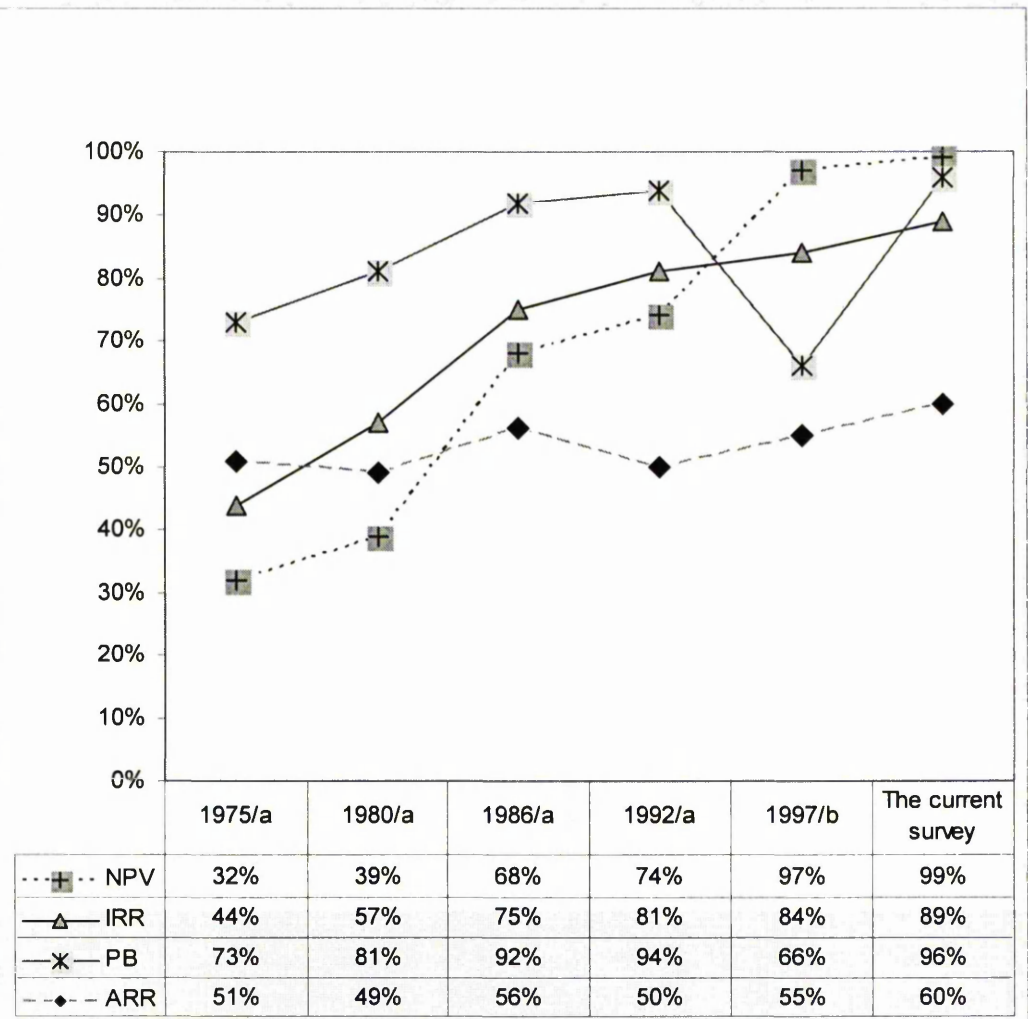
4. For the largest UK companies NPV has overtaken IRR as the most widely used method.

Generally previous surveys reported that IRR was preferred over NPV (Klammer *et al.*, 1991; Pike, 1988, 1996; and Abdel-Kader and Dugdale, 1998). For example, Pike's study (1988) shows that 23% of large companies always used NPV whereas 42 % always used IRR.

On the other hand, Arnold and Hatzopoulos (2000) argued that the position was reversed in the late 1990s with 58% of large companies always using NPV analysis compared with 55% always using IRR. The results of the current survey are consistent with the findings of Arnold and Hatzopoulos (2000). The descriptive statistics of the financial analysis techniques in Table (5.8) reveals that NPV is more widely used than IRR. Table (5.8) shows that 45.8 % of large UK companies always used NPV when evaluating strategic investment projects

(32.5% when evaluating non-strategic investment projects) compared to 38.6% of large UK companies which always used IRR when evaluating strategic investment projects (25.3% when evaluating non-strategic investment projects).

Figure (5.5): Financial analysis techniques used when evaluating major investment projects in large UK companies (1975-2002).



a: Pike (1996) 100 firms. b: Arnold and Hatzopoulos's survey (1997) 100 firms.

5. PB method is widely used by large UK companies.

Despite the theoretical limitations of the payback method it is the most widely used method in practice. The results of the current survey suggest that PB method is still widely used by companies either as a primary or secondary evaluation technique (98% of large UK companies use PB as a primary or secondary technique when evaluating strategic investment projects and 96% when evaluating non-strategic investment projects). The results are consistent with the findings of Tomkins and Carr, (1996), Abdel-Kader and Dugdale (1998) and Pike (1988, and 1996). Why then, is payback the most widely applied formal investment appraisal technique?

It is a useful approach for making projects where a firm faces liquidity constraints and requires a fast repayment of investments. The payback method assumes that risk is time related: the longer the period, the greater the chance of failure. Thus the payback method can be used as rough measure of risk, based on the assumption that the longer it takes for a project to pay for itself, the riskier it is. Managers may also choose projects with quick payback periods because of self-interest. If a manager's performance is measured using short-term criteria, such as net profits, there is a danger that he or she may choose projects with quick payback to show improved net profits as soon as possible (Drury, 2003). The payback method is also frequently used in conjunction with the NPV or IRR methods.

6. Financial appraisal techniques are applied to strategic investment projects as to other non-strategic projects.

In order to investigate whether the frequency use of financial analysis techniques vary according to the nature of project being evaluated (strategic or non-strategic), the researcher developed the null hypotheses and their alternatives as described in Table (5.10).

Table (5.10): The null hypotheses and their alternatives for the use of financial analysis techniques when evaluating strategic and non-strategic investment projects.

NPV	H0	There is no significant difference in the frequency of use of NPV techniques between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of NPV techniques between strategic investment projects and non-strategic investment projects.
IRR	H0	There is no significant difference in the frequency of use of IRR techniques between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of IRR techniques between strategic investment projects and non-strategic investment projects.
PB	H0	There is no significant difference in the frequency of use of PB techniques between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of PB techniques between strategic investment projects and non-strategic investment projects.
ARR	H0	There is no significant difference in the frequency of use of ARR techniques between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of ARR techniques between strategic investment projects and non-strategic investment projects.

The results of non-parametric Mann-Whitney (Z-test) independent samples for the NPV, IRR, PB and ARR signify that the alternative hypotheses (H1) are rejected and the null hypotheses (H0) are accepted. Accordingly, there is no statistically significant difference between the means of the frequent use of financial analysis

techniques between two types of investment projects because the P-value is large (greater than 0.05): (P = 0.139), (P = 0.065), (P = 0.257), (P = 0.179) for NPV, IRR, PB and ARR respectively (Table: 5.11). Also, a one-way test (F-test) was used to determine whether two samples have different variances. A one-way ANOVA test shows that the variances in group1 (the frequent use of financial analysis techniques for evaluating strategic investment projects) and group2 (the frequent use of financial analysis techniques for evaluating non-strategic investment projects) are not significantly different due to the large P-value: (P = 0.118), (P = 0.063), (P = 0.251), (P = 0.105) for NPV, IRR, PB and ARR respectively. Hence, it can be concluded that the responding companies use financial analysis techniques no matter what the nature of project being evaluated (strategic or non-strategic).

Table (5.11): The results of non-parametric Mann-Whitney, One-way ANOVA test for financial appraisal techniques.

Non-parametric Mann-Whitney test.	Mean Rank		Z	P-Value
	Strategic investment projects	Non-strategic investment projects		
Net present value.	87.68	77.19	1.481	0.139
Internal rate of return.	89.14	75.86	1.846	0.065
Payback.	86.57	78.43	1.133	0.257
Average accounting rate of return	79.99	71.01	1.344	0.179

One-way ANOVA test.	P-Value
Net present value.	0.118
Internal rate of return.	0.063
Payback.	0.251
Average accounting rate of return	0.105

Financial techniques are employed in most companies when evaluating investment opportunities (strategic or non-strategic projects). In other words, the nature of the projects being evaluated (strategic or non-strategic) is not a significant factor when deciding on the importance of financial investment appraisal techniques used for evaluating such projects. The above results are consistent with the study of Abdel-Kader and Dugdale (1998, P.273): that “a package of financial return indicators is employed by most companies in appraising investment opportunities- whether investing in AMT or in more conventional projects”.

Respondents who use discounted cash flow methods were asked to indicate the range of minimum rates of return or discount rate required by their companies. A frequency distribution of the minimum required rate of return is given below (Table: 5.12).

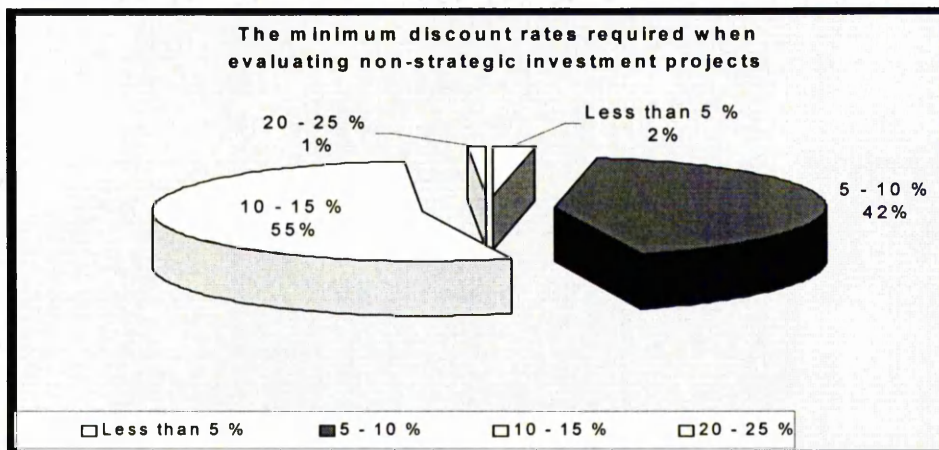
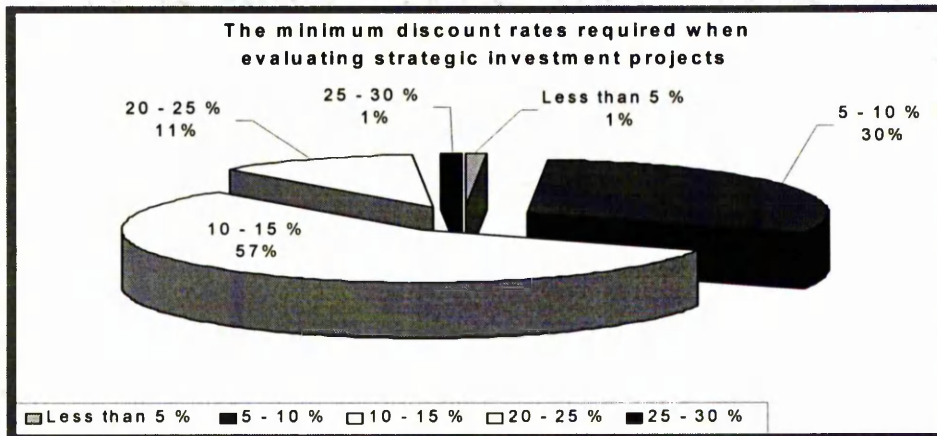
The survey results show that 57% of the companies required a minimum discount rate between 10 and 15% when evaluating strategic investment projects. 11% of the companies required a minimum discount rate between 20% and 30% when evaluating strategic investment projects.

The results of non-parametric Mann-Whitney tests for the minimum discount rates after tax required when evaluating strategic and non-strategic investment projects suggest the rejection of the null hypothesis (There is no significant difference between the minimum discount rates after tax required when evaluating strategic investment projects and the minimum discount rates after tax required when evaluating non-strategic investment projects) and the acceptance of the alternative hypothesis (There is significant difference between the minimum discount rates after tax required when evaluating strategic investment projects and the minimum discount rates after tax required when evaluating non-strategic investment projects) because of the small P-value ($P = 0.013$). Hence, this provides evidence that the nature of the project being evaluated (strategic or non-strategic) is a significant factor in determining the minimum discount rates after tax required when evaluating either strategic or non-strategic investment projects. It seems that top management's decision about investment projects in general was based on the expected financial

return and they treated the required minimum rate of return strictly as a pass/fail hurdle.

Table (5.12): the minimum discount rates required when evaluating strategic and non- strategic investment projects.

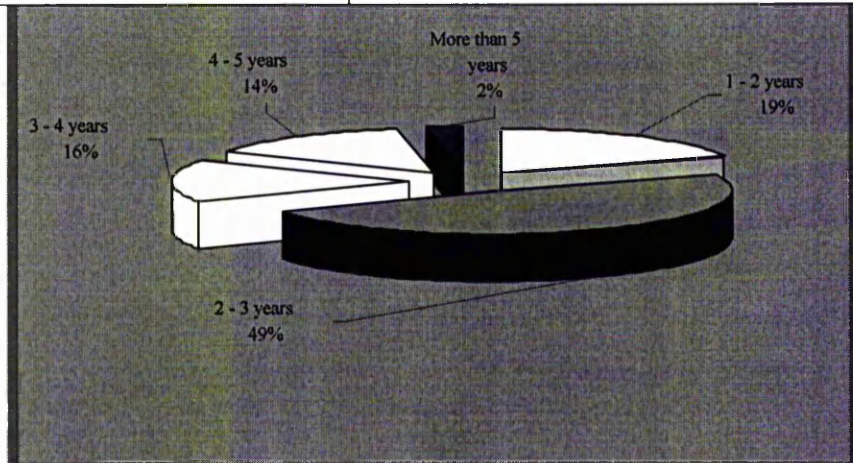
	When evaluating strategic investment projects	When evaluating non-strategic investment projects
Less than 5%	1%	2%
5-10%	30%	42%
10-15%	57%	55%
20-25%	11%	1%
25-30%	1%	-
Total	100	100



Respondents who use the payback method as a financial appraisal technique for evaluating investment projects were asked to indicate the required payback period which most frequently used in their companies. The survey results show that 48.2% of the respondents required a payback period when evaluating strategic investment projects of between 2-3 years as shown by Table (5.13).

Table (5.13): The frequency of use of the required payback period when evaluating strategic investment projects

1 - 2 years	19%
2 - 3 years	49%
3 - 4 years	16%
4 - 5 years	14%
More than 5 years	2%
Total	100.



5.7. Techniques used when assessing the risk of major investment projects

The notion of risk in the framework of capital budgeting analysis refers to whether the decision-maker is uncertain about the cash flows that will be produced by the investment, which may involve undesirable consequences. From the perspective of finance theory, if the risk associated with investment projects is high, investors require a high return to allow for extra risk (Lumby, 1995).

The problem of uncertainty is inherent in organisational life. In fact, dealing with uncertainty is a common problem that all organisations share (Mintzberg, 1983). For example, decision-makers virtually never have access to all the relevant information, nor can they generate all the possible alternatives and accurately anticipate all the consequences. The uncertainty of future cash flows and other estimation difficulties that exist in practice have resulted in the development of various risk analysis and management science techniques to supplement traditional present value based decision models. Risk handling methods are usually classified into two categories. One is the simple risk-adjustment method, which is based on deterministic assessment and intuitive adjustments such as increasing the discount rate, or shortening the required payback period. The second approach is risk analysis, which is derived from the management science literature. It implies an evaluation of the uncertainties associated with significant variables through allocating probabilities to possible outcomes (e.g. sensitivity analysis, probability analysis, simulation, and capital asset pricing model-CAPM).

In order to examine the importance of risk analysis techniques, respondents were asked to indicate the frequency of use of each technique using a five-point equal distance scale. Table (5.14) and Table (5.15) provide the percentages of respondents for each point on the scale and their descriptive statistics.

With regards to risk analysis the survey results suggest the following:

- 1. Sensitivity analysis is the most widely used technique employed for assessing the risk of strategic and non-strategic investment projects.**

Figure (5.6) and Figure (5.7) indicate that sensitivity analysis is the most widely used technique for assessing the risk associated with investment projects (89.20% of large UK companies employed sensitivity/scenario analysis when assessing the risk associated with major investment projects and 93.9% when assessing the risk of strategic investment projects). This finding is consistent with the findings of Klammer *et al* (1991), Pike (1988), Ho and Pike (1991), Pike (1996) and Arnold and Hatzopoulos (2000).

Table (5.14): Frequency of use of risk analysis techniques.

Strategic investment projects	Never %	Rarely %	Often %	Mostly %	Always %
■ Adjust required payback period to allow for risk.	19.3	31.3	20.5	19.3	9.6
■ Adjust required return on investment to allow for risk.	13.3	19.3	24.1	30.1	13.3
■ Adjust discount rate to allow for risk.	9.6	26.5	25.3	24.1	14.5
■ Adjust forecast cash flows to allow for risk.	12.0	21.7	20.5	24.1	21.7
■ Probability analysis.	16.9	28.9	33.7	9.6	10.8
■ Computer simulation.	39.8	33.7	16.9	6.0	3.6
■ Beta analysis (Capital asset pricing model).	53.0	28.9	12.0	1.2	4.8
■ Sensitivity /scenario analysis (e.g. "good vs. "bad").	6.0	12.0	30.1	32.5	19.3
Non-strategic investment	Never %	Rarely %	Often %	Mostly %	Always %
■ Adjust required payback period to allow for risk.	25.3	38.6	20.5	13.3	2.4
■ Adjust required return on investment to allow for risk.	18.1	39.8	18.1	20.5	3.6
■ Adjust discount rate to allow for risk.	18.1	32.5	20.5	21.7	7.2
■ Adjust forecast cash flows to allow for risk.	18	22.9	31.3	14.5	13.3
■ Probability analysis.	22.9	34.9	26.5	7.2	8.4
■ Computer simulation.	42.2	37.3	15.7	3.6	1.2
■ Beta analysis (Capital asset pricing model).	56.6	26.5	10.8	1.2	4.8
■ Sensitivity /scenario analysis (e.g. "good vs. "bad").	10.8	21.7	27.7	16.9	22.9

Table (5.15): Descriptive statistics of risk analysis techniques.

Strategic investment projects					
	Mean	Std. Deviation	Median	Minimum	Maximum
■ Adjust required payback period to allow for risk.	2.6867	1.2584	2	1.00	5.00
■ Adjust required return on investment to allow for risk.	3.1084	1.2495	3	1.00	5.00
■ Adjust discount rate to allow for risk.	3.0723	1.2176	3	1.00	5.00
■ Adjust forecast cash flows to allow for risk.	3.2169	1.3348	3	1.00	5.00
■ Probability analysis.	2.6867	1.1886	3	1.00	5.00
■ Computer simulation.	2.0000	1.0707	2	1.00	5.00
■ Beta analysis (Capital asset pricing model).	1.7590	1.0429	1	1.00	5.00
■ Sensitivity /scenario analysis (e.g. "good vs. "bad").	3.4699	1.1190	4	1.00	5.00
Non-strategic investment projects					
	Mean	Std. Deviation	Median	Minimum	Maximum
■ Adjust required payback period to allow for risk.	2.2892	1.0653	2	1.00	5.00
■ Adjust required return on investment to allow for risk.	2.5181	1.1192	2	1.00	5.00
■ Adjust discount rate to allow for risk.	2.6747	1.2108	2	1.00	5.00
■ Adjust forecast cash flows to allow for risk.	2.8193	1.2702	3	1.00	5.00
■ Probability analysis.	2.4337	1.1707	2	1.00	5.00
■ Computer simulation.	1.8434	.9037	2	1.00	5.00
■ Beta analysis (Capital asset pricing model).	1.7108	1.0422	1	1.00	5.00
■ Sensitivity /scenario analysis (e.g. "good vs. "bad").	3.1928	1.3109	3	1.00	5.00

Figure (5.8) shows the development of techniques used by large UK companies (1975-2002) when assessing the risk of major investment projects.

Figure (5.6): Techniques used when assessing the risk of strategic investment projects

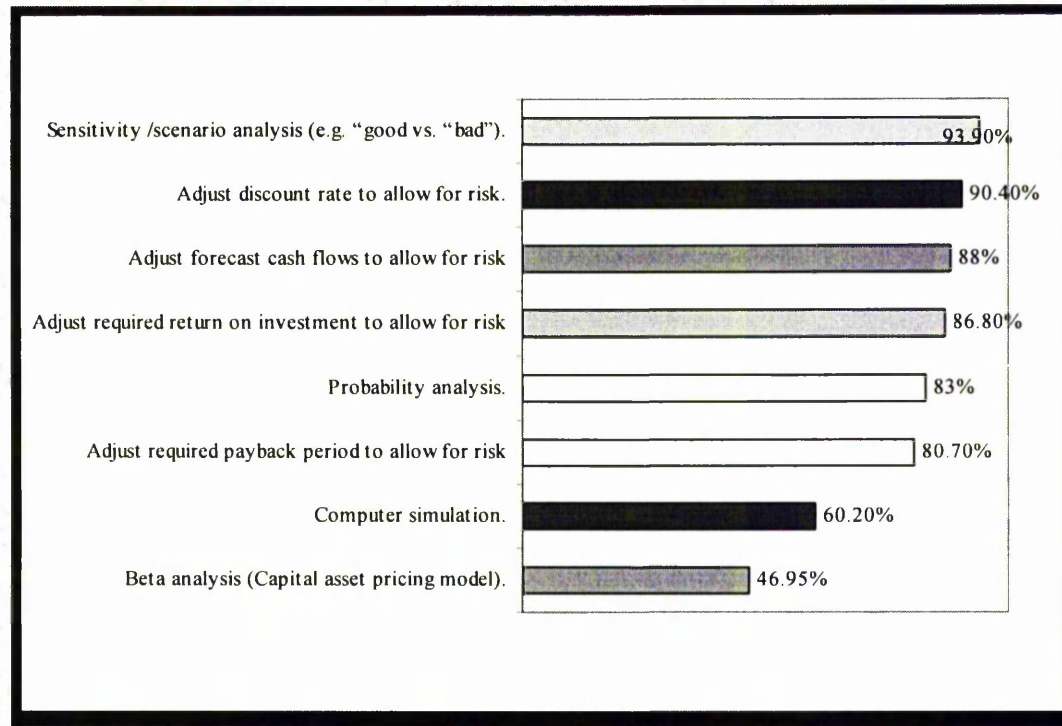


Figure (5.7): Techniques used when assessing the risk of non-strategic investment projects

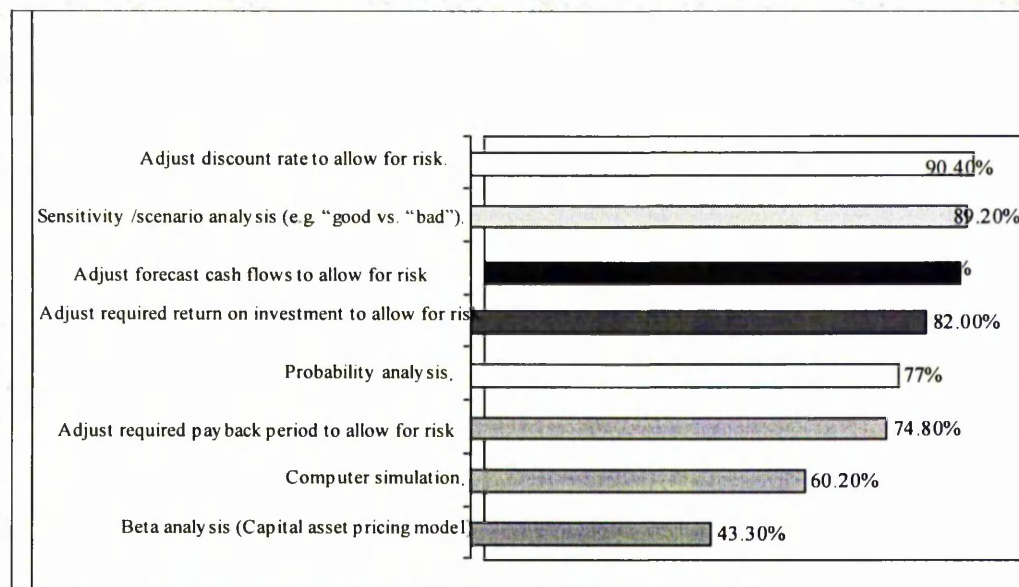
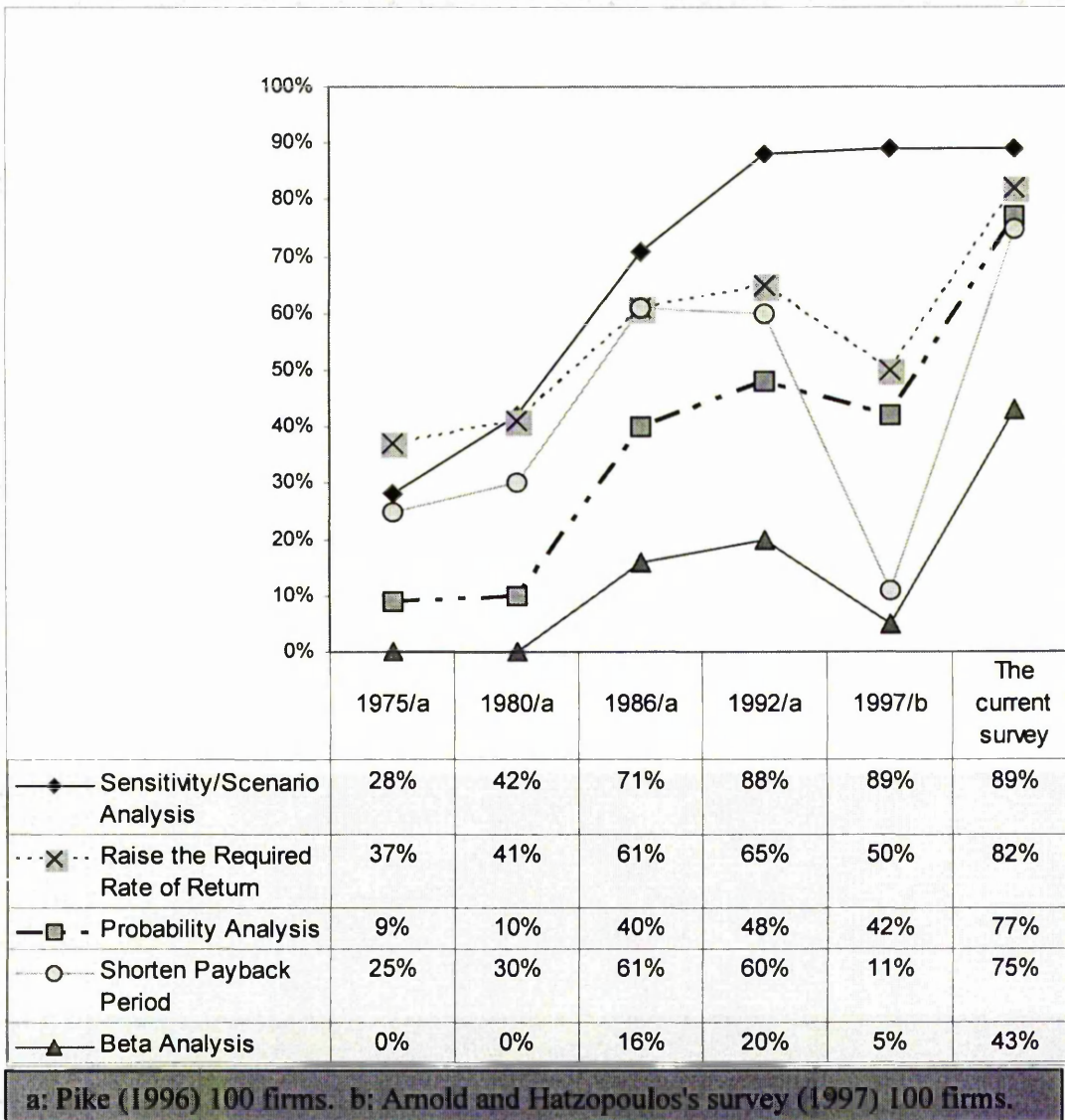


Figure (5.8): Risk analysis techniques used by large U.K. companies when evaluating major investment projects (1975-2002)



As shown in Figure (5.8) the most widely used risk technique is sensitivity/scenario analysis, used by 71%, 88%, 89% and 90.4% of large U.K. companies in 1986, 1992, 1997, and 2002 respectively. However, sensitivity analysis is often used in conjunction with adjusting discount rates, adjusting forecast cash flows, and raising the required rate of return.

2. A wide theory-practice gap still remains regarding the adoption of sophisticated techniques of risk analysis.

In general, sophisticated techniques of risk analysis such as probability analysis, CAPM, and computer simulation are not widely adopted when assessing the risk associated with strategic or non-strategic investment projects. Generally, the results provided in Table (5.14) and Table (5.15) regarding the frequency of use of risk analysis techniques and their descriptive statistics suggest that a theory-practice gap remains regarding the use of sophisticated risk analysis techniques. This finding supports Ho and Pike (1992), Abdel-Kader and Dugdale (1998) and Arnold and Hatzopoulos (2000). According to Abdel-Kader and Dugdale (1998, P.280) "The most preferred theoretical methods in evaluating investment risk: probability analysis, CAPM, and computer simulation, were judged to be important by very few respondents".

3. There is significant difference in the frequency of use of risk analysis techniques between strategic and non-investment projects.

In order to investigate whether the nature of the project being evaluated (strategic or non-strategic) is a factor in determining the importance of risk analysis techniques, the researcher developed the null hypotheses and their alternatives as described in Table (5.16).

Table (5.16): The null hypotheses and their alternatives for the use of risk analysis techniques when evaluating strategic and non-strategic investment projects.

Adjust required payback period to allow for risk.	H0	There is no significant difference in the frequency of use of adjust required payback period between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of adjust required payback period between strategic investment projects and non-strategic investment projects.
Adjust required return on investment	H0	There is no significant difference in the frequency of use of adjust required return on investment between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of adjust required return on investment between strategic investment projects and non-strategic investment projects
Adjust discount rate	H0	There is no significant difference in the frequency of use of adjust discount rate between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of adjust discount rate between strategic investment projects and non-strategic investment projects.
Adjust forecast cash flows	H0	There is no significant difference in the frequency of use of adjust forecast cash flows between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of adjust forecast cash flows between strategic investment projects and non-strategic investment projects.
Probability analysis	H0	There is no significant difference in the frequency of use of probability analysis between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of probability analysis between strategic investment projects and non-strategic investment projects.
Computer simulation	H0	There is no significant difference in the frequency of use of computer simulation between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of computer simulation between strategic investment projects and non-strategic investment projects.
Beta analysis	H0	There is no significant difference in the frequency of use of beta analysis between strategic investment projects and non-strategic investment projects.
	H1	There is significant difference in the frequency of use of beta analysis between strategic investment projects and non-strategic investment projects
Sensitivity /scenario analysis	H0	There is no significant difference in the frequency of use of sensitivity /scenario analysis between strategic investment projects and non- strategic investment projects.
	H1	There is significant difference in the frequency of use of sensitivity /scenario analysis between strategic investment projects and non- strategic investment projects.

The results of Mann-Whitney, one-way ANOVA tests regarding the frequency use of risk analysis techniques when evaluating strategic and non-strategic investment projects are shown in Table (5.17).

Table (5.17): The results of non-parametric Mann-Whitney, One-way ANOVA test for risk analysis techniques.

Non-parametric Mann-Whitney	Mean Rank		Z	P-Value
	Strategic investment projects	Non-strategic investment projects		
■ Adjust required payback period to allow for risk.	90.67	76.33	1.989	0.047
■ Adjust required return on investment to allow for risk.	94.78	72.22	3.111	0.002
■ Adjust discount rate to allow for risk.	91.01	75.99	2.068	0.039
■ Adjust forecast cash flows to allow for risk.	90.55	76.45	1.934	0.053
■ Probability analysis.	88.85	78.15	1.486	0.137
■ Computer simulation.	86.05	82.07	0.729	0.466
■ Beta analysis (Capital asset pricing model).	84.93	78.43	0.426	0.670
■ Sensitivity /scenario analysis (e.g. "good vs. "bad").	88.75	78.25	1.446	0.148

One-way ANOVA test	P-value
■ Adjust required payback period to allow for risk.	0.029
■ Adjust required return on investment to allow for risk.	0.002
■ Adjust discount rate to allow for risk.	0.036
■ Adjust forecast cash flows to allow for risk.	0.051
■ Probability analysis.	0.169
■ Computer simulation.	0.310
■ Beta analysis (Capital asset pricing model).	0.766
■ Sensitivity /scenario analysis (e.g. "good vs. "bad").	0.145

These results suggest that the first, second, and third null hypotheses are rejected because of the small P-value: ($P = 0.047$), ($P = 0.002$) and ($P = 0.039$) for adjusting the required payback period, return on investment, and discount rate respectively. These results indicate that there is significant difference in the frequency of use of risk analysis techniques between strategic and non-investment projects. On the other hand, the results indicate the acceptance of the remaining last five null hypotheses because of the large P-value (greater than 0.05): ($P = 0.053$), ($P = 0.137$), ($P = 0.466$) ($P = 0.670$), and ($P = 0.148$) for adjust forecast cash flows probability analysis, computer simulation, beta analysis, and sensitivity /scenario analysis respectively.

These results are also confirmed by using the one-way ANOVA test as shown in Table (5.14). Accordingly, I can conclude that there is significant difference in the frequency of use of risk analysis techniques between strategic and non-investment projects. The nature of the project being evaluated (strategic or non-strategic) is to some extent a significant factor in determining the importance of risk analysis techniques. This result not support the study of Abdel-Kader and Dugdale (1998) which reported that there are no significant differences between AMT investment projects and conventional investment projects regarding financial appraisal and risk analysis techniques.

Conventional investment appraisal techniques are unable to make a useful contribution to strategic investment decision-making due to difficulties in capturing all the relevant information within the financial information (Finnie, 1988). The present state of knowledge makes it impossible to produce as reliable cash flow forecasts as for conventional technology, making financial analysis unreliable. As was discussed earlier (see chapter four), DCF methods assume a static environment where decisions are reversible without penalty. That is, if an investment is not undertaken now, it can be undertaken later with no restriction on one's options. This assumption, however, seems unrealistic in a competitive environment. To implement NPV, we need estimates of expected future cash flows and an appropriate discount

rate. An NPV calculation only uses information that is known at the time of the appraisal. NPV and IRR analyses do not recognise the value of management in responding to changing circumstances. Over the last twenty years, criticisms have been directed at the traditional investment models in evaluating strategic investment. Critics such as Slagmulder *et al.* (1995) and Kaplan (1986) argue that financial criteria, particularly those involving DCF models, are biased towards short-term investments whose benefits are more easily quantified than longer-term projects.

5.8. Analysis of non-financial investment criteria (strategic factors)

The strategic factors (non-financial or 'intangible' factors) are sometimes referred to as non-traditional evaluation techniques (qualitative issues) as opposed to the traditional financial evaluation techniques. In accordance with Porter (1985), Butler *at al.* (1991), Butler *et al.* (1993) Chen, (1995), Shank (1996), Porter (1996) and Abdel-Kader and Dugdale (1998) Abdel-Kader and Dugdale. (2001), competitive positioning in the end depends on a firm's ability to increase efficiency, quality, innovation, and customer reaction. Therefore, decision-makers, before making the final decision regarding strategic investment projects, must consider the non-financial investment criteria that cannot be fitted into the cash flow analysis. In order to investigate the strategic factors that led to the initiation of strategic investment projects, respondents were asked to comment on the importance of strategic factors when evaluating strategic investment projects. Respondents were asked to evaluate ten criteria using a five-point equal distance scale. Emphasis was placed on the impact of strategic investment projects on improvements in company image, consistency with corporate strategy, requirements of customers, keeping up with competition, obtaining greater manufacturing flexibility, the ability to expand in the future, the quality and reliability of outputs, reduced lead-times, reduced inventory levels, and experience with new technology. Table (5.18) provides a description of the percentage of respondents for each point on the scale.

Table (5.18): The importance of strategic factors (non-financial investment criteria).

	(1) Not Important	(2) Below Average Importance	(3) Average Importance	(4) Important	(5) Very Important
■ Consistency with corporate strategy.	-	-	7.2%	41%	51.8%
■ Improved company image.	7.2%	36.1%	38.6%	14.5%	3.6%
■ Requirements of customers.	4.8%	1.2%	12%	50.6%	31.3%
■ Keeping up with competition.	6%	3.6%	22.9%	51.8%	15.7%
■ Obtaining greater manufacturing flexibility.	9.6%	8.4%	26.5%	49.4%	6%
■ The ability to expand in the future.	1.2%	12%	30.1%	49.4%	7.2%
■ Quality and reliability of outputs.	3.6%	2.4%	28.9%	50.6%	14.5%
■ Reduced lead-times.	10.8%	12%	47%	21.7%	8.4%
■ Reduced inventory levels.	12%	16.9%	41%	25.3%	4.8%
■ Experience with new technology.	13.3%	27.7%	36.1%	21.7%	1.2%

Descriptive statistics

	Mean
■ Consistency with corporate strategy.	4.4458
■ Improved company image.	2.7108
■ Requirements of customers.	4.0241
■ Keeping up with competition.	3.6747
■ Obtaining greater manufacturing flexibility.	3.3373
■ The ability to expand in the future.	3.4940
■ Quality and reliability of outputs.	3.6988
■ Reduced lead-times.	3.0482
■ Reduced inventory levels.	2.9398
■ Experience with new technology.	2.6988

Score1: not important; Score2: below average importance; Score3: average importance; Score 4: important; Score 5: very important.

As shown by Table (5.18) all criteria are used in most companies but with considerable deviation. 92.8% of respondents considered the criterion of consistency with corporate strategy to be important/very important. Requirements of customers, keeping up with competition, the quality and reliability of outputs, the ability to

expand in the future and obtaining greater manufacturing flexibility were rated important/very important by 81.9%. 67.5%, 65.1%, 56.6% and 55.4% of the companies respectively. However, improved company image, reduced lead-times, reduced inventory levels and experiences with new technology were rated as of average importance.

In the literature, it is usually reported that companies adopting strategic investment projects can gain numerous benefits. A list of 17 benefits was derived from the literature (e.g. Accola, 1994; Slagmulder *et al.*,1995; Abdel-Kader and Dugdale, 1998) and respondents were asked to classify whether each benefit was considered in financial terms, non-financial terms, equally in financial and non-financial terms, or not considered at all in the evaluation process. The results are provided in Table (5.19).

The survey results indicate that eight benefits are considered financially in evaluating strategic investment projects:

1. Reduced inventory levels (81.9%).
2. Reduced scrap/rework costs (77.1%).
3. Savings from less frequent set-ups (75.9%).
4. Reduced costs in product design (68.7%).
5. Reduced floor space requirements (61.4%).
6. Reduced manufacturing lead times (59%).
7. Reduced after sale costs such as warranties (57.8%).
8. Easier production scheduling (50.6%).

Five benefits are considered equally in financial and non-financial terms:

1. Consistency with corporate strategy (73.5%).
2. Improved competitive position (55.4%).
3. Improved product quality (53%).
4. Increased delivery speed to customers (45.8%).
5. Faster response to market needs (48.2%).

Other benefits, such as improved company image are considered non-financially by 72.3% of respondents.

Table (5.19): Benefits of strategic investment projects (% of respondents).

	(0) Not a benefit at all.	(1) A benefit mainly in financial terms.	(2) A benefit mainly in non-financial terms.	(3) A benefit equally in financial and non-financial terms	Descriptive statistics (Mean)
Consistency with corporate strategy.	1.2%	7.2%	18.1%	73.5%	2.6386
Improved company image.	10.8%	2.4%	72.3%	14.5%	1.9036
Improved product quality.	1.2%	18.1%	27.7%	53%	2.3253
Improved competitive position.	-	36 %	8.4%	55.4%	2.1928
The ability to expand in the future.	6.0%	28.9%	30.1%	34.9%	1.9398
Greater manufacturing flexibility.	7.2%	27.7%	32.5%	32.5%	1.9036
Increased delivery speed to customers.	1.2%	18.1%	34.9%	45.8%	2.2530
Increased market share.	3.6%	34.9%	22.9%	38.6%	1.9639
Reduced scrap/rework costs.	9.6%	77.1%	2.4%	10.8%	1.1446
Reduced manufacturing lead times.	12.0%	59.0%	6.0%	22.9%	1.3976
Reduced floor space requirements.	18.1%	61.4%	3.6%	16.9%	1.1928
Reduced costs in product design.	15.7%	68.7%	1.2%	14.5%	1.1446
Reduced after sale costs such as warranties.	16.9%	57.8%	1.2%	24.1%	1.3253
Reduced inventory levels.	8.4%	81.9%	-	9.6%	1.1084
Savings from less frequent set-ups.	15.7%	75.9%	1.2%	7.2%	1.0000
Faster response to market needs.	6.0%	15.7%	30.1%	48.2%	2.2048
Easier production scheduling.	14.5%	50.6%	15.7%	19.3%	1.3976

In general, the above-results regarding non-financial criteria confirm the observations made by Butler *et al.* (1991), Slagmulder *et al.*(1995) and Abdel-Kader and Dugdale (1998).

5. 9. Strategic methods to the appraisal of strategic investment projects

In order to provide additional insight into the relative emphasis on strategic versus financial considerations, respondents were asked to determine the importance of techniques/information (other than conventional financial techniques) which can be used as guidance for strategic investment decisions using a five-point equal distance scale. Emphasis was placed on coordination with investment decisions of other firms (e.g. through the use of industry level data or technology roadmaps), real options approach, balanced scorecard, benchmarking, and value chain analysis. Table (5.20) provides a description of the percentage of respondents for each point on the scale. The survey result shows that there is considerable deviation regarding the importance of these techniques. Benchmarking was rated as of average importance or important by 87% of the companies in the sample. This result is not surprising because the benchmarking technique has now been applied to many world-class companies (e.g. General Electric, General Motors, Honda Motors, IBM and Motorola) (Hoque, 2001). Benchmarking can be defined as “a continuous systematic processes of evaluating companies recognized as industry leaders, to determine business and work processes that represent best practices and establish rational performance goals” (cited in Hoque, 2001, p.184.). The benchmarking literature identifies numerous advantages. For example, it identifies the best practice, links operational tactics to corporate vision and strategy, help companies redefine their objectives, allows realistic stretch goals⁴⁷. On the other hand, coordination with investment decisions of other firms, real options approach, balanced scorecard and value chain analysis were considered to be

⁴⁷ see Hoque, 2001

not important or of below average importance by 79.5%, 79.5%, 61.4% and 54.8% of the companies in the sample respectively.

Table (5.20): Importance of strategic techniques/information in guiding strategic investment decisions.

	(1) Not important	(2) Below average importance	(3) Average importance	(4) Important	(5) Very important
Coordination with investment decisions of other firms (e.g. through use of industry level data or technology roadmaps)	54.2%	25.3%	13.3%	3.6%	3.6%
Real options approach.	56.6%	22.9%	16.9%	3.6%	-
Balanced scorecard.	12.0%	49.4%	20.5%	13.3%	4.8%
Benchmarking.	4.8%	7.2%	49.4%	27.7%	10.8%
Value chain analysis.	9.6%	48.2%	22.9%	15.7%	3.6%

This finding is consistent with the view of Burns and Yazdifar (2001, p.34.). They stated "Several new techniques such as economic value added, balanced scorecard, activity-based costing and target costing were seen as relatively unimportant". These results, however, do not underestimate the importance of these techniques but may be interpreted as a theory-practice gap.

Although the literature of real options techniques has developed considerably, the empirical base is still relatively weak (MacDougall and Pike, 2003). Busby and Pitts (1998) pointed out by most respondents were not aware of the term "real options", the expression frequently used by researchers to describe investment flexibility.

The survey results show that practitioners use different hurdle rates (discount rates) for different types of investment projects. They use a higher rate for strategic investment projects and a lower rate for non-strategic investment projects. This conclusion is consistent with the observation made by Stark (1990) and Busby and Pitts (1997). According to Stark (1990) "If managers are aware, conceptually, of the

missing components of the analysis, (i.e. the option to wait and the option to shut down/abandon), even if they are unable to use the appropriate valuation formula for these components, it is argued that firms can use hurdle rates in excess of the cost of capital as an ad hoc (if somewhat crude) heuristic for allowing these factors". Busby and Pitts (1997) pointed out that UK companies do not use mathematical calculation to value real options, but they have a rule of thumb to deal with real options. In fact, this may not always be the case due to the possibility that finance directors may use higher hurdle rates than their companies' cost of capital in order to satisfy their need to show higher accounting profits. This is because empirical evidence shows that accounting earnings may influence management compensation and job security (Palepu, 1986). Further, UK companies have to report to their shareholders, on a quarterly basis, good or growing profits to prevent their share price from falling⁴⁸.

5.10. Summary of the survey results

The survey results suggest that each company has its own formal procedures for evaluating strategic investment decisions. Strategic investment decisions are generally derived from an explicit corporate strategy and they are completely concurrent with the long-term strategic direction of an organisation. The survey results confirm the conclusion of the existing literature that investment projects (strategic or non-strategic) appear to be affected mainly by financial return measures, risk measures and non-financial criteria. The expected financial return of strategic investment projects (or non-strategic projects) will remain valuable and play an important role in strategic (or non-strategic) investment decision-making. Financial evaluation techniques are used in the early analysis and in the final choice of strategic investments decision. Profitability (net profit), efficiency (low costs), growth (increase in total assets, sales), and shareholder wealth (dividends plus stock price appreciation) are the key indicators of the company's success. An investment proposal should show sufficient profitability to be implemented. Strategic investment proposal would be rejected if its expected financial return does not meet the minimum

⁴⁸ See Carr and Tomkins, 1998.

requirements of return on investment (these results provides superior support for hypothesis 8 and restricted support for hypothesis 9).

Decision-makers use more than one technique for evaluating investment projects with different levels of importance. Practitioners give the highest importance to the discounting techniques (NPV and IRR)(this result provides superior support for hypothesis 2 and leads to the rejection of hypothesis 1). Also, the NPV technique was rated higher than the IRR (this result provides superior support for hypothesis 4 and leads to the rejection of hypothesis 3). These results are consistent with the findings of Arnold and Hatzopoulos (2000). The statistical test of Mann-Whitney one-way ANOVA did not indicate any significant difference in the importance of any financial technique used in evaluating either strategic or non-strategic investment projects (this result supports hypothesis 5).

Consistent with the literature, traditional financial measures (discounting or non-discounting methods) penalise strategic investment projects through using high discount rates or short payback targets. For example, a period of 3 years or shorter was set as a target for payback by approximately 60 % of the sample companies. Also, the majority of the companies required a minimum discount rate between 10 and 15% when evaluating either investment projects or non-strategic investment projects.

With regards to risk analysis the survey results suggest sensitivity analysis is the most widely technique employed for assessing the risk of strategic and non-strategic investment projects. A wide theory-practice gap still remains regarding the adoption of sophisticated techniques of risk analysis. Sophisticated techniques of risk analysis such as probability analysis, CAPM, and computer simulation are not adopted when assessing the risk associated with strategic or non-strategic investment projects. This result provides confirmation of the observations made by Abdel-Kader and Dugdale (1998) and Arnold and Hatzopoulos (2000). The results of Mann-Whitney, one-way

ANOVA tests regarding the frequency use of risk analysis techniques when evaluating strategic and non-strategic investment projects suggest that the nature of the project being evaluated (strategic or non-strategic) is to some extent a significant factor in determining the importance of risk analysis techniques (this result leads to the rejection of hypothesis 6).

Practitioners use strategic investment criteria that go beyond discounted cash flow calculations, as the latter cannot capture all relevant information or reflect strategic aims. Strategic investment proposals whose expected financial returns meet the minimum financial requirements may be rejected if they are not consistent with the firm's competitive strategy. Vice versa, a strategic investment proposal whose expected returns fall below the required level may be accepted for strategic reasons. Broadly, in making strategic investment decisions, practitioners consider strategic analysis but not at the expense of financial analysis. Customer requirements, being competitive, greater manufacturing flexibility, the quality and reliability of outputs, and future expansion, are of particular significance in strategic investment decision-making (this result provides support for hypothesis 10)

However, these non-financial investment criteria (strategic factors) are insufficient to gain approval for investment projects (either strategic or non-strategic) (this result offers restricted support for hypothesis 9)

Disappointingly for their advocates, many of the strategic methods to the appraisal of strategic investment projects such as real options approach, value chain analysis and balanced scorecard, are of relatively minor importance, as is frequently reported in both professional and academic accounting/finance research publications (this result provides support for hypothesis 7).

Decision-makers adopt 'holistic' approaches incorporating both financial and strategic considerations in the evaluation of strategic investment proposals. The survey results suggest that experienced decision-makers also use judgement and

intuition, and are not just technocrats anchored on financial calculations. Intuition based on experience remain valuable and plays a major role in the decision-making process among decision-makers in large UK companies. A strategic investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of the top managers. Practitioners combine qualitative intuitive judgement with systematic analysis (financial analysis), facts and figures to evaluate the proposal of strategic investment project. Rational factors (such as financial assessment techniques and the strategy of the company) together with intuitive judgement constitute the basic elements for the evaluation of a strategic investment proposal. This finding confirms the observations made by Butler *et al.* (1991) and Van Cauwenbergh *et al.*, (1996).

There is also support for the study of Abdel-Kader and Dugdale (1998) regarding Shank's three issues underlying strategic cost management analysis (1996): value chain analysis (requirements of customers and quality and reliability of outputs), cost driver analysis (reduced lead-times and reduced inventory levels) and competitive advantage analysis (greater manufacturing flexibility, keeping up with competition and the ability to expand in the future).

There is also support for Kaplan and Norton (1992)'s balanced scorecard. The survey results suggest that decision-makers are directly or indirectly aware of the basic elements which constitute the four perspectives underlying the balanced scorecard formulated by Kaplan and Norton (1992): financial perspective (net profits, low costs, increase in total assets, sales), customer perspective (requirements of customers and increased delivery speed to customers), internal perspective (quality and reliability of outputs and reduced manufacturing lead times) and innovation and learning perspective (experience with new technology).

To ensure that relevant issues regarding the research questions were covered, an explanatory study by means of interviews was conducted with selected individuals from several companies. Details of this explanatory study are presented in the following chapter.

Chapter Six

Field Study of Strategic Investment Decision-Making And Investment Appraisal Techniques

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Chapter Six

Field Study of Strategic Investment Decision-Making And Investment Appraisal Techniques

6.1. Introduction

The survey results reported in Chapter Five suggest the following:

1. Decision-makers use more than one technique for evaluating investment projects with different levels of importance. Practitioners give the highest importance to the discounting techniques (NPV and IRR). Also, the NPV technique was rated higher than the IRR.
2. With regard to risk analysis techniques, the survey results suggest that sensitivity analysis is the technique most widely employed for assessing the risk of strategic and non-strategic investment projects. However, the sophisticated techniques of risk analysis, such as probability analysis, CAPM and computer simulation, are not adopted when assessing the risk associated with investment projects.
3. Despite the commercial promotion of sophisticated models (e.g. ROA) and the enthusiasm of their key advocates, such models appear not to have been adopted as much as might have been expected.
4. Regarding strategic factors, the survey results suggest that customer requirements, keeping up with competition, obtaining greater manufacturing flexibility, the quality and reliability of outputs and the

ability to expand in the future are of particular significance in strategic investment decision-making. However, these non-financial investment criteria (strategic factors) are insufficient to gain approval for investment projects because an investment proposal needs to show sufficient profitability to be implemented. Accordingly, a strategic investment proposal will be rejected if its expected financial return does not meet the minimum requirements of return on investment.

5. Business strategy is an important criterion in strategic investment choices. For example, strategic investment proposals whose expected financial returns meet the minimum financial requirements may be rejected if they are not consistent with the firm's competitive strategy.
6. A strategic investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of the top managers.

A descriptive approach was adopted in the current field study to answer how and why questions regarding strategic investment decision-making practices⁴⁹. The field study aimed to collect qualitative data to describe how strategic investment decisions can be made in specific companies and provide some explanations of the survey results⁵⁰. Field studies based on interviews can provide some explanations concerning the survey results and examine aspects underlying strategic investment decisions which could not be examined using questionnaires⁵¹. For example, why do practitioners prefer some financial return measures to other techniques; why are the sophisticated techniques of risk analysis such as CAPM not adopted by practitioners; and why are sophisticated models (e.g. ROA) not adopted as much as might have been expected? Further, the field study enables the researcher to examine other stages of strategic

⁴⁹ Yin (1994) points out that research methodology based on case study is appropriate:

- 1) When 'how'/'why' are primary research questions;
- 2) When there are many more variables of interest than data points.
- 3) When research rests on a variety of sources of evidence.
- 4) When a theoretical framework informs data compilation and interpretation.

⁵⁰ Researchers (e.g. Nixon, 1995) have argued that the case study approach may offer a better opportunity than surveys to examine in depth variables that motivate or constrain investment in new technology.

⁵¹ The qualitative approach offer us the possibility of understanding the nature of strategic investment decision-making in practice in terms of the techniques and procedures which are used and the way in which they are actually applied in the organization.

investment decision-making, such as identification of strategic investment opportunities and authorisation of strategic investment proposals.

6.2. Data collection

Qualitative methods provide a rich description of the social world (Hopper and Powell, 1985; Kaplan, 1986; Scapens, 1990; Humphrey and Scapens, 1996 and Ryan et al., 2002)⁵². While the survey provides an effective way of collecting data from a large sample of companies regarding the practice of strategic investment decision-making, interviews can provide rich data to explain these practices. Combining survey data (questionnaire) with fieldwork (interviews) together with publicly available information (e.g. annual reports and company websites) helps explore this sort of research question. By this triangulation, the advantages of both types of research methods can be maximised and their limitations minimised.

Follow-up interviews were carried out during July-September 2003 to explore, enrich, and check the questionnaire findings with more detailed interview data from respondents. Qualitative data were gathered from publicly available information and from personal interviews. Such triangulation helps reduce systematic bias in research work⁵³. Also, qualitative data can help validate, interpret, clarify, and illustrate quantitative findings (Miles and Huberman, 1994, p. 41).

To gain access, respondents to the questionnaire were asked if they were willing to participate in interviews. Eight agreed to take part. One of the respondents agreed to a face-to-face interview and the other seven agreed to be interviewed by telephone. Table (6.1) provides some information about the interviewees.

⁵² Scapens (1990) addressed six stages to be follow in executing case studies:

(1) Preparation: preparation is a review of existing theory believed to be relevant to the problem, issue or theme being explored, (2) developing theory, (3) explaining patterns, (4) collecting evidence (e.g. interviews, company documentation, field and participant observation), (5) identifying patterns: such evidence needs to be assessed through a process of "triangulation" to determine any themes or pattern, and (6) the evidence and any grounded conclusions, made plausible and reasonable, should be reported.

⁵³ The validity of each piece of evidence should be assessed by comparing it with other kinds of evidence on the same issue. The process of collecting multiple sources of evidence on a particular issue is known as triangulation (see Ryan *et al.*, 2002).

Table (6.1): Some information about the interviewees.

Company name	Industry	Respondent	Date	Nature of the interview
RIO TINTO PLC	Mining	Guy Elliott Group Finance Director	Wednesday 6 th August 2003. 9: 30 a.m.	Phone Interview
BRITAX INTERNATIONAL PLC	Vehicles	Doug Robertson Group Finance Director	Thursday 7 th August 2003. 11: 00 a.m.	Phone Interview
OCTEL INTERNATIONAL LIMITED	Chemical	Paul Jennings Vice President Group Finance Director	Friday 8 th August 2003. 10: 00 a.m.	Face-to- face interview
TOMKINS PLC.	Machinery	Ken Lever Group Finance Director	Thursday 14 th August 2003. 9: 30 a.m.	Phone Interview
YOUNG & Co.'s BREWER Plc	Beverage	Peter Whitehead Group Finance Director	Tuesday 19 th August 2003. 11: 00 a.m.	Phone Interview
ASTRAZENECA INTERNATIONAL	Chemical	John Cole Vice President Corporate Finance and Taxation	Tuesday 26 th August 2003. 02: 00 p.m.	Phone Interview
HUNTLIGH TECHNOLOGY PLC	Machinery	Julian Schild Chairman Finance Director	Wednesday 3 rd September 2003. 03: 00 p.m.	Phone Interview
BRITISH VITA PLC	Chemical	Jez Maiden Group Finance Director	Wednesday 24 th September 2003. 02: 00 p.m.	Phone Interview

an interview guide to help the researcher make sure that all important topics and issues are covered.

Each interviewee was provided with the interview schedule, a blank copy of which appears in Appendix (5). The schedule used during interviews was used with a considerable degree of flexibility. That is, if an interviewee showed great interest in a specific issue and wished to discuss it further, he was encouraged to do so. On the other hand, if the interviewee was not comfortable about saying much on the issue, the question was then dropped. The interview schedule served as a basic checklist of the main topics of this study to ensure that all relevant issues were covered during the interview. Further, utilising semi-structured interviews prevented participants from posing their own questions and introducing lines of investigation not assumed by the researcher.

The interview schedule included three sets of questions. The first set aimed to obtain general information regarding the identification of strategic investment opportunities. The second set of questions aimed to trace the following issues:

- Which financial analysis technique is preferred to the others? Why?
- Why do practitioners not adopt the sophisticated techniques of risk analysis such as CAPM?
- Why are sophisticated approaches (e.g. ROA) not adopted for evaluating strategic investment projects as much as might have been expected?
- What sort of non-financial criteria do the companies usually use? Are these criteria documented in the proposal of the strategic investment project?

The remaining set of questions aimed to examine the importance of business strategy in strategic investment choices and trace the importance of intuition and judgement in evaluating strategic investment decisions:

- How important is business strategy in strategic investment choices?
- How important are intuition and judgement in evaluating strategic investment decisions?

All interviews were tape-recorded and then transcribed verbatim. The transcription of the interviews and the publicly available data on the companies (e.g. annual report, company website).⁵⁴

In this chapter, eight interviews conducted with practitioners (finance directors) who had experience in evaluating strategic investment decisions are presented in eight sections. Each section starts with a brief background of the company followed by a description of the principal products. Subsequently, answers to the research questions above are examined.

6. 3. Rio Tinto Plc

The transcripts of the interview (interview with Chief Financial Officer, hereafter CFO, and Business Development Executive at Business Evaluation Department, hereafter BDE) together with publicly available information (e.g. annual report, company's website) were used in producing this evidence. It starts with a brief background of the company followed by a description of the principal products, Rio Tinto's strategy in identifying strategic investment opportunities.

Background⁵⁵: Rio Tinto was created in December 1995 by the merger of Rio Tinto plc and Rio Tinto Limited through a dual listed companies (DLC) structure. Rio Tinto operates in more than 20 countries, employing 29,000 people. At 31 December 2002, Rio Tinto had consolidated operating assets of US\$13 billion; 49 per cent were located in Australia and New Zealand, 36 per cent in North America, five per cent in South America, four per cent in Indonesia, three per cent in Africa, and three per cent in Europe and other countries.

The principal products: The principal products include aluminium, copper, diamonds, gold, iron ore, energy minerals (coal and uranium) and industrial minerals (borates, salt, titanium dioxide feedstock, and talc).

⁵⁴ Annual reports are analysed by using NUDIST (Non-numerical Unstructured Data Indexing Searching and Theorizing) This is a computer package designed to aid users in analysing non-numerical data in qualitative analysis (see Richards, 2000).

⁵⁵ For more information visit www.riotinto.com.

Identification of strategic investment opportunities: Rio Tinto's fundamental objective is to maximise the overall long-term return to its shareholders by operating responsibly and sustainably in areas of proven expertise where the group has a competitive advantage. The BDE stated: "We have a portfolio of quality projects, currently under development or appraisal and a clear and focused exploration programme to seek out and secure quality new opportunities for further profitable expansion".

Investment projects are driven by the quality of opportunity, not choice of commodity. In general, Rio Tinto's strategy focuses on large scale, long life and cost competitive mining operations and aims to invest throughout their lives to maintain their competitive positions. The business unit at Rio Tinto usually identifies investment opportunities. The BDE stated that "the business unit identifies investment opportunities in general and proposes the ideas to the Business Evaluation Department and the technical evaluation groups".

Formal procedure for evaluating strategic investment decisions: The Business Evaluation Department in coordination with product groups continuously evaluates suitable business proposals using consistent guidelines developed by Rio Tinto. These are designed to maximise value through the rigorous identification, assessment and management of risks. Project evaluation methodology necessarily incorporates consideration of the risk of not achieving the estimated value. In evaluating a project, the project proponent must consider the resources appropriate for the minimum standards that Rio Tinto sets for health, safety and environmental performance. External relations, sustainable development, climate change and community issues all require consideration.

The evaluation process in Rio Tinto is very formal. A standard presentation format is adopted for all investment proposals. "We evaluate business proposals using consistent guidelines developed by Rio Tinto. Evaluation guidelines used when considering a project are not simply to create value but to define the project in a way that maximises value. Among other things, this means a rigorous approach to identifying, assessing and managing risks", affirmed the BDE.

Summaries of benefits, costs and risks are the main issues included in the investment proposal. According to the BDE, "the guidelines incorporate a

valuation methodology that includes net present value (NPV), cash flows and the earnings effect of an investment. A project's future uncertainties are analysed to build a profile of the risk/reward relationships, including both the magnitude of potential loss and the probability of such loss occurring. The full range of economic and non-economic impacts of the project will be evaluated. Those will all then be reflected in the proposal that comes to the investment committee”.

The process of strategic investment decision-making varies according to the nature of investment opportunities being evaluated. For example, Appendix (6) illustrates the evaluation guidelines used for exploration projects. Rio Tinto invests in other projects such as processing facilities (e.g. smelters) or infrastructure (e.g. ports or railways) which have their own procedures. The BDE mentioned that “the Business Evaluation Department may be involved at many stages of a project. However, our most formal role occurs when a business unit wishes to spend capital above its authorised level. When this happens, they must seek the approval of the Rio Tinto Investment Committee to proceed. The Business Evaluation Department, together with other groups, will review that proposal and report to the Investment Committee accordingly.”

Investment proposal authorisation: The business unit managing director has the authority to approve any capital project up to \$20 million. Anything above \$20 million has to come through the Business Evaluation Department for evaluation and approval. The BDE affirmed: “There is a whole range of approval processes, so at some point, for example, up to \$20 million, product group CEO has authority to approve it. At other levels, it’s the business unit managing director who has the authority to approve it. Above \$20 million, it needs to come to the investment committee in London”.

Strategic investment decision-making in organisations involves several actors. In this company, different departments of Rio Tinto (Technical Services Group, Technical Evaluation Group and Business Evaluation Department) participate in evaluating the proposal of strategic investment projects. The Technical Evaluation Group provides independent reviews of all major investment proposals and

conducts post-investment reviews which focus on identifying the key learning and experiences from investments for the benefit of both existing and future projects. Decision-makers need to conduct environmental scanning, gathering information which is mostly externally oriented, much of which is non-financial. The CFO stated: "There are always difficulties and complexities. Information is obviously the most important, judging a very long term risk. But also political conditions or environmental factors, tax, etc, etc. There are many things that can change". Also, the BDE confirmed that "there will be a fairly regular financial modelling of the proposal and it will then need to be looked at by a range of different parts of Rio Tinto. So we have a Technical Services Group that will provide some engineering support to it. It will be looked at by a range of other groups who will think about things like the environmental impact of the project, the social and economic or social and political impacts of the project. The proposal will then be reviewed by the Business Evaluation Department, where I work, and another department called the Technical Evaluation Group. The Business Evaluation Group is very much looking at the financial and business aspects. The Technical Evaluation Group is giving an independent view on the technical viability of the project".

The importance of financial evaluation: The company relies heavily on financial evaluation for evaluating investment projects. An investment proposal must show sufficient profitability to be implemented. The BDE said: "Our investment decisions are very much made on a financial basis and we don't tend to make decisions that don't have a positive NPV." The CFO also confirmed that "any investment proposal has to add NPV, otherwise it will not be approved".

The expected financial return of strategic investment projects (or non-strategic projects) will remain valuable and play an important role in strategic (or non-strategic) investment decision-making. A strategic investment proposal would be rejected if its expected financial return did not meet the minimum requirements of return on investment. "Financial return is of supreme importance. It's the most important factor that we look at when we think about new projects. If we can't come up with a financial rationale for the project, then in almost all circumstances we won't go ahead with it" (BDE).

Rio Tinto adopts more than one financial appraisal technique. However, it gives the highest importance to the NPV technique over other techniques when evaluating strategic investment projects. The BDE affirmed that “net present value is the measure we rely most on, but we use all sorts of other things as well, on an as-needs basis. So, people who are writing academic papers may refer to the internal rate of return. They might look at accounting rates of return. We certainly look at the earnings impact of the project, so what it’s going to do to the earnings of the group”. Also, The CFO indicated that the NPV technique is preferred over other techniques, “because we believe it to be the most rigorous evaluation of the project’s ability to add value to the shareholders”. Practitioners use different discount factors for different types of strategic investment project. The BDE affirmed: “We have a range of discount rates that vary according to the commodity that we are looking at and the location of the project. That’s a fairly broad or crude approach. We do some risk analysis. If it’s a project in a high risk country, then we will think more closely about it. We’ll look at the premium of government bonds over US bonds and things like that to give us a measure of the way the market’s looking and the financial risk in that country”.

Risk analysis techniques: Rio Tinto has a fairly well specified risk assessment process that every proposal goes through. The CFO said: “We don’t have any single set of risk analysis. We have a careful matrix assessment of all risk as to the probability and the effect and we try to manage or reduce those risks if necessary by financial means. And of course we look at the sensitivity, and we look at other assessments of risk”. However, sophisticated risk analysis techniques such as the capital asset pricing model (CAPM) are still not widely used in practice. The BDE commented: “In some projects, we would certainly use estimates of beta. It’s not difficult in certain projects. Obviously, you’ve got to have the right sort of data there, but I guess it is not possible if you are looking at the acquisition of a private company; it might be difficult to get beta data for that.”

Non-financial investment criteria (strategic factors): In making strategic investment decisions, practitioners consider strategic analysis but not at the expense of financial analysis. The BDE stated: “Things that relate to our

reputation, environmental performance and others like that have strategic value to us, so we would possibly think about those differently”. However, he made it clear that these non-financial investment criteria (strategic factors) are insufficient to gain approval for investment projects (either strategic or non-strategic). “We do use non-financial criteria but at the end of the day we rely heavily on financial criteria.”

Intuition and judgement: Intuition and judgement may have to be the basis for making a decision, rather than computation⁵⁶. Intuition and judgement remain valuable and play a justifiable role in the decision-making process among decision-makers in large UK companies. The BDE stated: “We would always want to see that intention built into the financial model, so for example, if you’re looking at growth in a particular market you’d need to financially evaluate that and what it means to the business, but at the end of the day, yes, there is a certain amount of judgment that is used in assessing whether the various inputs into the model are realistic or not”.

Business strategy is an important criterion in strategic investment choices: The approval of a strategic investment proposal is not based wholly on the computed signal derived from financial analysis; fit with corporate strategy is an important criterion. The CFO stated: “Well, we look at strategic fit, we look at risk, we look at environmental effects, we look at safety, we look at the effect on the community”. Furthermore, “I completely agree that strategic investment proposals whose expected financial return meets the minimum financial requirements can be rejected if they do not fit with the company’s strategy”. The BDE also confirmed that Rio Tinto decision-makers “rely heavily on financial evaluation. There is a strategy for the company that guides the sort of project that we’ll look at. I guess we have a fairly clear view about the sort of projects that we’ll look at and that fit with the company’s strategy, and if it falls outside of these sorts of projects, then we wouldn’t go ahead with it”.

⁵⁶ Computations may be made to inform a decision but managers realize that the answer cannot fall out of the figures (Butler et al., 1993, p.9).

However, strategic investment proposals cannot be approved on strategic grounds alone. "An investment opportunity has to be consistent with the company's strategy but that is not sufficient; it also has to meet risk-adjusted NPV criteria. Everything has to pass a financial hurdle. The strategy is subordinate to value".

Sophisticated approaches: A gap still remains between practitioners in the business community and researchers regarding the adoption of strategic methods in the appraisal of strategic investment projects. Yet the ROA has not been adopted to analyse business opportunity and adaptability in strategic investment decisions. The CFO said that he "would like to use real options, but in general we do not use them. I think the capabilities of people to understand what they are doing in options are very limited. In other words, they think it is theoretically the correct thing to do but practically it is not feasible in my business". The BDE said: "We've certainly thought quite a lot of real options, but it's never really been applied in decision making process, and I think [...] at the end of the day it's hard to get the data. There are two issues; one is to get enough data and reliable enough data to put into the model. The second is: will people really understand what the model means, or it is just a black box approach? Will you come up with the answer?" The process of strategic investment decision-making in this company is summarised in Table (6.2).

Table (6.2): Summary of strategic investment decision-making process in Rio Tinto.

<p>Identification of investment opportunities</p>	<ul style="list-style-type: none"> * Rio Tinto's strategy is to maximise the net present value per share by investing in large, long life, cost competitive mines. * Investment projects are driven by the quality of opportunity, not choice of commodity. * The Business Evaluation Department in coordination with e.g. Technical Services continuously evaluates suitable business proposals using consistent internal guidelines. * Summaries of benefits, costs and risks are the main issues included in the investment proposal. The full range of economic and non-economic impacts of the project are evaluated.
<p>The importance of financial evaluation</p>	<ul style="list-style-type: none"> * Financial return is of supreme importance. If no financial rationale can be given, projects do not normally go ahead.
<p>The most widely used techniques</p>	<ul style="list-style-type: none"> * Net present value is the most popular measure. * A range of discounts rates that vary according to the commodity and the location of the project are applied. * Careful matrix assessments are made of all risks, including sensitivity scenarios. * CAPM is still not widely used (e.g. in case of the acquisition of a private company it might be difficult to get beta data).
<p>Non-financial criteria</p>	<ul style="list-style-type: none"> * Strategic fit, risk, environmental effects, safety and effects on community are usually documented in the strategic investment project proposal. * Matters relating to reputation and environmental performance have strategic value. * However, non-financial strategic factors are insufficient to gain approval for investment projects (either strategic or non-strategic).
<p>Sophisticated approaches</p>	<ul style="list-style-type: none"> * ROA has never really been applied in decision-making. * There are two issues: reliability of data and whether the model can be understood well enough to be applied correctly.
<p>The importance of business strategy</p>	<ul style="list-style-type: none"> * Only projects that fit with company strategy are implemented.
<p>The importance of intuition and judgement</p>	<ul style="list-style-type: none"> * A certain amount of judgment is used in assessing whether the various inputs into the model are realistic or not.
<p>Authorisation of investment proposal</p>	<ul style="list-style-type: none"> * The business unit managing director has the authority to approve capital projects up to \$20 million. * Anything above \$20 million has to come through the Business Evaluation Department for evaluation and approval.

6.4. Britax International Plc

Britax International Plc is described as one of the most innovative and successful manufacturing and marketing companies in the world. The transcripts of the interview (telephone interview with CFO) together with publicly-available information were used in producing this evidence.

The principal products: There are three major divisions in this company. The first, called Britax Aircraft Interior Systems, makes a range of products that go into commercial aircraft, including premium class seating and beds, lavatories for Airbus and aircraft. The second, Childcare Safety Systems, makes products which are sold around the globe. Britax Childcare is one of the three largest providers of children's car seats worldwide, with several of its core brands holding estimated market shares of 30% or higher in their respective local markets. Britax Childcare holds number one market share positions in Germany for children's car seats and wheeled goods, in the UK for children's car seats and in Australia and New Zealand for children's car seats, and is the leading supplier of children's car seats sold to independent specialist retailers in the US. The third is the Public Safety Division, which sells a range of products to the law enforcement and emergency services such as the flashing blue and red lights on police cars, flashing amber lights, sirens, state monitoring equipment, and laser and radar guns.

Britax's strategy in identifying strategic investment opportunities: Expansion of new distribution channels is an important part of Britax's strategy. The CFO stated: "We are looking for sales and acquisition of our businesses that will offer us new technology that will fit with our profile in each of our divisions, or that will give access to new geographical markets, perhaps new distribution channels for our products. This is an essential part of the investment strategy".

A number of actors are involved in strategic investment decision-making. The general management and financial management play a primary role in identifying

investment opportunities in this company. The above-mentioned three divisions are also involved in identifying their own markets and their own activities. The group relies on external consultants and investment banks as well. The CFO stated: "I would say that it's general management and financial management as they have the primary role and we also use external consultants, investment banks".

Approval of investment proposals: There is a hierarchy regarding authority to approve investment projects. The company managing director has the authority to approve any capital projects up to certain level. However, anything above £500,000 has to come through the Business Evaluation Department to the board of directors for evaluation and approval. The CFO affirmed: "We have strict authorisation control for capital investment. The company managing director will be allowed to spend up to certain level and above that, the divisional managing directors have a certain authority level and above that the chief executive and beyond £500,000 to the complete board of directors. We have a hierarchy of approval authorities".

Obviously, there is a formal procedure for evaluating strategic investment proposals and different scenarios might be included in the proposal. These scenarios are usually based on financial and non-financial information.

The importance of financial evaluation: Practitioners rely heavily on financial evaluation for evaluating investment projects. IRR and PB are the two primary techniques used by this company. "Financial evaluation is critical in both strategic and non-strategic. As far as we're concerned, there is no such thing as a strategic investment that doesn't have a financial aspect to it. The financial evaluation is critical to the process. IRR and payback are the two primary techniques that we use" (CFO).

The importance of non-financial criteria: Non-financial criteria are of particular importance and included in qualitative considerations. However, all investment proposals must meet financial criteria. According to the CFO, "production enhancement, improving competitive advantage and growth

opportunities - all of those are important where they are relevant. I do believe that all of the things ultimately translate into financial terms which would be quantified. We include these into the qualitative considerations but ultimately any investment will have to meet financial criteria”.

The CFO agreed that strategic investment proposals whose expected financial return meets the minimum financial requirements can be rejected if they do not fit with the firm’s competitive strategy. Conversely, no investment proposal, strategic or non-strategic, can be justified solely on strategic grounds if it fails to meet the financial hurdles. The CFO affirmed: “I think the competitive issue is very important to us. There could be circumstances where the projects do meet the financial criteria, but they are rejected for good reasons, but I don’t think that a project that doesn’t meet the financial criteria would be approved and accepted. Certainly not while I have been here. No”.

Intuition and judgement: Intuition and judgement remain valuable and play a justifiable role in strategic investment decision-making. The CFO said: “Certainly, when we are looking at acquisition-type investment, there is a lot of uncertainty as to future production and prediction and of course one’s facing enormous reliance on the judgements of the management team that are making the proposal”. Further, he agreed that a strategic investment proposal whose expected financial return meets the minimum requirements of return on investment can be rejected if it does not satisfy the expectation and intuition of top managers. “I think that under certain circumstances that could well happen. So, as I said before, while I don’t believe that we don’t make an investment that doesn’t meet the financial criteria, there could be occasions where an investment still meets the financial criteria but for other reasons we are not prepared to undertake it”.

A theory–practice gap remains between practitioners in the business community and researchers regarding strategic methods for the appraisal of strategic investment projects such as ROA . In this regard, the CFO affirmed: “I don’t know that. So, we don’t use any sophisticated technique. I am not aware of the concept of real option approach that is for sure. That is certainly not what we use”.

The process of strategic investment decision-making in this company is summarised in Table (6.3).

Table (6.3): Summary of strategic investment decision-making process in Britax.

Identification of investment opportunities	<ul style="list-style-type: none"> * Expansion of new distribution channels is an important part of Britax's strategy. * The general management and financial management play a primary role in identifying investment opportunities. The group relies on external consultants and investment banks as well. * Documents are presented by the management team promoting the proposal, identifying the target company, describing the area of activity, market position and financial performance history and stating perceived benefits of acquisition.
The importance of financial evaluation	* Financial evaluation is critical in all cases.
The most widely used techniques	* IRR and PB are the two primary techniques used by this company.
Non-financial criteria	* Production enhancement, improving competitive advantage and growth opportunities are all important where relevant. These are included in the qualitative considerations but ultimately any investment will have to meet financial criteria.
Sophisticated approaches	* Sophisticated techniques are not used. CFO was not aware of the concept of real options approach and it is not used.
The importance of business strategy	* Some projects meeting the financial criteria are rejected for strategic reasons, but those which do not meet the financial criteria cannot be approved.
The importance of intuition and judgement	* For acquisition-type investments, there is heavy reliance on the judgements of the management team that are making the proposal.
Authorisation of investment proposal	* A hierarchy of approval authorities. The company managing director has the authority to approve any capital projects up to a certain level. However, anything above £500,000 has to go to the board of directors for evaluation and approval.

6.5. OCTEL International Limited

The transcripts of the face-to-face interview with the Vice President/CFO, together with publicly available information, were used in producing this evidence.

A brief history of the company: The company was founded in 1938. Shareholders include Shell, BP, Texaco, Mobil, Chevron, Esso and General Motors. TEL manufacture commenced at Northwich in 1940. The company became The Associated Octel Company Limited in 1954. Octel is a flourishing specialty chemicals business, expanding into new products and new markets with around 1000 employees based in 23 countries. Recently, Octel has made eight acquisitions, completed four joint ventures, launched two new companies (Octel Innovation and Octel Exhaust Systems) and further developed Octel Environmental.

The principal products: Octel is an independent producer of petroleum additives and speciality chemicals, serving both industrial and consumer markets worldwide.

Octel's strategy in identifying strategic investment opportunities: A special internal department is responsible for looking at acquisition and investment opportunities. The Corporate Development Department is usually involved in evaluating strategic investment decisions, with participation from Finance and from the Chief Executive's Office. "We have an internal department of four people who are responsible for looking at acquisition and investment opportunities in the business. They report to me and the Chief Executive Officer, and look at many companies in the marketplace in the area of speciality chemicals" (CFO).

The strategic investment decision-making process varies according to the type of investment project being evaluated. The CFO illustrated this as follows: "Let us

take two types: one when it is a capital expenditure and one when it will be an acquisition. If you look at capital expenditure in the business, then you would expect the business management team to identify the need for capital, whether it will be for increased capacity, cost reduction or environmental. So you expect them to identify and put together a business case which will be used in their own management team to make sure it makes sense, and then they will submit that to group level for the group to sign off and buy into that. The time frame on that depends, but you are probably looking at anything from a week to 3 months, depending on the type of investment.

“If it is an acquisition it is a different type of processes, because first of all you have to decide what the strategy is. When you decide on your strategy then you start looking at target companies and have a series of conversations with different companies, where you say, ‘Why don’t you sell your division to us?’ and why it will make good sense. In that scenario it can be anything between three months and two years depending on the type of investment”.

It is clear from the above that there is a significant range of duration of decision-making between different types of investment projects, which can be anything between a week and two years, depending on the type of investment.

To some extent, strategic investment decisions are often problematic because they are expected to be made under conditions of uncertainty, volatility, complexity and ambiguity. “The hardest thing to ascertain is some of the basic financial data, but more important is the projection of financial data because one is trying to ascertain what the likely forecast is over a period of time. So, on that basis, the best thing is to have what is called the base case. This is a developed case which shows what you could do to a particular business or investment if you owned it. So what you would attempt to do is to run a whole series of sensitivity analyses which would say: ‘This is our base case in terms of what we expect; but what happens if the price is 5% lower? What happens if the costs will be 10% lower? And we will see how sensitive is the investment to the particular changes. If it is very sensitive, we will spend more time looking at it. If it is not too sensitive then this obviously means you get close in terms of being able evaluate that particular investment” (CFO).

Financial evaluation techniques: Octel adopts more than one financial appraisal technique. “We use a number of different formats; we would use NPV and IRR calculations, but we also use cash payback as being probably our principle one that allows us to assess how quickly we are going to get return on our investments in terms of cash and before it starts to generate cash for the business. We use NPV because it gives us a very accurate review over a longer time horizon as to what value we can expect from the investment, especially when you compare it with the discount rate that you might use and the level of risk that is associated with it. We do not place an over-emphasis on terminal value calculations. So we tend to look at the actual cash flows that will be generated, rather have an excessive multiple on the terminal value” (CFO).

Risk analysis techniques: Different risk analysis techniques are used when evaluating strategic investment decisions. “We use a combination of techniques, depending on the actual investment that we are looking at. We always look at probability analysis because we need to see the application of not doing it versus the application of doing it, and also different levels of sales, volume, pricing, and costs.” However, sophisticated risk analysis techniques such as CAPM or ROA are not adopted by this company. “Beta estimation is a tool in the textbooks but it is not something necessarily to use in the business perspective. The ROA is also an academic exercise rather than something that is real for businesses” (CFO).

Practitioners use different discount rates for different types of strategic investment projects. If it is an internal investment within Octel, i.e. capital expenditure, then practitioners will use their own cost-of-capital calculations. If it is an external investment where there will be acquisitions or joint ventures, then they will use this plus or minus the risk factor. “We probably use a minimum discount rate of between 9% and 10%. It could be little bit lower if it is something that is really very easy for us to see, very easy for the cash to come out. Generally, this depends on the cost of capital for the business, where the investment is and the risk associated with it. But our cost of capital is 10% or under. So, on some investments where you can see the cash coming out very quickly, then there is no need to have a high risk factor on it” (CFO).

The importance of non-financial criteria: The CFO agreed that non-financial criteria are also considered in making strategic investment decisions. “There are some areas, like environmental investments, where you would not be able to do a financial justification of it but which are strategically important to the business, especially in the chemical industry. So we use different criteria for that. Also, with R&D investments it is not necessary to make a financial return. This is will be based on new product flow or new technology flow. And you will not do a full DCF calculation on a particular product introduction if it was part of a technology update.”

However, the CFO made it clear that no investment proposal can be justified solely on strategic grounds if it fails to meet the financial hurdles. “Keeping up with competition is interesting because again that will have financial benefits. You will do it because it will generate extra returns. Quality and reliability there are all financial indicators anyway. Expansion is an important area that will be assessed based on your work capacity, how quickly you can sell it, etc, etc. So you can lead it towards the financial area. Our strategy is to act as responsible citizens, so we will use that quite heavily within the business.”

In general, the CFO highlighted the importance of the balance between strategic and financial considerations. “Overall, I think you have to use a balance of the two categories. I would never say I would only do something because the numbers make sense. But equally I would never say I would only do something because it is strategic. And therefore you have to use a balance between strategy and finance. I would not use one over the other”.

The role of intuition and judgement: The CFO agreed that a strategic investment proposal whose expected financial return meets the minimum requirements of return on investments can be rejected if it does not satisfy the expectations and intuition of top managers. “Intuition and judgement are absolutely essential because you can’t just take the academic calculations and sit down and look at it and say it makes sense. A lot is based on how easy it is to do, and how good is the management etc, etc. These are not based on hard calculations but on the view you get of a company when you are talking to the

people. That intuition is extremely important. Investment bankers might say it is a great acquisition on paper, but you may look at it with a different head on it. ‘It looks great on paper but I wouldn’t touch it at all,’ or ‘it looks great on paper and we can do some thing with it’. All that is based on intuition and experience”.

The process of strategic investment decision-making in this company is summarised in Table (6.4).

Table (6.4): Summary of strategic investment decision-making process in Octel.

Identification of investment opportunities	<ul style="list-style-type: none"> • Generally, the corporate development department with inclusion from finance and from the chief executive’s office.
The importance of financial evaluation	<ul style="list-style-type: none"> • Financial evaluation is critical in both strategic and non-strategic investments.
The most widely used techniques	<ul style="list-style-type: none"> • NPV and IRR are used, but cash payback is the principal technique. • The combination of techniques used depends on the nature of the investment.
Non-financial criteria	<ul style="list-style-type: none"> • Keeping up with competition will have financial benefits. Quality and reliability are financial indicators. Expansion is also important financially.
Sophisticated approaches	<ul style="list-style-type: none"> • Beta estimation is a tool in the textbooks but is not used in practice. • The ROA is also an academic exercise rather something that is real for businesses.
The importance of business strategy	<ul style="list-style-type: none"> • A balance between strategy and finance is sought. Neither is applied to the exclusion of the other.
The importance of intuition and judgement	<ul style="list-style-type: none"> • Intuition and judgement are absolutely essential. • Experience is extremely important.
Authorisation of investment proposal	<ul style="list-style-type: none"> • All investment projects proposals must be submitted to the head office. • For capital expenditure, anything over \$10 000 and for acquisition is any acquisition.

6. 6. Tomkins Plc.

Tomkins Plc is a global engineering group with market and technical leadership across three businesses: Industrial and Automotive, Air Systems Components and Engineered and Construction Products.

Tomkins is committed to enhancing shareholder value through increasing the economic value of its businesses by concentrating on product and geographic markets in its chosen sectors where the businesses have sustainable competitive advantage, and which offer prospects for profitable growth.

Tomkins has sales of approximately £3.3 billion, employing some 40,000 people throughout the world.

The product range⁵⁷: Tomkins' activities are positioned within three specific business groups: Air Systems Components, Engineered and Construction Products and Industrial and Automotive. Products are sold into a wide variety of end markets and to both original equipment manufacturers and the aftermarket.

- **Air Systems Components** (£516 million turnover, 33 plants and 6909 employees): This group of companies is the largest manufacturer of air handling components in North America, supplying the heating, ventilating and air conditioning market. The product range includes fans, grilles, registers, diffusers, fan coils and terminal units for residential and commercial applications and dampers for architectural, commercial and industrial use.
- **Engineered and Construction Products** (£872 million turnover, 39 plants and 10,104 employees): The Tomkins Engineered and Construction Products group of companies manufactures engineered products for a variety of end markets primarily related to the building, construction, truck and trailer and automotive industries. The main product lines include baths, conveyors, doors, panels, pipe fittings, process valves, hood extractors, axles and windows.

⁵⁷ For more information see <http://www.tomkins.co.uk>

- **Industrial and Automotive** (£1,986 million turnover, 68 plants, 23,596 employees): The Industrial and Automotive group manufactures a wide range of systems and components for the industrial and automotive markets through four main business areas: Power Transmission, Fluid Power, Fluid Systems and Wiper Systems, selling to original equipment manufacturers and the replacement markets throughout the world. In addition, the group has a number of discrete businesses that manufacture products primarily for the automotive replacement markets.

Tomkins' strategy in identifying and selecting strategic investment opportunities: Each business prepares budgets and financial plans in accordance with a defined format, which includes consideration of risks. To the extent that risks are both reasonably estimable and likely to occur, they are reflected specifically in the budgets of the respective businesses. Management at the Corporate Centre reviews the budgets and financial plans with the business units and a summary is presented to the board for approval.

The management of each of the businesses considers strategic, operational, commercial and financial risks and identifies risk mitigation actions.

Each business identifies and assesses the key business risks affecting the achievement of its objectives. Business unit management also identifies the risk management processes used to mitigate the key risks to an acceptable level and, where appropriate, additional actions required to manage and further mitigate them. Each business is required to prepare a strategic position assessment taking into account the current and likely future market environment and competitive position of the business, with specific consideration given to strategic risk. "Each of the business groups produces its own strategic plans. They look to the market that they operate in, why that is an attractive market to play in and the competitive position, and they basically assess whether it believes it can make a return on capital which exceeds the cost of capital" (CFO).

In general, there are two levels of identifying strategic investments: (1) the individual business, which generally concentrates on the competitive position; and (2) the corporate level, which assesses whether the investment will generate

sufficient returns for their shareholders. "There is the individual business that is basically identifying investments that it might make in each business, and that is the right place, because it interfaces directly with the market. And there is the corporate level of Tomkins, which has to assess whether we are placing our resources in that area which is going to generate the greatest returns for our shareholders" (CFO).

Authorisation of capital investment proposals: Every significant capital expenditure proposal is subject to a formal capital expenditure authorisation process, with a standard format for all investment proposals. In general, each investment proposal must reflect the strategic development of the business and take into account operational, financial and technical risks. "There is a standard format used by Tomkins which we call a capital investment proposal and which includes information about the financial returns, the risk analysis and how it responds to the strategic development of the business" (CFO).

There are different levels of authorisation of investment proposals. According to the CFO, if the capital investment is included in the business or strategic plan and if it is up to £3 million, then the management of each business can make the investment without getting approval from the head office, while anything above £3 million has to have such approval. If, however, it is capital expenditure that was not originally planned (i.e. outside the budget or the plan), then the approval limit is lower.

The decision duration of strategic investment projects may be impacted by the size and type of investment project and by geography. For example, if the investment proposal is for a major investment in a new geographical area like China, the process may take 12 months or longer. "From the inception to the conclusion of the investment proposal is 6 months at the outside, but may be 12 months if it is a major investment in new geography like China. The duration will be impacted probably not only by the size, but also knowledge about the markets and the business opportunities, because at the end of the day, the quality of the investment proposal depends on the available information. If you are looking to

make a major investment in new business or a new company, or acquisitions in new products or new geography, then the time it takes actually to prepare the investment proposal depends on the time you need to gather the information and actually satisfy yourself that you can make the financial returns. It could be a year or longer. This depends on your strategic horizon” (CFO).

To some extent, the complexity associated with the strategic investment decision-making process is due to the difficulty of determining the validity of inputs, i.e. gathering data and information on the decision process. The CFO offered the following example: “If you want to prepare to make an investment and you need to collect all the information that you want and be 100% happy with the integrity of that information and the regular process being used to acquire the information, it is likely that you will miss the opportunity because you spend so much time gathering the information that you considerably minimise the risk”.

Thus, there is an ultimate trade-off between available information and risk. In some cases it is just not possible to get complete information about the business that is being looked at. Also, practitioners go through a kind of regressive process because they have to ask and try to respond to a series of questions about competitors, trends in the markets and competing technologies. The CFO said “I think what you have to do is to get the trade-off between the risk and the completely different information. Clearly, if you got no information whatsoever you would be running a very high risk. But with complete information you will go to very low risk and it is about risk tolerance really. In some cases it is just not possible to get complete information because, for whatever reasons, most of our competitors, if they are private companies, it is impossible to get hold of financial data about those businesses. So trying to assess the economic return on a particular market can be difficult. But at the end of the day, we go through a sort of regressive process because we have to ask questions about competitors, trends in the markets, competing technologies – a whole series of questions about the business which you have to try to respond to”.

Financial analysis techniques.

The CFO affirmed that the modified internal rate of return is preferred over other techniques such as NPV or ARR. “The preference that we look at effectively is

the modified internal rate of return, because what we are trying to focus on in the business is to ensure that the business actually runs a return on capital in excess of cost of capital”.

Risk assessment: Tomkins has a standard risk assessment formula that thoroughly tests strategic risk, operational risk (which addresses things such as: is it a new market? new product? have we made this before? is it new technology?) and commercial risk (which address issues related to suppliers and customers). The CFO stated “We have a standard risk assessment formula that completely tests strategic risk, operational risk and commercial risk. Strategic risk is taken into account when we are developing or formulating the strategy of the business such as the impact of competition or the impact of changing the regulation; all these things are considered as strategic risks and must be taken into account when we are developing or formulating the strategy of the business. There is a comprehensive list of issues that have to be considered as part of risk assessment and you may actually have to score each one of these items, and you have to be very clear in risk mitigation strategy”. Sensitivity/scenario analysis is the method most widely used to assess the risk associated with strategic investment projects. “We use sensitivity scenario analysis; we look at different cases; we do an up-side, down-side type of risk analysis”. The company uses different discount factors to account for the risk associated with investment projects. “We use different discount factors to account for different currency risks and country risks. The minimum discount rate is 9 %, and we use the weighted average cost of capital rate in the actual project evaluation” (CFO).

The importance of strategic considerations: The CFO completely agreed that a strategic investment proposals whose expected financial return meet the minimum requirements can be rejected if it does not fit with the firm’s competitive strategy. “We wouldn’t make acquisitions that do not fit with our competitive strategy, regardless of whether they will show a financial return”.

Non-financial criteria, such as keeping up with competition, quality and reliability of output and the ability to expand in the future, are also important and included in

qualitative considerations. However, financial return is the consequence of all major investment decisions that they make. "The investment proposals have to focus on the market and why they believe that market to be attractive, how it is adding value to the customer's business. They have to focus on cost saving, flexibility of manufacturing. All these criteria are taken into account and included within the capital expenditure proposals. But the ultimate focus is on making sure that we can get the financial return on the investment. At the end of the day, the financial return is the consequence of all the business decision that you make. Otherwise you will not be in the business". The CFO further argued that there can be some investment projects that are approved regardless of financial justification if it is believed that they will improve the quality of the business or relate to environmental considerations. "If you believe that doing it improves the quality of the business that you want to sell you might do that. Also, sometimes we have to make investments due to environmental considerations, which is important to preserve the business and important to maintain our credibility and reputation. We do that even if they do not have a financial return".

The process of strategic investment decision-making in this company is summarised in Table (6.5).

Table (6.5): Summary of strategic investment decision-making process in Tomkins.

<p>Identification of investment opportunities</p>	<ul style="list-style-type: none"> - Each business group produces its own strategic plans. In general, there are two levels of identifying strategic investments: (1) the individual business, which concentrates on the competitive position. (2) the corporate level, which assesses whether the investment will generate the greatest returns for the shareholders. - A standard format used by Tomkins includes information about the financial returns, risk analysis and how it responds to the strategic development of the business. - If the investment proposal is for major investment in new geography, the process may take 12 months or longer.
<p>The importance of financial evaluation</p>	<ul style="list-style-type: none"> - Ultimately focuses on financial return on investment. Financial return is the consequence of all business decisions.
<p>The most widely used techniques</p>	<ul style="list-style-type: none"> - The preference is for modified internal rate of return to ensure that return on capital is in excess of cost of capital. - A standard risk assessment formula tests strategic risk, operational risk and commercial risk. - Sensitivity scenario analysis and up-side, down-side risk analysis are used.
<p>Non-financial criteria</p>	<ul style="list-style-type: none"> - Investment proposals focus on why the market is believed to be attractive, how it would add value, on cost saving, and on flexibility manufacturing. Quality of the business is important, as are environmental considerations which maintain credibility and reputation, regardless of financial return.
<p>The importance of business strategy</p>	<ul style="list-style-type: none"> - Acquisitions that do not fit with competitive strategy are rejected, regardless of financial return.
<p>Authorisation of investment proposal</p>	<ul style="list-style-type: none"> - If the capital investment is included in the business plan or strategic plan and it is up to £3 million, then the management of each business can make the investment without approval from head office. Capital expenditure not originally planned has a lower approval limit.

6.7. Young & Co.'s Brewer Plc⁵⁸

The principal activities of the company are brewing and bottling beer, and selling food and drink through its public houses, hotels, restaurants and other channels.

Authorisation of capital investment proposals: There are clear and detailed procedures for the appraisal and authorisation of all investment projects. There is a standard format for all investment proposals which includes information about financial return, risk and how it responds to the development of the company. There are different levels of the authorisation of investment proposals. The CFO stated that “we have a formal procedure for the appraisal and authorisation of all investment proposals. Any investment proposal over £100,000 has to have approval from the board, who meet once a week”.

Financial evaluation: This company gives the highest importance to the discounting techniques (NPV and IRR) with a high preference for NPV over IRR. “We rely heavily on financial evaluation. We use NPV more than IRR” (CFO).

Risk analysis techniques: Sensitivity/scenario analysis is the method most widely used to assess the risk associated with all investment projects. The company uses a high discount rate for high risk projects. “We use sensitivity analysis to account for the risk. We tend to build a higher hurdle rate on the risky projects. The average discount rate is 15%” (CFO).

The importance of Non-financial criteria: “We certainly consider non-financial criteria such as keeping up with competition, quality and reliability of output and the ability to expand in the future are also important”.

The interviewee agreed that strategic investment proposals could be approved despite their failure to pass the financial hurdle. “There are certain investments we make and which are difficult to ascertain in terms of a financial hurdle.

⁵⁸ For more information see [http://www. Young & Co.'s Brewer.co.uk.co.uk](http://www.Young & Co.'s Brewer.co.uk.co.uk)

Sometimes we spend a large amount of money to improve the quality of beer, regardless of financial return.”

An investment proposal whose expected financial return meets the minimum requirements of return on investment could nevertheless be rejected if it does not satisfy the expectations and intuition of the top managers. “Intuition and judgement based on experience are of huge importance” (CFO).

The process of strategic investment decision-making in this company is summarised in Table (6.6).

Table (6.6): Summary of strategic investment decision-making process in Young & Co.'s Brewer.

Identification of investment opportunities	<ul style="list-style-type: none"> • An internal department looks at investment opportunities in the business.
The importance of financial evaluation	<ul style="list-style-type: none"> • Rely heavily on financial evaluation.
The most widely used techniques	<ul style="list-style-type: none"> • NPV is used more than IRR. • Sensitivity analysis is used to account for the risk. • There is a higher hurdle rate on risky projects.
Non-financial criteria	<ul style="list-style-type: none"> • Keeping up with competition, quality and reliability of output and the ability to expand in the future are important. • Certain investments such as improving the quality of beer are made regardless of financial return.
The importance of intuition and judgement	<ul style="list-style-type: none"> • Any investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of the top managers. Intuition and judgement based on experience are of huge importance.
Authorisation of investment proposal	<ul style="list-style-type: none"> • Formal procedure for the appraisal and authorisation of all investment proposals. Any investment over £100,000 needs approval from the board.

6.8. AstraZeneca International⁵⁹

AstraZeneca is one of the world's leading pharmaceutical companies, engaged in the research, development, manufacture and marketing of medical devices and implants for use in healthcare, primarily in urology but also in odontology, diagnostic radiology and surgery.

Company background: AstraZeneca was formed on 6 April 1999 through the merger of Astra AB of Sweden and Zeneca Group PLC of the UK – two companies with similar science-based cultures and a shared vision of the pharmaceutical industry. The merger aimed to improve the combined companies' ability to deliver long term growth.

Headquartered in the UK, with R&D headquarters in Sweden and a strong presence in the key US market, AstraZeneca spends over \$11 million every working day on research and development. The company combines global capabilities with high quality relationships in local markets and focuses on responding quickly and effectively to changing business needs. Sales in 2002 totalled \$17.8 billion, with an operating profit of \$4.4 billion and over 58,000 employees worldwide. Active in over 100 countries, they have an extensive, high quality sales and marketing network worldwide, structured to anticipate and respond to local market needs.

AstraZeneca's strategy in identifying and selecting strategic investment opportunities: The company's strategy in identifying and selecting strategic investment opportunities is based on R&D and buying intellectual property. The company spent \$3.1 billion on R&D in 2002. Generally, investment opportunities are identified and proposed by the business department, which has to work closely with other departments such as commercial, R&D and marketing. The Vice President Corporate Finance (VPCF) stated: "We have a business department which has to work closely with the commercial department and the R&D department. The other department which is likely to be involved is the marketing

⁵⁹ For more information visit www.AstraZeneca.com.

department, which clearly has a strategic objective to increase our presence in the markets which tend to be the emergent markets. So, clearly, we seek opportunities in certain markets there to increase our presence”.

Authorisation of capital investment proposals: Any significant capital expenditure is subject to a formal capital expenditure authorisation process. There is a standard format for all investment proposals. There are different levels of authorisation of investment proposals. According to the VPCF, if the capital investment is included in the business plan, the decision is delegated to the Chief Executive without need for approval from the board of directors, while any strategic investment project outside of the plan does have to have such approval.

The decision duration of strategic investment projects varies according to the nature of the industry. In this company, the process must move quickly in order to achieve a sustainable competitive advantage. “If you are looking to buy intellectual property, if you are looking to buy partially developed compounds, you actually have to move very quickly because the competition for our industry is quite intense. So if you go about 6 months evaluation, for example, by the time you finish, the product will be gone. Our company is working very hard to accelerate the evaluation process without losing the quality” (VPCF).

Financial analysis techniques: The company basically uses the discounted cash flow techniques, mainly NPV. Also, the Vice President Corporate Finance commented on the role of financial evaluation and addressed the importance of technical evaluation. “Every investment has to have a financial case attached to it. Certainly, if it is a developing compound, it is more a technical evaluation than a financial one. Then of course, the rest of the financial evaluation - how much we will sell, what price can we get - that very much depends on what the competition is doing”. He further stated that the information for decision making is probably provided by departments other than the finance department: “Clearly, you can present a financial case, the most important underlying assumptions, and those underlying assumptions probably come from different departments. They may come from the operational department and may come from R&D”.

Risk assessment: The company has a standard risk assessment formula. In this regard, the Vice President Corporate Finance stated: “Clearly, with every investment you are taking a risk and it does not matter how much intelligence or research you do, you never totally eliminate the risk. All you do is seek to understand the risk better. You can do a year of work on it with a hundred people; you don’t take the risk away. You know our industry is all about taking risks”. Regarding risk assessment techniques, the company uses probability analysis and does not adopt any sophisticated approaches such as ROA. “Real options is something we look at but in fact we are not using it. I am aware that some of the pharmacy companies are using real options but we are not; we tend to use decision tree analysis and probability analysis” (VPCF).

The importance of non-financial criteria: Non-financial criteria such as quality and reliability of output and manufacturing flexibility are also important and included in qualitative considerations. “Quality and safety are very important for us, because ultimately we can’t sell any of our products unless we have the approval of the relevant authority. Manufacturing reliability and manufacturing flexibility are very important for us because we are supplying drugs to customers” (VPCF).

The importance of strategic considerations: The Vice President Corporate Finance completely agreed that a strategic investment proposal whose expected financial return meets the minimum requirements can be rejected if it does not fit with the firm’s competitive strategy. “There is a long term business strategy and there is an annual plan which is obviously consistent with strategy. We have a strategy which is revisited every year by the board, and there is an annual plan approved by the board which is consistent with strategy. All investments really must be aligned with that strategy”.

The role of intuition and judgement.

The interviewee agreed that a strategic investment proposal which meets the financial requirements may be rejected if it does not satisfy the intuition and expectation of top managers. “The judgement of the chief executive is particularly key. Ultimately, the experience of the Chief Executive is a key factor there”.

The process of strategic investment decision-making in this company is summarised in Table (6.7).

Table (6.7): Summary of strategic investment decision-making process in Astra Zeneca.

Identification of investment opportunities	<ul style="list-style-type: none"> ➤ Company’s strategy is based on R&D and buying intellectual property (they spent \$3.1 billion on R&D in 2002). ➤ Generally, investment opportunities are identified and proposed by the business department working with e.g. commercial, R&D and marketing departments.
The importance of financial evaluation	<ul style="list-style-type: none"> ➤ Every investment has to have a financial case attached to it. Developing a new compound needs a more technical than financial evaluation. The rest of financial evaluation, e.g. volume and price, depends on the competition.
The most widely used techniques	<ul style="list-style-type: none"> ➤ NPV
Non-financial criteria	<ul style="list-style-type: none"> ➤ Quality, safety, reliability and manufacturing flexibility are very important.
Sophisticated approaches	<ul style="list-style-type: none"> ➤ ROA has been considered but is not used.
The importance of business strategy	<ul style="list-style-type: none"> ➤ All investments must be aligned with long term business strategy.
The importance of intuition and judgement	<ul style="list-style-type: none"> ➤ The judgement and experience of the chief executive are key.
Authorisation of investment proposal	<ul style="list-style-type: none"> ➤ If the capital investment is included in the business plan, the delegation is given to the chief executive without getting approval from the board of directors. Any strategic investment project outside the plan has to have approval from the board of directors.

6.9 Huntleigh Technology PLC

Huntleigh Technology PLC is an innovative medical engineering and service group helping to provide patient environment solutions within the healthcare market worldwide. Over the past three decades, the Group has reached a market leading position through industry-renowned innovation and commitment to research and development, reinforcing the manufacture of medical devices with an integrated supply chain to the customer. This is achieved by the use of overseas subsidiaries and in partnership with local distributors with representation in over 100 countries. The Group now employs nearly 2000 people.

Group Products:

- Pressure Area Care.
- Seating - 24-Hour Patient Care.
- Intermittent Pneumatic Compression Systems.
- Specialist Beds and Trolleys.
- Moving and Handling Technology.
- Akron Couches and Tables.
- Diagnostic Technology.

Authorisation of capital investment proposals: Any significant capital expenditure is subject to a formal capital expenditure authorisation process. According to the Chairman and Group Finance Director (CGFD), if the capital investment is included in the business plan and up to £100,000, delegation is given to the Chief Executive without the need for approval from the board of directors, while any investment project over £100,000 has to have approval from the board of directors. The decision duration of strategic investment projects varies according to the nature of projects being evaluated. "If the proposal is for capital expenditure within the company then the time is probably two days to two weeks. If it is an acquisition, it can be two months" (CGFD).

Financial analysis techniques: “Basically, we use the payback method and we are looking for a three-year payback period. When it is an acquisition, we use discounted cash flow techniques” (CGFD).

The importance of strategic considerations: The CGFD completely agreed that a strategic investment proposal whose expected financial return meets the minimum requirements can be rejected if it does not fit with the firm’s competitive strategy. “There is a corporate strategy. Any proposal can be rejected if it does not fit with the company strategy”. With regard to the importance of non-financial criteria, he mentioned the case of recent investments the company has made in India: “It is not going immediately to make very much money; however, it will build up our corporate knowledge about the market”.

The role of intuition and judgement: The interviewee affirmed that the judgement of the Chief Executive is very important. He further agreed that strategic investment proposals meeting the financial requirements may be rejected if they do not satisfy the intuition and expectations of top managers.

The process of strategic investment decision-making in this company is summarised in Table (6.8).

Table (6.8): Summary of strategic investment decision-making process in Huntleigh Technology.

The most widely used techniques	<ul style="list-style-type: none"> • Payback method with 3-year payback period. • For acquisitions, discounted cash flow techniques are used.
Non-financial criteria	<ul style="list-style-type: none"> • For e.g. investment in India, immediate financial returns are uncertain, but building corporate knowledge of the market is important.
The importance of business strategy	<ul style="list-style-type: none"> • Any proposal can be rejected if it does not fit with the company strategy.
The importance of intuition and judgement	<ul style="list-style-type: none"> • The judgement of the chief executive is very important.
Authorisation of investment proposal	<ul style="list-style-type: none"> • Any significant capital expenditure is subject to a formal capital expenditure authorisation process. • Capital investments up to £100,000 included in the business plan are delegated to the chief executive without the approval of the board of directors.

6. 10. British Vita Plc

British Vita has over 100 manufacturing sites across 21 countries and employs over 9000 people. It is an international leader in the manufacture and processing of a wide assortment of polymers including cellular foams, specialised and coated textiles, polymer compounds and mouldings. Its products are marketed to the furniture, transportation, packaging and engineering industries.

British Vita is managed by a Main Board which formulates corporate strategy and approves strategic investment decisions.

Identification of strategic investment opportunities: With regard to the identification stage of strategic investment projects, British Vita has a hundred and fourteen geographic locations managed through forty business centres, each of which has at least a managing director, marketing director and finance manger. Primarily, the job of this team is to come up with the opportunities. The next level is the executive group, whose job in relation to expansion and strategic development is either to review the proposals coming out from the business unit or to look at expansion where they have no business unit in that area, such as in the US. They look every six months at the overall strategy of the business and the strategic development plan. According to the Finance Director (FD): "We do a strategic review against the direction plan every six months. About every two years, we completely revise our strategy. The review of business areas happens at three levels: (1) Local business - the forty units; (2) Divisional review - the five units, and (3) Central executive board as a single unit".

British Vita has a standard format which include 8 pages of financial data, and the investment proposal is mostly quantitative, with some qualitative information about markets, whereas the narrative is generally more qualitative. Duration varies according to the nature of the investment project being evaluated. If it is new geography, new technology or a new market, then the time frame is around 9-12 months, because of the large amount of data that must be collected and analysed.

Decision-makers need to conduct environmental scanning, gathering information which is mostly externally oriented and much of which is non-financial. On larger projects and acquisitions, there will be a business narrative as well, which will set out information about the market. In general, decision-makers place very much emphasis on market size, on rate of growth and on political conditions in some of the markets they are looking at. They tend to use market studies to estimate the rate of sales and what their operating costs are going to be. The study is generally non-financially based. "We tend to use a market study when entering a new market, and that commonly will be a new geography. What we tend to use is market analysis to look at the size of market and our competitors. Recently, for example, we have been looking at the expansion of our branches in Eastern Europe. So, we do a market study to look at the size of the domestic market, import, export, competitors, and types of technology. Interestingly, when we look at a market that we feel we understand very well, such as the UK, Germany and France, where we have operated for a number of years, we very rarely use a market study in those areas. The market study tends to be non-financially based. We use the information from that to generate how our proposed business will look" (FD).

Financial appraisal techniques

Financial return measures are important in the evaluation of strategic investment projects. The FD confirmed that British Vita adopts more than one technique to evaluate major investment projects. However, British Vita gives high preference to NPV over other techniques, because they believe it represents the best rigorous evaluation of the project's ability to add value for the shareholders. "The discounted cash flow analysis is the most widely method used by British Vita. We use NPV and PB. I prefer NPV to IRR because it is a more usable concept. NPV allows us to measure the total additional shareholder value we expect to generate from the project. The IRR is useful to give managers an overall feel for the project, but we are primarily looking for NPV. I think that the main reason is that the finance function at the corporate level becomes much more required. The external markets seem to be using the discounted cash flow based techniques" (FD).

Risk analysis techniques: British Vita adopts sensitivity analysis as the most widely employed technique for assessing the risk of strategic and non-strategic investment projects. “Primarily, we use sensitivity scenario analysis. We identify the best case, we identify the mid case and usually a downside scenario. We do some scenario planning on what eventuality people think could happen with this project and then we model those on our NPV basis” (FD).

Approval of investment projects: British Vita has a formal procedure for evaluating strategic investment decisions. A standard presentation format is adopted for all investment proposals (strategic or non-strategic) and there is a detailed procedure for the authorisation of all investment projects. “There is a structured system; basically, there are essentially three levels at which investment cases can be authorised. By the managing director of the local business unit - that is for lower level authority. For a certain expenditure level, it is then passed to our Executive Control Group. The largest size goes to the full board of British Vita plc for approval. That is the case of capital investment. In the case of acquisitions, all acquisitions have to be approved by the main board. In general, any investment proposal for more than £75,000 has to come to the head office”.

Company strategy is an important criterion in strategic investment choices
Strategic investment proposals whose expected financial returns meet the minimum financial requirements may be rejected if they are not consistent with the firm’s competitive strategy. According to the Finance Director, the discussion of consistency with corporate strategy is not for every investment case. It is obvious that for a capital proposal for the replacement of existing machines, there will be little discussion of strategy. Likewise, if they are doing cost saving projects (e.g. to automate existing manual processes), there will not be a discussion of strategy. But as soon as they consider larger projects such as new ventures, new markets, new geography or major acquisitions, strategy is fundamental. There will be a great deal of discussion on the competition, political risk and contingent risk. “Certainly, it is not our style to approve projects which can’t generate a financial payback. However, we have a couple of investments

because they strategically make sense. For example, we have a partnership in China and it is quite difficult now to model the return from China because there are many uncertainties about the growth of the Chinese business. Strategically, we should have a Chinese presence. Some IT projects give us some form of competitive advantage or improve the information and the control of the business. We tend to approve such investments without necessarily a full financial payback” (FD).

Considerable judgement is also applied in assessing the reliability of data underlying the appraisal. Intuition and judgement based on experience remain valuable and play a major role in the decision-making process among decision-makers in large UK companies. The Finance Director agreed that a strategic investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of the top managers. “The largest problem in trying to validate the data is the assumptions regarding the financial appraisal, especially when it is a new market. At the end of the day, people are presenting data on their assessment of how much they can sell and at what prices. Intuitively, do I feel that the growth rate and the market size that have been discussed here make sense? A project will sometimes be turned down because I don’t believe the fundamental business case”.

The process of strategic investment decision-making in this company is summarised in Table (6.9).

Table (6.9): Summary of strategic investment decision-making process in British Vita.

Identification of investment opportunities	<ul style="list-style-type: none"> * Each of 40 business centres has a team responsible for identifying investment opportunities. * There is a strategic review against the direction plan every six months. About every two years, the company completely revises its strategy. * The review of business areas happens at three levels: (1) Local businesses, (2) Divisional review, and (3) Central executive board. * Focus is on market size, on rate of growth and on political conditions. * The company conducts market studies to estimate rate of sales and operating costs. * British Vita has a standard format. The investment proposal is mostly quantitative with some qualitative information about markets and the narrative is generally more qualitative.
The importance of financial evaluation	<ul style="list-style-type: none"> * Financial evaluation is important in the evaluation of strategic investment projects.
The most widely used techniques	<ul style="list-style-type: none"> * The discounted cash flow analysis is the most widely used method. NPV and PB are used. NPV is preferred over IRR because it allows a measure of the total additional shareholder value expected. * Sensitivity scenario analysis is used. Best case, mid case and downside scenarios are usually identified. * CAPM is used to calculate cost of capital.
Sophisticated approaches	<ul style="list-style-type: none"> ROA is never used.
Non-financial criteria	<ul style="list-style-type: none"> * Investment proposals focus on the market and how it adds value. Non-financial criteria such as cost saving and flexibility of manufacturing are included within the capital expenditure proposals.
The importance of business strategy	<ul style="list-style-type: none"> * Projects which cannot generate a financial payback are not normally approved. However, exceptions include a partnership in China (strategic advantage) and some IT projects (competitive advantage, information and control). A full financial payback is not necessary in these cases.
The importance of intuition and judgement	<ul style="list-style-type: none"> * Especially in new markets, intuition about growth rate and market size can be important.
Authorisation of investment proposal	<ul style="list-style-type: none"> * The largest size goes to the full board of British Vita plc for approval. All acquisitions have to be approved by the main board. In general any investment proposal of more than £75,000 goes to the head office.

6. 11. Discussion and conclusion

Table (6.10) traces similarities and differences which emerged from the semi-structured interviews with CFOs with respect to strategic investment decision-making process. In general, the interviews confirm the key findings of both the questionnaire and the theoretical speculations.

Formal procedure for the appraisal and authorisation of all investment proposals: An important dimension characterizing strategic investment decision-making process which emerged from the semi-structured interviews with CFOs is the formalization/standardization dimension of the process (e.g. a specialized department which evaluates new investment projects, pre-determined techniques for the evaluation of new investment projects, written procedures which guide decision processes and are strictly followed in making the final decision, a certain hierarchy of approval).

The quality of the investment proposals depends on the validity of data and information gathered as input to the decision process. Decision-makers need to conduct environmental scanning, gathering information which is mostly externally oriented, much of which is non-financial. For example, decision makers tend to use market studies to estimate the rate of sales and what their operating costs are going to be. Such studies are generally non-financially oriented. If it is a major investment in new business, a new company or acquisitions, or in new products or new geographical area, then the time it takes actually to prepare the investment proposal depends on the time decision-makers need to gather the information and fully satisfy themselves that they can make the financial returns, and therefore it could be a year or longer. However, it seems that practitioners are satisfying rather than optimising in their information search behaviour regarding strategic investment decision-making. In some cases, it is just not possible for practitioners to be 100% happy with the integrity of that information. If they want to be absolutely certain, it is likely that they will miss the opportunity as they spent so much time gathering the information.

Company name	Industry	Formal procedure for the appraisal and authorisation of all investment proposals	Multiple techniques	The most widely used technique	Sophisticated approaches (Real Options Approach, CAPM)	Financial evaluation is critical in all cases	Strategic factors (non-financial criteria) are sufficient to gain approval for investment projects	Company strategy is an important criterion	Intuition and Judgement
RIO TINTO PLC	Mining	✓	✓	NPV	x	✓	x	✓	✓
BRITAX INTERNATIONAL PLC	Vehicles	✓	✓	IRR	x	✓	x	✓	✓
OCTEL INTERNATIONAL LIMITED	Chemical	✓	✓	PB	x	✓	x (*)	✓	✓
TOMKINS PLC.	Machinery	✓	✓	IRR	x	✓	x	✓	✓
YOUNG & Co.'s BREWER Plc	Beverage	✓	✓	NPV	x	x	✓	✓	✓
ASTRAZENECA INTERNATIONAL	Chemical	✓	✓	NPV	x	✓	x	✓	✓
HUNTLIGH TECHNOLOGY PLC	Machinery	✓	✓	PB	x	✓	x	✓	✓
BRITISH VITA PLC	Chemical	✓	✓	NPV	x	✓	x (**)	✓	✓

(*): R&D investment does not necessarily have to meet the financial return.

(**): Exceptions include a partnership in China (strategic advantage) and some IT projects (competitive advantage, information and control). A full financial payback is not necessary in these cases.

Duration refers to the length of time the decision takes from its inception to the final authorisation. Duration varies according to the size of the company and the nature of the investment project being evaluated. For Octel, if the proposal is for capital expenditure (increased capacity or cost reduction) then the time frame is probably a week to 3 months, depending on the type of investment. If it is an acquisition, it can be anything between three months and two years depending on the type of investment. It appears that duration is affected by the level of knowledge about markets and business opportunities. For example, if the investment proposal concerns a major investment in a new area like China, the process may take 12 months or longer (e.g. Tomkins).

The use of authority is a major feature of how people influence in decision-making (Butler *et al.*, 1993, p.42). To obtain the final approval to proceed with a particular project, a specific capital authorisation request has to be prepared. It is noticeable that investment proposal authorisation level varies according to company size and the nature of the investment project being evaluated. For example, the business unit managing director at Rio Tinto has the authority to approve any capital project up to \$20 million, while anything above \$20 million has to come through the Business Evaluation Department for evaluation and approval. The MD of Britax is subject to the same constraints, but with a ceiling of £500,000. For Tomkins, if the capital investment is included in the business plan or strategic plan and is up to £3 million, then the management of each business can make the investment without getting the approval of the head office, with a lower limit for unplanned expenditure. It is clear that the ultimate authority for strategic investment projects rests with top management (the board of directors); the formal systems for authorisation of capital expenditure restrict the independence of divisional managers.

In fact, capital expenditure limits at different hierarchical levels are among the traditional accounting-based control systems most frequently used to guide investment decision process. It is appears that managerial behaviour is influenced by pre-decision control mechanisms at an early stage in the investment process.

Examples are setting authorisation levels, standard formats for investment appraisal, formal procedures to be followed and influencing the proposal submitted by identifying strategic areas for growth, hurdle rates and maximising shareholder value.

Evaluation of investment proposals: The results of the field study suggest that financial assessment, risk assessment and other non-financial assessments (strategic factors) are the main issues included in investment proposals. The main objective for each company is to maximise shareholder value over the long term through increasing the economic value of its business. Hence, the expected financial return will remain of supreme importance and play an important role in investment decision-making⁶⁰. It is the most important factor that companies look at when they make decisions about strategic investment projects. Interviewees confirmed that financial evaluation is critical in both strategic and non-strategic investments. They believed that there is no such thing as a strategic investment that has no financial aspect to it. Ultimately, an investment proposal should show sufficient profitability to be implemented and will be rejected if its expected financial return does not meet the minimum requirements of return on investment. Some companies give the highest importance to the discounting techniques (NPV and IRR) over other techniques. For example, companies, such as Rio Tinto and British Vita, give high preference to NPV because they believe it represents the most rigorous evaluation of the project's ability to add value for the shareholders. According to the CFO of British Vita, the main reason for this preference is that the finance function at the corporate level has become much more important. The external markets seem to be using discounted cash flow based techniques. The CFO of Tomkins said, "The preference that we look at effectively is the modified internal rate of return because what we trying to focus on in the business is to ensure that the business is actually running a return on capital in excess of cost of

⁶⁰ It seems that decision-makers are dominated by shareholder wealth goals, and place most emphasis on the financial objective (maximising shareholder value). However, it worth mentioning that the shareholders are not the only group interested in the company's success. Other stakeholders include trade creditors, banks, customers, employees, the government and management. Each stakeholder group will measure corporate performance in a slightly different way. Shareholder wealth rests on companies building long-term relationships with suppliers, customers and employees, and promoting a reputation for honesty, financial integrity and corporate social responsibility (see Pike and Neale, 2003, p.170).

capital". On the other hand, some companies, such as Octel, still give high preference to the PB method over other techniques.

It is obvious that decision makers heavily rely on the computational approach to making strategic investment decisions, which implies careful step-by-step planning and the use of calculations and algorithms to compute an optimal solution before taking any action. It is noticeable that the use of NPV, IRR and PB calculations, provides the leading quantitative method of assessing major investment projects.

With regard to risk analysis techniques, interviewees confirmed that sensitivity analysis is the technique most widely employed for assessing the risk of investment projects. Different discount rates are used for different types of investment projects. For example, if it is an internal investment within the company (i.e. capital expenditure) then they will use their own cost of capital calculations. If it is an external investment where there will be an acquisition or a joint venture, for instance, then they will use this plus or minus the risk factor.

Sophisticated methods of investment appraisal: A wide theory-practice gap remains regarding the adoption of sophisticated techniques of investment appraisal. For example, sophisticated techniques of risk analysis such as CAPM are not adopted when assessing the risk associated with investment projects. Some practitioners stated that Beta estimation is a tool in the textbooks but is not necessarily something to use in the business.

Despite the commercial promotion of sophisticated models such as ROA and the enthusiasm of their key advocates, such models appear not to have been adopted as much might have been expected. Decision-makers still believe that the ROA is an academic exercise rather something that is real for businesses, largely because of the complexity associated with real options evaluation. One interviewee pointed out that ROA had never really been applied in decision-making because there are two issues; one is to get enough reliable data to put into the model, and the second is the question of whether people really understand what the model

means or whether it is just a black box approach.. In other words, they think it is theoretically the correct thing to do but practically it is not feasible in their business. It is important to bear in mind that some of the interviewees were not even aware of the term 'ROA', the expression frequently used by researchers to describe investment flexibility. This result is consistent with the view of Busby and Pitts (1998).

It seems that executives do not practice what academics preach. They prefer to continue to use their traditional appraisal techniques rather than adopt new ones. Traditional and relatively unsophisticated methods of investment appraisal continue in practice despite the academic offerings of more sophisticated techniques. Practitioners believe that these traditional techniques enable them to arrive at the optimal solution to a problem. This conclusion is consistent with Scapens (1991), who argues that the simpler techniques may often lead to the optimal solution to a problem and that they should not be rejected solely on the grounds of simplicity⁶¹.

Company strategy is an important criterion in strategic investment choices: Strategic investment decisions are generally derived from an explicit corporate strategy and are aligned with the long-term strategic direction of an organisation. There is a long-term business strategy and an annual plan which is consistent with strategy. All investments must be aligned with this strategy, which is typically revisited every year. Accordingly, the approval of strategic investment proposals is not based wholly on the computed signal derived from financial analysis; company strategy is an important criterion in strategic investment choices. Practitioners use strategic investment criteria that go beyond discounted cash flow calculations, as the latter cannot capture all relevant information or reflect strategic aims.

⁶¹Scapens, in his book entitled Management Accounting: A Review of Recent Developments (1991) refers to the empirical research which showed that traditional, and relatively unsophisticated, methods continued in practice despite the academic offerings of more sophisticated techniques. His conclusion is that the simple techniques might be arriving at the optimal solution to a problem and that they should not be rejected solely on the grounds that they are simple techniques. It is necessary to concentrate on explaining the existing practice rather than promoting the academic models at all costs.

Interviewees confirmed that strategic investment proposals whose expected financial return meets the minimum financial requirements may be rejected if they are not consistent with the firm's competitive strategy. Further, some interviewees agreed that a strategic investment proposal could be approved on strategic grounds alone; for example, R&D investment does not necessarily have to meet the financial return. In some cases, practitioners will not do a full DCF calculation on a particular product introduction if it is part of a technology update. In other words, there are some investment projects that are approved regardless of financial justification because it is believed that they would improve the quality of the business or relate to environmental considerations. Sometimes, companies make investments based on environmental considerations even though they do not have a financial return. On the other hand, other practitioners still believe that strategy is subordinate to value and that everything has to pass the financial hurdle.

Non-financial criteria (strategic factors): Interviewees believed that non-financial criteria (e.g. customer requirements, keeping up with competition, and obtaining greater manufacturing flexibility) are of particular significance and these criteria are included in investment proposals. However, these strategic factors are insufficient to gain approval for investment projects. It is evident that decision-makers consider strategic analysis but not at the expense of financial analysis.

Intuition and judgement: There are clear procedures for the authorisation of all investment projects. Following evaluation, strategic investment projects require consideration at a number of levels in the organisation's hierarchy until finally being approved or rejected. However, the decision outcome is rarely based wholly on the computed signal derived from financial analysis. Considerable judgement is applied in assessing the reliability of data underlying the appraisal⁶². Intuition and judgement based on experience play a major role in decision-making processes in large UK companies. This suggests that decision-makers adopt 'holistic' approaches incorporating both financial and strategic considerations in

⁶² Careful consideration is required regarding the influence on the investment of such key factors as product markets, the economy, production, finance and people (Pike and Neale, 2003, p.235).

the evaluation of strategic investment proposals. Decision-makers are experienced people who also use judgement and intuition, and not just technocrats anchored to financial calculations. Interviewees affirmed that a strategic investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of the top managers. Accordingly, it seems that decision-makers combine qualitative intuitive judgement with systematic (financial) analysis to evaluate the proposal of strategic investment project. Ignoring any one of them would make the evaluation less effective.

The next chapter (Chapter Seven) will investigate the multidimensional aspects of strategic investment decision-making processes and examine the combined effects of contextual factors, including decision characteristics, firm characteristics, top management characteristics, corporate goals and corporate performance, as additional domains of importance.

Chapter Seven
Strategic Investment Decision-Making Processes:
Towards a Contingency View

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Chapter Seven

Strategic Investment Decision-Making Processes: Towards a Contingency View

7.1 Introduction

Strategic investment decision-making is a complex procedure that cannot be reduced to a set of optimal techniques for rational decision makers (Butler, Davies, Pike, and Sharp, 1991; Papadakis *et al.*, 1998). The various dimensions of strategic decision-making processes that can be derived from the literature include comprehensiveness/rationality, political and negotiation, formalization/standardization, and centralization and decentralization (e.g. Pettigrew, 1973; Fredrickson, 1984; Fredrickson and Iaquinto, 1989; Bourgeois and Eisenhardt, 1988; Butler *et al.*, 1991; Dean and Sharfman, 1993 and 1996; Papadakis *et al.*, 1998)(see section 2.4).

Fredrickson (1985, p.821) argues that “empirical tests of factors that have been hypothesised to affect the way that strategic decisions are made are notably absent”. Papadakis *et al.* (1998, p.115) point out that “it is still widely recognised

that our knowledge of strategic decision-making processes is limited and is mostly based on normative or descriptive studies and on assumptions most of which remain untested”.

The underlying hypothesis of this study is that strategic investment decision-making processes may be viewed as the interplay of multiple perspectives. The study of Papadakis *et al.* (1998) comprised all manufacturing enterprises in Greece and examined strategic investment decision-making. However, the authors advocate conducting further research to test the *generalizability* of the results in other settings and sample designs. Limited research has been undertaken in the UK regarding the strategic investment decision-making process and no attention has been given to investigating the link between contextual factors and the multidimensional aspects of the process.

The purpose of this chapter is to integrate the results of previous chapters, by means of regression analyses, into an overall model which simultaneously considers the effects of various contextual domains upon strategic investment decision-making process dimensions. Firstly, it examines factors believed to influence strategic investment decision-making processes (see section 2.5). Secondly, by means of factor analysis, it classifies the dimensions of strategic investment decision-making processes into three significant dimensions. Each of the resulting three dimensions is given a specific name indicating the meaning of the variables loading on the factor: procedural rationality, strategy formulation and political behaviour. Thirdly, the chapter explores the relationships between these dimensions and the context in which these decisions are taken. The three factors between them explain 57.78% of the variance: procedural rationality explains 27.74%; strategy formulation explains 18.12%; and political behaviour explains 11.92% of the variance. Finally, the chapter identifies the implications for theory and concludes that strategic investment decision-making processes are more complex and less systematic than the normative literature would suggest.

The results of this study validate the contingency view of strategic investment decision-making and show that each contextual dimension contributes in a unique manner to describing the decision-making process. According to this perspective, there is no single acceptable model that explains the processes of strategic investment decision-making. They depend on the contingent and contextual factors relevant to the situation. Hence, the process of strategic investment decision-making varies according to the contextual factors and specific circumstances and situations in which the organization operates.

Seven sections follow this introductory section:

- Factors influencing strategic investment decision-making processes.
- Selection of explanatory dimensions.
- Reliability and validity considerations.
- An integrative perspective.
- Data analysis.
- An interpretation of the results.
- Conclusion and implications for theory.

7.2. Factors influencing strategic investment decision-making processes

Many researchers have addressed the impact of certain contextual factors on strategic decision-making processes (e.g. Fredrickson, 1985; Dean and Sharfman, 1993; Hitt and Tyler, 1991; Papadakis et al., 1998) (see section 2.5). In an attempt to answer the call raised by many researchers (e.g. Papadakis *et al.*1998, Arnold and Hatzopoulos, 2000), the researcher examined some factors which believed to influence strategic investment decision-making processes, taking into consideration both the contradictions associated with the evidence produced by previous research efforts and the shortage of evidence in the literature regarding the impact of other significant sources on strategic decision-making processes. These factors are: (1) decision characteristics (e.g. type of strategic investment decision, decision uncertainty), (2) corporate goals, (3) objective measures of corporate performance, (4) subjective measures of corporate performance, (5) firm

characteristics (e.g. size), and (6) top management characteristics (e.g. type of education).

7.2.1. Decision characteristics: A few researchers (e.g. Fredrickson, 1985; Dean and Sharfman, 1993; Papadakis *et al.*, 1998) have examined the relationship between decision-specific characteristics and a range of strategic investment decision-making process dimensions. The most striking finding of the study of Papadakis *et al.*, (1998, p.134) was the dominant role of decision-specific characteristics in determining decision-making processes. Further, they found that “new business investments and investments in marketing exhibit less association with rationality in comparison to capital equipment investment and internal reorganisations. Investments in capital equipment and marketing exhibit more financial reporting in comparison to other investments. Investments in internal reorganization seem to be hierarchically more centralized in comparison to all other types of strategic decisions”. Strategic investment decisions are made with incomplete information under uncertain conditions. It was argued that the general characteristics of strategic decisions, such as uncertainty, significantly influence the dimensions of the decision-making process more than other environmental, organizational, and managerial factors (Papadakis *et al.*, 1998).

Decision uncertainty refers to the extent to which the strategic investment decision is not clear to the decision makers, in terms of information to be collected, or actions to be taken. Uncertainty can be defined as a lack of information, that is, the gap between the information one has and the information one needs to perform a task (Dean and Sharfman, 1993). From this perspective, uncertainty will increase the procedural rationality of decisions, as more information collection and analysis will be needed to fill this gap. This is consistent with the view of Bourgeois and Eisenhardt (1988), that uncertain issues require greater information processing, and this initiates a more extensive search for information. Dean and Sharfman (1993) examined 57 strategic decisions in 24 firms, concluding that high uncertainty was negatively related to procedural rationality in strategic decisions. However, significant issues still need further research to test the generalizability of the results.

The study incorporates various types of strategic investment decisions:

- Acquisition of another company.
- Merger with another company.
- Substantial increase in production capacity.
- Introduction of electronically integrated operations.
- Introduction of computerised production processes.
- Introduction of fundamentally new product lines.
- Introduction of electronic commerce capabilities.

The association between these types of strategic investment decision-making and decision characteristics (e.g. the type of strategic investment decision, decision uncertainty) will be examined.

7.2.2. Corporate goals: Respondents confirm that profitability (net profit), efficiency (low costs), growth (increase in total assets, sales) and shareholder wealth (dividends plus stock price appreciation) are the most important indicators of company success over the last five years. The interaction between these indicators and strategic investment decision-making process dimensions will be examined.

7.2.3. Corporate performance: Many researchers have argued that superior performance is negatively related to rational decision-making, i.e. superior performance is expected to lower the intensity with which organizations will search for and analyse information (e.g. Bourgeois, 1981). The study of Papadakis *et al.* (1998, p.135) provides evidence to support the existence of significant relationships between corporate performance and strategic decision-making processes. They state: "ROA provides significant positive associations with rationality, financial reporting, and hierarchical decentralization. Profit growth in turn is highly related to politicisation and dissension. So different performance aspects appear to influence different dimensions of the process". However, these results cannot be adopted as significant generalizations. It seems significant, therefore, to explore empirically the link between performance and strategic investment decision-making processes.

Previous research efforts have used a number of different performance measures, ranging from pure financial measures to measures of overall effectiveness. They also indicate that sales growth, profit growth, and return on investment are among

the most widely used measures (Papadakis, 1993). The researcher proposes to examine three financial performance measures in this study:

- Net profit margin. The net profit margin ratio indicates profit levels of a business after all costs have been taken into account.
- Return on assets, which can be viewed as an operational measure of the efficiency of a firm with regard to the profitable use of its total assets base (Bourgeois, 1980). This ratio gives an indication of the effectiveness of business in generating a profit. The higher the ratio, the greater the return on assets.
- Return on equity: a measure of a company's management. It measures the degree to which the company produces earnings using the investment of the share or stockholders. The higher the ROE, the more income the management produces as a percentage of the money invested in the company.

These performance measures are calculated as an average of the years 1997-2001. Financial performance provides an indication of past and present organisational ability to adapt or to meet overall goals, while operating performance indicates an organisation's ability to react and transform itself in the face of various external challenges (Papadakis, 1993). As pointed out by Papadakis (1993) the subjective measures take into account the corporate goal structure, while objective performance measures do not. This may explain why subjective measures of performance provided better results than their objective counterparts. Product quality, fit with business strategy and improving the competitive position of the firm are the most important factors which influence strategic investment decision-making (Van Cauwenbergh *et al.*, 1996). There is a shortage of evidence in the literature regarding the relationship between subjective corporate performance measures and strategic investment decision-making processes. Shank (1996) amongst others has argued that strategic investment decision-makers must consider qualitative issues that cannot be fitted into the cash flow analysis, before making 'go' or 'not go' decisions. In order to investigate the strategic factors that lead to the initiation of strategic investment projects, respondents were asked to comment on the importance of these factors when evaluating such projects.

Emphasis was placed on the impact of strategic investment on improvements in company image, consistency with corporate strategy, requirements of customers, keeping up with competition, obtaining greater manufacturing flexibility, the ability to expand in the future, quality and reliability of outputs, reduced lead-times, reduced inventory levels, and experience with new technology. The relationship of the above-mentioned subjective measures to a range of dimensions of strategic investment decision-making processes will be examined.

7.2.4. Firm size: Company size is an important control variable, which may significantly influence strategic investment decision-making processes. A number of studies (e.g. Mintzberg, 1973; Mintzberg and Waters, 1982; Fredrickson, 1984; Fredrickson and Iaquinto, 1989; Papadakis *et al.* 1998) have addressed the importance of company size in influencing the framework of strategic decision-making. Mintzberg and Waters (1982) note how organisation size affected the rationality of strategic decision-making. Fredrickson and Iaquinto (1989) found that organisation size was negatively related to the comprehensiveness of strategic decision processes. Papadakis *et al.* (1998) found that comprehensiveness /rationality appears to increase with size but size is largely insignificant in the remaining dimensions they addressed. In contrast, Dean and Sharfman (1993) and the Bradford studies (e.g. Hickson *et al.*, 1986) found no differences in strategic decision-making processes could be attributed to size.

The present research explores the link between firm size and strategic investment decision-making process dimensions. A number of researchers have advocated the use of the number of employees as a proxy of size (e.g. Fredrickson, 1984 and Papadakis *et al.*, 1998). Others have advocated the use of net assets or turnover to represent the size. This study incorporates three measures of size in an attempt to explore whether different measures influence different dimensions of strategic investment decision-making processes. These are: (1) number of employees (log number) for the year ended 2001, (2) turnover (log number) for the year ended 2001, and (3) total assets (log number) for the year ended 2001. The log of size was used in the regression analysis because the distribution of the sample is positively skewed, indicating a distribution with an asymmetric tail extending toward more positive values.

7.2.5. Top management characteristics (e.g. decision makers' type of academic education): Research has focused on the impact of top management on corporate performance. However, the few studies which have examined the link between top management characteristics and strategic decision-making processes have produced mixed results. For example, Lyles and Mitroff (1980) note that management characteristics may not influence the organizational problem-formulating process (cited in Papadakis *et al.*, 1998, p118.). On the other hand, researchers such as Hitt and Tyler (1991) found that CEOs' academic education does influence strategic decision-making processes. Hitt and Tyler's view is supported by the study of Papadakis *et al.*, (1998, p.134), which establishes the relatively important influence of top management characteristics on strategic investment decision-making process dimensions: "Certain CEO characteristics entered significantly into the regression modes and influenced financial reporting, formalization and hierarchical decentralization". Hence, the influence of top management on strategic investment decision-making processes remains unclear and needs further investigation.

To sum up, there has been little research on the influence of the broader context on strategic decision-making processes. An exception is the study conducted by Although each of the above studies has its own contribution to make, it also has its limitations, due to their focus being only on one dimension or on limited factors, thereby ignoring other significant sources of influence. These limitations can be referred to as *model underspecification* (Papadakis *et al.*, 1998)..

In an attempt to answer the call raised by researchers such as Papadakis *et al.* (1998) and Arnold and Hatzopoulos (2000), the researcher examined the following hypotheses (Table 7.1):

Table 7.1: The influence of managerial and contextual factors on strategic investment decision-making process dimensions.

Hypothesis	Source
H1 Decision characteristics (e.g. types of strategic investment decision, decision uncertainty) influence strategic investment decision-making processes.	Fredrickson (1985), Dean and Sharfman (1993), Papadakis <i>et al.</i> (1998). Bourgeois and Eisenhardt (1988), Papadakis <i>et al.</i> (1998).
H2 Different aspects of corporate goals influence strategic investment decision-making processes.	Eisenhardt and Bourgeois (1988), Nutt (1993), Dean and Sharfman (1996).
H3 Different performance aspects influence strategic investment decision-making processes.	Bourgeois (1981), Rasheed and Kotulic(1995), Papadakis <i>et al.</i> (1998).
H4 Firm size influences strategic investment decision-making processes.	Mintzberg (1973), Mintzberg and Waters (1982), Fredrickson (1984), Fredrickson and Iaquinto (1989), Papadakis <i>et al.</i> (1998)
H5 Top management's type of education influences strategic investment decision-making processes.	Hitt and Tyler (1991), Papadakis <i>et al.</i> (1998)

7.3. Selection of explanatory dimensions of strategic investment decision-making processes

To derive general dimensions of strategic investment decision-making processes, the researcher incorporated 16 items in this study to measure various dimensions of investment practices in large U.K. companies (Table 7.2). These items were derived from the literature review. Incorporating a large number of variables may offer the advantage of having a rich database for the analysis, but may at the same time create specific problems and potential limitations. However, factor analysis can be used to reduce such problems.

Table (7.2): Variables of strategic investment decision-making process dimensions.

Var 1	Strategic investment decisions emerge through the formal planning processes of our firm.
Var 2	Strategic investment decisions derive from an explicit corporate strategy.
Var 3	We have formal procedures for evaluating strategic investment decisions.
Var 4	Investment opportunities are identified and proposed by top management.
Var 5	Lower level managers in the organisation are involved in strategic investment decisions.
Var 6	Strategic investment decisions are influenced by the relative power of various groups in the firm.
Var 7	The company culture is unfavourable to strategic investment decisions.
Var 8	Strategic investment decisions are influenced by negotiations among groups in the firm.
Var 9	It is not clear what kind of information we need to appraise strategic investment decisions.
Var 10	Financial evaluation techniques are often used in the early analysis of strategic investments
Var 11	Financial evaluation techniques are often used in the final choice of strategic investments.
Var 12	The evaluation of strategic investments is left to the judgment of top management.
Var 13	A strategic investment proposal will be rejected if its expected financial return does not meet the minimum requirements of return on investment.
Var 14	A strategic investment proposal whose expected financial return meets the minimum requirements can be rejected if it does not fit with the firm's competitive strategy.
Var 15	A strategic investment proposal whose expected financial return meets the minimum requirements of return on investment can be rejected if it does not satisfy the expectations and intuition of the top managers.
Var 16	A strategic investment proposal whose expected returns fall below the required level can still be accepted for strategic reasons.

Factor analysis can be used to identify the underlying variables, or factors, that explain the pattern of correlations within a set of observed variables. It is often used in data reduction and in identifying a small number of factors that explain most of the variance observed in a much larger number of manifest variables. Further, factor analysis can be used to generate hypotheses regarding causal mechanisms or to screen variables for subsequent analysis (for example, to identify collinearity prior to performing a linear regression analysis). The theoretical basis for factor analysis is that variables are correlated because they share one or more common components. That is, correlations among variables are explained by underlying factors. In brief, factor analysis enables researchers to establish whether different measures do, in fact, measure the same thing (Bryman and Cramer, 2001).

Two uses of factor analysis can be distinguished. The one most commonly reported is the *exploratory* kind in which the relationships between various variables are examined without determining the extent to which the results fit a particular model. *Confirmatory* factor analysis, on the other hand, compares the solution found against a hypothetical one (Bryman and Cramer, 2001). The first step is to compute a correlation matrix for the related variables of strategic investment decision-making. If there are no significant correlations between these variables, then this means that they are unrelated and that one would not expect them to form one or more factors. In other words, it would not be worthwhile to conduct a factor analysis.

Table (7.3) shows the correlation matrix for these variables, together with their significance levels. Table (7.3) reveals that most of the variables are significantly correlated at 0.01 or 0.05 level, either positively or negatively, with one another, which suggests that they may constitute one or more factors. The reliability of the factors emerging from a factor analysis depends on the size of the sample. Although, there is no agreement on what the size should be, there is consensus, that there should be more participants than variables (Bryman and Cramer, 2001).

However, the sample is sufficiently large to enable us to find out what factors underlie a group of variables and this can be done reliably. There are various forms of factor analysis (*Principal components, principal-axis factoring, alpha, image and maximum likelihood factoring*). But the most widely used form of factor analysis is *principal components*. A principal component is a linear combination of observed variables that is independent of other components.

The first component or axis that is extracted accounts for the largest amount of variance shared by the tests. The second factor consists of the next largest amount of variance which is not related to or explained by the first factor. The third factor extracts the next largest amount of variance, and so on. However, the first few factors are the most important ones because the degree of variance which is explained by the remaining factors becomes smaller and smaller. The SPSS output showing the initial factors produced by a principal component analysis of the related variables of strategic investment decision-making and the amount of the variance they account for (their eigenvalue) is presented in Table (7.4). The proportion of variance accounted for by any one factor is its eigenvalue divided by the sum of the eigenvalues as illustrated by Table (7.4). For example, the variance accounted for by the first factor is $(2.27/10) \times 100 = 27.74\%$ per cent of the total variance. Eigenvalues are the most commonly used index for determining how many factors to take from a factor analysis. They are fairly technical measures, but when principal components are derived, their values represent the amount of variance in the variables that is accounted for by a component (or factor). Eigenvalues logically lead to a rule of thumb for determining the number of factors to take from a factor analysis. Researchers can take as many as there are eigenvalues greater than 1.

The next step is to decide how many factors to keep. Two useful technical aids can be used when deciding to keep or drop a factor. The first, known as *Kaiser's criterion*, is to select those factors which have an eigenvalue of greater than one as shown in Table (7.4). *Kaiser's criterion* has been recommended for situations where the number of the variables is fewer than thirty. The second method is the graphical *scree test* (a graph is drawn of the descending variance accounted for by the factors initially extracted as shown in Table (7.4)).

Table (7.3): Correlations among various variables of strategic investment decision-making process dimensions.

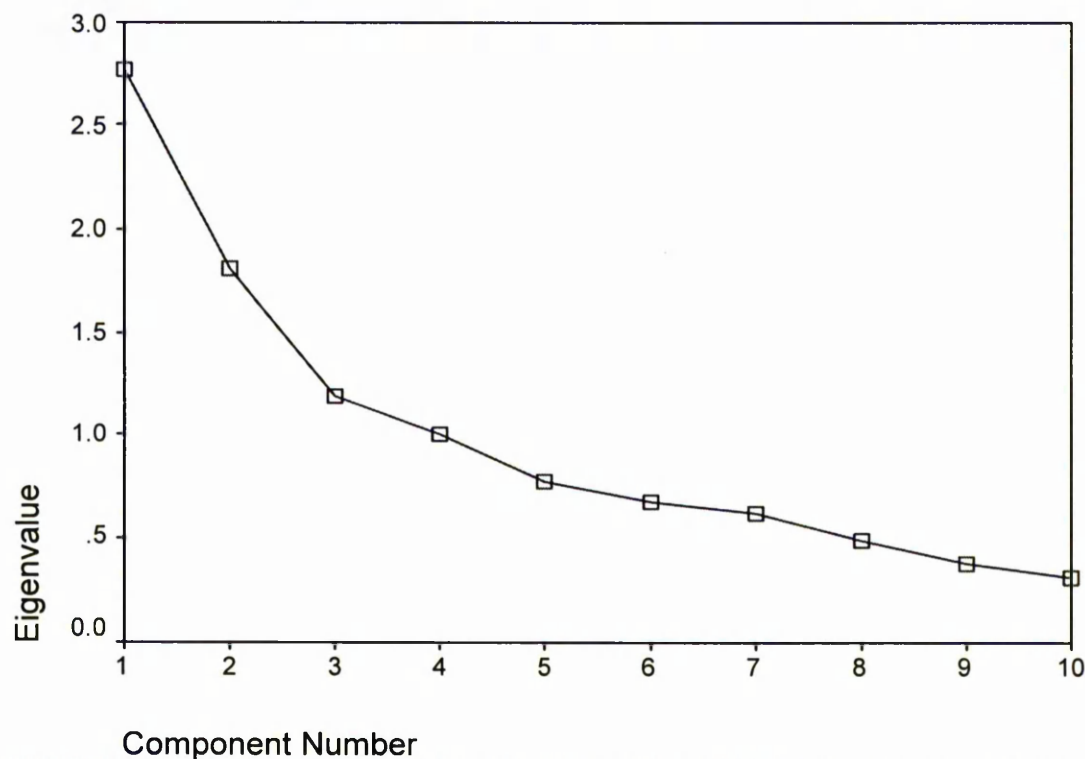
		Var 1	Var 2	Var 3	Var 4	Var 5	Var 6	Var 7	Var 8	Var 9	Var 10	Var 11	Var 12	Var 13	Var 14	Var 15	Var 16
Var 1	I	1.00	0.37	0.48	-0.03	0.28	-0.11	-0.32	-0.17	-0.24	0.27	0.31	-0.11	0.29	0.14	-0.04	-0.16
	II		0.00	0.00	0.82	0.01	0.31	0.00	0.14	0.03	0.01	0.00	0.30	0.01	0.20	0.75	0.17
Var 2	I	0.37	1.00	0.24	-0.06	-0.02	-0.11	-0.17	-0.05	-0.04	0.31	0.21	0.10	0.20	0.25	0.11	-0.18
	II	0.00		0.03	0.58	0.85	0.32	0.13	0.64	0.70	0.01	0.06	0.39	0.07	0.02	0.31	0.10
Var 3	I	0.48	0.24	1.00	-0.26	0.54	-0.18	-0.33	-0.24	-0.38	0.30	0.45	-0.29	0.38	0.08	-0.05	-0.20
	II	0.00	0.03		0.02	0.00	0.12	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.46	0.64	0.08
Var 4	I	-0.03	-0.06	-0.26	1.00	-0.20	-0.09	-0.08	-0.12	-0.18	-0.08	-0.03	0.00	-0.03	0.04	-0.06	0.06
	II	0.82	0.58	0.02		0.07	0.42	0.46	0.28	0.10	0.51	0.76	0.99	0.81	0.71	0.59	0.57
Var 5	I	0.28	-0.02	0.54	-0.20	1.00	-0.24	-0.18	-0.27	-0.16	0.39	0.38	-0.23	0.31	0.10	-0.03	-0.34
	II	0.01	0.85	0.00	0.07		0.03	0.11	0.01	0.17	0.00	0.00	0.04	0.00	0.36	0.76	0.00
Var 6	I	-0.11	-0.11	-0.18	-0.09	-0.24	1.00	0.35	0.60	0.45	-0.11	-0.15	0.19	-0.27	0.03	0.03	0.35
	II	0.31	0.32	0.12	0.42	0.03		0.00	0.00	0.00	0.31	0.17	0.10	0.02	0.77	0.77	0.00
Var 7	I	-0.32	-0.17	-0.33	-0.08	-0.18	0.35	1.00	0.28	0.41	-0.30	-0.17	0.09	-0.13	0.08	0.04	0.14
	II	0.00	0.13	0.00	0.46	0.11	0.00		0.01	0.00	0.01	0.14	0.43	0.24	0.46	0.75	0.22
Var 8	I	-0.17	-0.05	-0.24	-0.12	-0.27	0.60	0.28	1.00	0.35	-0.16	-0.20	0.28	-0.17	0.00	0.13	0.21
	II	0.14	0.64	0.03	0.28	0.01	0.00	0.01		0.00	0.16	0.07	0.01	0.13	0.98	0.24	0.06
Var 9	I	-0.24	-0.04	-0.38	-0.18	-0.16	0.45	0.41	0.35	1.00	-0.23	-0.47	0.32	-0.08	0.08	0.10	0.13
	II	0.03	0.70	0.00	0.10	0.17	0.00	0.00	0.00		0.04	0.00	0.00	0.46	0.48	0.37	0.23
Var 10	I	0.27	0.31	0.30	-0.08	0.39	-0.11	-0.30	-0.16	-0.23	1.00	0.31	-0.08	0.26	0.19	0.23	-0.24
	II	0.01	0.01	0.01	0.51	0.00	0.31	0.01	0.16	0.04		0.00	0.46	0.02	0.09	0.04	0.03
Var 11	I	0.31	0.21	0.45	-0.03	0.38	-0.15	-0.17	-0.20	-0.47	0.31	1.00	-0.19	0.24	0.12	-0.02	-0.22
	II	0.00	0.06	0.00	0.76	0.00	0.17	0.14	0.07	0.00	0.00		0.08	0.03	0.27	0.83	0.05
Var 12	I	-0.11	0.10	-0.29	0.00	-0.23	0.19	0.09	0.28	0.32	-0.08	-0.19	1.00	-0.20	-0.10	0.02	0.14
	II	0.30	0.39	0.01	0.99	0.04	0.10	0.43	0.01	0.00	0.46	0.08		0.06	0.39	0.89	0.23
Var 13	I	0.29	0.20	0.38	-0.03	0.31	-0.27	-0.13	-0.17	-0.08	0.26	0.24	-0.20	1.00	0.20	0.11	-0.55
	II	0.01	0.07	0.00	0.81	0.00	0.02	0.24	0.13	0.46	0.02	0.03	0.06		0.07	0.31	0.00
Var 14	I	0.14	0.25	0.08	0.04	0.10	0.03	0.08	0.00	0.08	0.19	0.12	-0.10	0.20	1.00	0.34	0.07
	II	0.20	0.02	0.46	0.71	0.36	0.77	0.46	0.98	0.48	0.09	0.27	0.39	0.07		0.00	0.52
Var 15	I	-0.04	0.11	-0.05	-0.06	-0.03	0.03	0.04	0.13	0.10	0.23	-0.02	0.02	0.11	0.34	1.00	0.05
	II	0.75	0.31	0.64	0.59	0.76	0.77	0.75	0.24	0.37	0.04	0.83	0.89	0.31	0.00		0.63
Var 16	I	-0.16	-0.18	-0.20	0.06	-0.34	0.35	0.14	0.21	0.13	-0.24	-0.22	0.14	-0.55	0.07	0.05	1.00
	II	0.17	0.10	0.08	0.57	0.00	0.00	0.22	0.06	0.23	0.03	0.05	0.23	0.00	0.52	0.63	

I: Correlation coefficient.
II: Significant (2-tailed)

Table (7.4): Total variance explained- extraction method: Principal component analysis.

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.77	27.74	27.74	2.77	27.74	27.74	2.43	24.28	24.28
2	1.81	18.12	45.86	1.81	18.12	45.86	1.70	17.00	41.27
3	1.19	11.92	57.78	1.19	11.92	57.78	1.65	16.51	57.78
4	1.00	10.01	67.79						
5	0.77	7.71	75.49						
6	0.67	6.71	82.21						
7	0.62	6.17	88.38						
8	0.48	4.81	93.19						
9	0.37	3.74	96.93						
10	0.31	3.07	100.00						

Scree Plot



The 16 items were factor analysed using the varimax rotation method and three main factors were selected. The relationship between each item and a factor is expressed as a correlation or loading. Thus, by means of factor analysis, the researcher excluded 7 variables and retained 9 independent variables. The three principal components factors are shown in Table (7.5).

Table (7.5): Factor analysis results of strategic investment decisions process dimensions (the dependent variables)

	Procedural rationality	Strategy formulation	Political behaviour
We have formal procedures for evaluating strategic investment decisions	0.84	-0.08	0.01
Lower level managers in the organisation are involved in strategic investment decisions	0.72	-0.12	-0.14
Strategic investment decisions emerge through the formal planning processes of your firm.	0.67	0.15	-0.08
Financial evaluation techniques are often used in the final choice of strategic investments.	0.64	0.13	-0.12
Strategic investment decisions derive from an explicit corporate strategy.	0.27	0.70	-0.13
A strategic investment proposal whose expected financial return meets the minimum requirements can be rejected if it does not fit with the firm's competitive strategy.	-0.03	0.69	0.15
A strategic investment proposal whose expected financial return meets the minimum requirements of return on investment can be rejected if it does not satisfy the expectations and intuition of the top managers.	-0.15	0.65	0.16
Strategic investment decisions are influenced by the relative power of various groups in the firm.	-0.09	0.07	0.87
Strategic investment decisions are influenced by negotiations among groups in the firm	-0.15	0.06	0.86

*Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Factors loadings less than 0.50 are not reported.*

Each of the resulting three dimensions was given a specific name indicating the meaning of the variables loading on the factor: procedural rationality, strategy formulation and political behaviour. Factor one incorporates four variables measuring the procedural rationality dimension of strategic investment decision-making processes (this explains 27.74% of the variance). Factor two incorporates three variables measuring the strategy formulation dimension of strategic investment decision-making processes (this explains 18.12% of the variance) and factor three explains 11.92% of the variance and incorporates the two variables measuring the political behaviour dimension of strategic investment decision-making processes. Factor loadings less than 0.50 are not reported. Thus, by means of factor analysis, the data reduction processes resulted in three dimensions characterizing the processes of strategic investment decision-making. Having identifying the most significant dimensions of strategic investment decision-making processes, the next step is to examine, by means of regression models, the interactions between strategic investment decision-making processes dimensions and the contextual factors. It is obvious that the dimensions of strategic investment decision-making processes will be treated as dependent variables, whereas the contextual factors will be treated as the independent variables.

7. 4. Reliability and validity considerations

The reliability analysis (ALPHA) procedure calculates a number of commonly used measures of scale reliability and also provides information about the relationships between individual items in the scale (Table, 7.6).

For each dimension items that did not correlate well with the related dimension are dropped. This left a total of four items for procedural rationality ($\alpha = 0.73$), three items for strategy formulation ($\alpha = 0.60$) and two items for political behavior dimension ($\alpha = 0.74$). As it was difficult to find acceptable scales for measuring procedural rationality and political behaviour in the literature, the researcher designed scales specifically for this study. These scales benefited from different resources. For procedural rationality: how important were quantitative analytic

techniques in making the strategic investment decisions (Mintzberg et al., 1976; Hickson et al., 1986; Langley, 1989; and Dean and Sharfman, 1996).

Table (7.6): Reliability analysis- Scale (ALPHA)

	Var 1	Var 2	Var 3	Var 4	Var 5
Var 1	1.0000				
Var 2	.5619	1.0000			
Var 3	.4607	.2410	1.0000		
Var 4	.3825	.3567	.3128	1.0000	
Var 5	.2380	.3412	.3182	.2986	1.0000

Procedural rationality (Alpha = 0.7302)

	Var 6	Var 7	Var 8
Var 6	1.0000		
Var 7	.2981	1.0000	
Var 8	.1451	.3230	1.0000

Strategy formulation (Alpha = 0.6072).

	Var 9	Var 10
Var 9	1.0000	
Var 10	.5902	1.0000

Political behaviour (Alpha = 0.7423)

The items of procedural rationality are to some extent consistent with those adopted by Dean and Sharfman (1996) but the researcher added additional items related to procedural rationality, such as formalized rule and participation. Thus, procedural rationality items include: (1) formalization (the degree to which an organization relies on rules and standardized procedures to direct the behaviour of members regarding strategic investment decision-making, (2) participation of lower level, (3) formal planning, and (4) financial evaluation (the degree to which

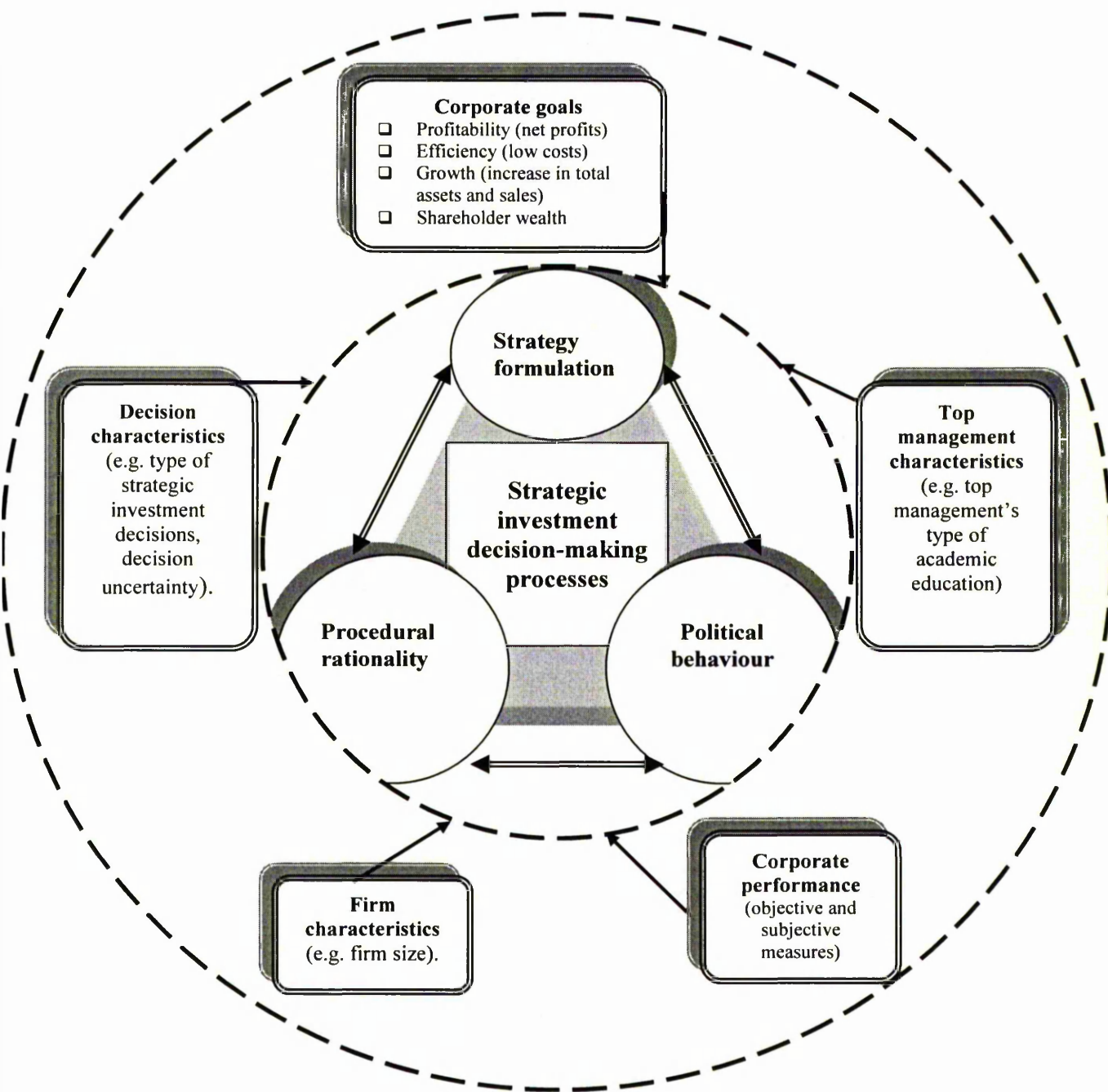
decision makers rely on financial evaluation in making strategic investment decisions). Strategy formulation items include to what degree decision makers rely on the corporate strategy, and the need for intuition (the degree to which the satisfaction / expectations and intuition of the top managers influence strategic investment decision-making processes (Butler *et al.*, 1992). For political behaviour: to what extent were the strategic investment decisions affected by the use of power and influence among group members, to what extent was the decision affected by negotiation among group members (Pettigrew, 1973; Pfeffer, 1981; Butler *et al.*, 1991; and Dean and Sharfman, 1996).

7. 5. An integrative perspective

The concern of this section is to examine the interactions between the most important dimensions of strategic decision making processes (selected by factor analysis) and other related factors (decision characteristics, corporate goals, corporate performance, size and top management's type of education). Since the aim is to integrate the above-mentioned factors/dimensions into an overall model as illustrated in Figure (7.1), the researcher used some multivariate methods. Such methods include multivariate analysis of variance and multiple regression analysis. Taking into consideration that all the variables in the survey are interval in nature, multiple regression analysis is the most appropriate statistical tool which can be used, because this technique requires both dependent and independent variables to be interval (Bryman and Cramer, 2001). Multiple regression analysis can be used to analyse the relationship between a single dependent (criterion) variable and several independent (predictor) variables. The objective of multiple regression analysis is to use the several independent variables whose values are known to predict the single dependent value (Papadakis, 1993).

A potential problem associated with data used in a regression is the problem of multicollinearity. Multicollinearity problems are certainly expected due to the rich database. Perfect collinearity is present when one independent variable is perfectly linearly related to one or more independent variables (or when an independent variable when regressed on the other independent variables yields an *R square* very close to 1.00).

Figure (7.1): An integrative perspective- factors (the independent variables) influencing strategic investment decision-making process dimensions (the dependent variables).



By using SPSS it is easy to distinguish the high multicollinearity which arises from the regression, and therefore it is not a serious threat to the statistical validity of the regression results. However, several warning signs may make the researcher aware of the presence of multicollinerarity in the data, such as the existence of large correlation coefficients between pairs of independent variables in the correlation matrix (Bryman and Cramer, 2001).

7. 6. Data Analysis

Taking into consideration the number of variables involved, separate regression models were applied for each of the assumed three dimensions of strategic investment decision-making processes. However, it is important to ensure that the independent variables (Table, 7.7) are not highly related to each other. The correlation coefficient between each pair of independent variables should not exceed 0.80 (Papadakis, 1993). Pearson’s correlation coefficient is presented in Table (7.8). The independent variables that show a relationship at or in excess of 0.80 may be suspected of exhibiting multicollinearity. As discussed earlier, multicollinearity is usually regarded as a problem because it means that the regression coefficients may be unstable (Papadakis, 1993). This implies that they are likely to be subject to considerable variability from sample to sample. Table (7.8) reveals that each of the correlation coefficients is less than 0.66. This implies that serious multicollinearity is unlikely to be present. Further, in none of the equations was there a substantial *R square* accompanied by statistically significant coefficients to make us suspicious about possible multicollineraity. The best regression models which presented below provide satisfactory predictions of the extent to which each dimension of the strategic decision making process is determined by contextual factors. Below the heading ‘ANOVA’ is an analysis of variance. This table is useful as a test of statistical significance for each equation of the regression models. It provides the calculation of the (F) ratio (e.g. F=3.058) and the significant level is (e.g. 0.001) (*P* smaller than 0.05)

Analysis of variance (ANOVA)		
Model	F	Sig.
1 - Procedural rationality	3.058	0.001
2- Strategy formulation	4.737	0.00
3- Political behaviour	2.885	0.003

Table (7.7): Contextual factors (independent variables used in regression analysis).

Contextual Dimensions	Variables
Type of strategic investment decision	<ol style="list-style-type: none"> 1. Acquisition of another company. 2. Merger with another company. 3. Substantial increase in production capacity. 4. Introduction of electronically integrated operations. 5. Introduction of computerised production processes. 6. Introduction of fundamentally new product lines. 7. Introduction of electronic commerce capabilities.
Decision uncertainty	<ol style="list-style-type: none"> 8. Risk analysis techniques used to allow for risk associated with strategic investment projects.
Organizational goals	<ol style="list-style-type: none"> 9. Profitability (net profit). 10. Efficiency (low costs). 11. Growth (increase in total assets, sales). 12. Shareholder wealth (dividends plus stock price appreciation).
Corporate performance (Subjective measures)	<ol style="list-style-type: none"> 13. Consistency with corporate strategy. 14. Improved company image. 15. Requirements of customers 16. Keeping up with competition. 17. Obtaining greater manufacturing flexibility. 18. The ability to expand in the future. 19. Quality and reliability of outputs. 20. Reduced lead-times. 21. Reduced inventory levels. 22. Experience with new technology
Corporate performance (Objective measures)	<ol style="list-style-type: none"> 23. Net profit margin 24. Return on assets. 25. Return on equity
Firm size	<ol style="list-style-type: none"> 26. Number of employees (Log number) for the year ended 2001. 27. Turnover (Log number) for the year ended 2001. 28. Total assets (Log number) for the year ended 2001.
Demographic characteristics of decision - makers	<ol style="list-style-type: none"> 29. Top management's type of education.

Var2	I	0.05	1.00	-0.01	0.11	0.65	0.22	0.93	0.24	0.00	0.02	0.74	0.60	0.39	0.38	0.56	0.04	0.31	0.94	0.03	0.58	0.75	0.91	0.56	0.42	0.92	0.99	0.59	0.39	0.58	0.43	0.71	0.68	
	II	0.65	0.96	0.34	0.16	0.04	0.15	0.24	0.05	0.14	0.02	0.14	0.12	0.12	0.07	0.15	-0.02	-0.11	-0.14	0.02	0.01	-0.05	0.01	0.91	0.56	0.42	0.92	0.99	0.59	0.39	0.58	0.43	0.71	0.68
Var3	I	-0.14	-0.01	1.00	0.04	0.15	0.24	0.11	0.03	0.06	0.00	0.08	0.00	0.00	0.08	0.00	0.04	0.06	0.02	0.87	0.92	0.68	0.96	0.92	0.56	0.23	0.68	0.72	0.42	0.43	0.19	-0.08	0.82	
	II	0.22	0.96	0.75	0.18	0.04	0.32	0.82	0.61	0.99	0.46	0.98	0.72	0.59	0.50	0.29	0.03	0.00	0.15	0.76	0.40	0.54	0.79	0.01	0.53	0.92	0.52	0.80	0.87	0.80	0.87	0.80	0.87	
Var4	I	-0.01	0.11	0.04	1.00	0.34	0.06	0.35	0.24	-0.23	0.00	-0.02	0.14	0.03	0.19	0.15	0.01	-0.05	-0.18	0.09	0.02	0.03	0.15	0.08	-0.12	-0.02	0.11	0.06	0.22	-0.05	0.66	0.66		
	II	0.93	0.34	0.75	0.34	0.00	0.58	0.00	0.03	0.04	0.97	0.86	0.23	0.81	0.09	0.18	0.95	0.69	0.11	0.43	0.87	0.79	0.17	0.45	0.29	0.87	0.32	0.37	0.05	0.66	0.66	0.66		
Var5	I	-0.13	0.16	0.15	0.34	1.00	0.10	0.16	0.09	-0.18	-0.10	-0.03	0.26	0.19	0.12	-0.01	-0.04	0.01	-0.14	0.09	0.03	0.22	0.05	-0.02	-0.07	0.06	-0.23	0.20	0.26	-0.06	0.66	0.66		
	II	0.24	0.16	0.18	0.00	0.39	0.16	0.43	0.10	0.38	0.77	0.02	0.10	0.27	0.94	0.75	0.94	0.21	0.42	0.82	0.82	0.04	0.64	0.87	0.51	0.62	0.04	0.08	0.02	0.57	0.57	0.57		
Var6	I	0.32	0.05	0.24	0.06	1.00	0.34	0.20	0.03	-0.01	0.16	0.19	0.40	0.26	0.14	0.13	0.17	0.07	0.05	0.62	0.99	0.27	0.36	0.53	0.14	0.33	0.05	0.33	0.36	0.92	0.53	0.53		
	II	0.00	0.64	0.04	0.58	0.39	1.00	0.22	0.14	0.09	0.19	0.21	-0.19	0.03	0.08	-0.04	-0.08	-0.01	0.01	0.08	-0.05	0.27	0.17	0.08	0.22	0.23	0.03	0.10	0.17	0.17	0.17	0.17		
Var7	I	0.27	0.14	0.11	0.35	0.16	0.34	1.00	0.08	0.08	0.76	0.91	0.42	0.26	0.00	0.82	0.46	0.75	0.49	0.94	0.96	0.48	0.64	0.02	0.13	0.47	0.05	0.04	0.77	0.37	0.12	0.12		
	II	0.02	0.23	0.32	0.00	0.16	0.00	0.05	0.20	0.42	0.08	0.06	0.10	0.82	0.46	0.75	0.49	0.94	0.94	0.94	0.96	0.48	0.64	0.02	0.13	0.47	0.05	0.04	0.77	0.37	0.12	0.12		
Var8	I	-0.04	0.05	0.03	0.24	0.09	0.20	0.22	1.00	0.00	0.13	0.02	0.22	0.22	0.18	-0.07	-0.20	-0.18	0.00	-0.06	0.00	-0.06	0.60	0.32	0.02	0.41	0.24	0.15	0.58	0.28	0.37	0.79	0.00	
	II	0.74	0.68	0.82	0.03	0.43	0.08	0.05	0.99	0.26	0.85	0.05	0.05	0.81	0.11	0.52	0.07	0.11	0.98	0.60	0.60	0.32	0.02	0.41	0.24	0.15	0.58	0.28	0.37	0.79	0.00	0.00	0.00	
Var9	I	0.06	0.14	0.06	-0.23	-0.18	0.03	0.14	0.00	1.00	0.36	0.03	0.09	-0.11	-0.21	-0.02	0.02	0.08	0.21	0.02	0.21	0.02	0.02	-0.03	0.21	0.02	0.05	0.05	-0.01	0.18	0.18	0.18	0.18	
	II	0.60	0.23	0.61	0.04	0.10	0.76	0.20	0.99	0.00	0.76	0.40	0.31	0.06	0.87	0.86	0.87	0.86	0.47	0.06	0.84	0.35	0.46	0.50	0.78	0.05	0.83	0.66	0.67	0.95	0.11	0.11		
Var10	I	-0.10	0.12	0.00	0.00	-0.10	-0.01	0.09	0.13	0.36	1.00	0.10	0.21	0.10	0.01	-0.16	-0.08	0.11	0.16	-0.03	0.08	0.16	0.77	0.47	0.55	0.05	0.51	0.44	0.63	0.65	0.21	0.41	0.41	
	II	0.39	0.29	0.99	0.97	0.38	0.91	0.42	0.26	0.00	0.40	0.05	0.38	0.96	0.15	0.47	0.33	0.16	0.77	0.47	0.33	0.16	0.77	0.47	0.55	0.05	0.51	0.44	0.63	0.65	0.21	0.41	0.41	
Var11	I	0.10	0.04	0.08	-0.02	0.86	0.77	0.17	0.08	0.85	0.76	0.40	1.00	0.36	0.04	0.14	0.05	0.00	-0.13	0.01	0.06	0.16	0.06	0.16	0.00	0.26	0.05	0.12	0.10	0.13	0.24	0.24	0.24	
	II	0.38	0.71	0.46	0.86	0.77	0.17	0.08	0.85	0.76	0.40	1.00	0.36	0.04	0.14	0.05	0.00	-0.13	0.01	0.06	0.16	0.06	0.16	0.00	0.26	0.05	0.12	0.10	0.13	0.24	0.24	0.24	0.24	
Var12	I	0.07	0.15	0.00	0.14	0.26	0.19	0.21	0.22	0.40	0.09	0.21	0.36	1.00	0.09	0.17	-0.08	-0.11	-0.08	-0.12	0.08	0.07	0.17	-0.11	0.11	0.08	0.08	0.08	-0.05	-0.08	0.01	0.01	0.01	
	II	0.56	0.17	0.98	0.23	0.02	0.09	0.06	0.05	0.00	0.00	0.00	0.00	0.40	0.12	0.48	0.50	0.32	0.46	0.30	0.50	0.52	0.13	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	
Var13	I	-0.23	-0.02	0.04	0.03	0.19	0.10	-0.19	0.03	-0.11	0.10	0.04	0.09	1.00	0.12	0.12	0.22	0.12	0.04	0.11	0.02	0.12	0.08	0.06	-0.10	-0.05	-0.09	0.13	0.09	-0.16	-0.16	-0.16	-0.16	
	II	0.04	0.84	0.72	0.81	0.10	0.40	0.10	0.81	0.31	0.38	0.69	0.40	1.00	0.29	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	
Var14	I	-0.11	-0.11	0.06	0.19	0.12	0.13	0.03	0.18	-0.21	0.01	0.14	0.17	0.12	1.00	0.28	0.14	0.01	-0.08	0.37	0.11	0.14	0.13	0.13	-0.12	0.02	-0.01	-0.13	-0.03	-0.11	-0.11	-0.11	-0.11	
	II	0.31	0.35	0.59	0.09	0.27	0.26	0.82	0.11	0.06	0.96	0.19	0.12	0.29	1.00	0.02	0.14	0.01	0.22	0.90	0.47	0.00	0.31	0.19	0.25	0.24	0.30	0.86	0.95	0.24	0.77	0.32	0.32	
Var15	I	-0.01	-0.14	0.08	0.15	-0.01	0.17	0.08	-0.07	-0.02	-0.16	0.05	-0.08	0.12	0.28	1.00	0.57	0.31	0.09	0.37	0.23	0.15	0.24	0.12	0.10	0.08	-0.05	0.19	0.19	0.19	0.19	0.19	0.19	
	II	0.94	0.22	0.50	0.18	0.94	0.14	0.46	0.52	0.87	0.15	0.68	0.48	0.27	0.01	1.00	0.00	0.01	0.42	0.00	0.04	0.19	0.03	0.30	0.35	0.48	0.69	0.08	0.09	0.33	0.33	0.33	0.33	
Var16	I	-0.24	0.02	0.12	0.01	-0.04	0.07	-0.04	0.07	-0.04	-0.02	-0.08	0.00	-0.08	0.22	0.14	0.57	1.00	0.37	0.08	0.22	0.31	0.31	0.18	0.00	0.01	0.01	-0.19	0.06	0.02	-0.16	-0.16	-0.16	
	II	0.03	0.87	0.29	0.95	0.75	0.57	0.75	0.07	0.86	0.47	0.98	0.50	0.05	0.22	0.00	1.00	0.00	0.49	0.04	0.01	0.00	0.10	0.98	0.92	0.96	0.08	0.60	0.84	0.84	0.84	0.84	0.84	
Var17	I	-0.06	0.01	0.25	-0.05	0.01	0.01	-0.08	-0.18	0.08	0.11	-0.13	-0.11	0.12	0.01	0.31	0.37	1.00	0.39	0.40	0.52	0.63	0.34	0.02	0.03	0.06	-0.23	0.02	0.12	0.12	0.12	0.12	0.12	
	II	0.58	0.92	0.03	0.69	0.94	0.95	0.49	0.11	0.47	0.33	0.24	0.32	0.28	0.90	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Var18	I	-0.04	-0.05	0.33	-0.18	-0.14	0.06	0.09	0.00	0.01	-0.06	0.02	-0.03	0.06	-0.12	0.11	0.37	0.37	1.00	0.39	0.40	0.52	0.63	0.34	0.02	0.03	0.06	-0.23	0.02	0.12	0.12	0.12	0.12	
	II	0.75	0.68	0.00	0.11	0.21	0.62	0.94	0.98	0.06	0.16	0.90	0.46	0.72	0.47	0.42	0.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Var19	I	-0.01	0.01	0.16	0.09	0.09	0.09	0.00	0.01	-0.06	0.02	-0.03	0.06	-0.12	0.11	0.37	0.37	0.37	1.00	0.15	0.26	0.06	0.19	0.15	0.07	0.17	0.00	0.05	0.02	0.09	0.09	0.09	0.09	
	II	0.91	0.96	0.15	0.43	0.42	0.99	0.96	0.60	0.84	0.77	0.58	0.30	0.31	0.00	0.00	0.00	0.00	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	
Var20	I	-0.06	0.01	0.03	0.02	0.03	-0.13	0.08	-0.11	-0.11	0.08	0.16	0.08	0.02	0.11	0.23	0.31	0.31	0.52	0.26	0.37	1.00	0.37	0.31	0.15	0.13	-0.06	0.08	0.01	0.14	0.14	0.14	0.14	
	II	0.56	0.92	0.76	0.87	0.82	0.27	0.48	0.32	0.35	0.47	0.16	0.50	0.84	0.31	0.04	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Var21	I	-0.09	0.07	0.10	0.03	0.22	-0.10	-0.05	-0.26	-0.08	0.07	-0.12	0.07	0.12	0.14	0.19	0.00	0.00	0.31	0.63	0.06	0.31	0.66	1.00	0.27	-0.02	-0.04	0.07	-0.33	0.13	0.17	-0.12	-0.12	
	II	0.42	0.56	0.40	0.79	0.04	0.36	0.64	0.02	0.46	0.55	0.27	0.52	0.30	0.19	0.15	0.00	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Var22	I	-0.01	0.13	0.07	0.15	0.05	0.07	0.27	0.09	-0.07	0.22	0.09	0.17	0.08	0.13	0.24	0.18	0.34	0.19	0.15	0.25	0.16	0											

Table (7.9): Summary table of the best models of regression analysis.

Variables	rationality (Model -1-)	formulation (Model -2-)	behaviour (Model-3-)
Type of strategic investment decision			
Acquisition of another company	-0.278	-	-
Merger with another company.	-	0.051	0.083
Substantial increase in production capacity	-0.112	-	-
Introduction of electronically integrated operations	0.096	-	-
Introduction of computerised production processes	-	-	-
Introduction of fundamentally new product lines	0.176	0.159	-
Introduction of electronic commerce capabilities.	-	-	0.105
Decision uncertainty	-	-	
Risk analysis techniques used to allow for risk associated with strategic investment projects.	0.253	0.192	-
Corporate goals			
Profitability (net profit).	-	-	-0.133
Efficiency (low costs).	-	-	0.084
Growth (Increase in total assets, sales).	-	-0.203	-
Shareholder wealth (dividends plus stock price appreciation).	0.315	-	0.27
Corporate performance (Subjective measures)			
Consistency with corporate strategy.	-	0.359	-
Improved company image.	-0.183	-0.177	0.228
Requirements of customers.	-	-	0.23
Keeping up with competition.	-	-	-
Obtaining greater manufacturing flexibility.	-	-	-
The ability to expand in the future.	0.214	-0.217	-
Quality and reliability of outputs.	-	0.353	-
Reduced lead-times.	-0.373	-	-
Reduced inventory levels.	0.378	-	-
Experience with new technology.	-0.13	-	-
Corporate performance (Objective measures)	-	-	-
Net profit margin	-	-	0.311
Return on assets	-	-	0.096
Return on equity	0.051	-	-
Firm size	-	-	-
Number of employees (Log number) for the year ended 2001.	-	-0.082	-0.158
Turnover (Log number) for the year ended 2001.	-	-	0.379
Total assets (Log number) for the year ended 2001.	0.099	-	-0.576
Demographic characteristics of decision - makers			
Top management's type of education	0.067	-	-
Summary of best model of regression			
R	0.637	0.607	0.575
R Square	0.406	0.367	0.331
F Change	3.058	4.737	2.885
Sig. F Change	0.001	0.00	0.003

7.7. An interpretation of the results

Each model was derived by enter, remove, backward and stepwise methods in verification, in an attempt to present the best regression model. Thus the model with the best explanatory power was selected. The results of regression analysis are presented in Table 7.9. The results present the best regression equation (i.e. the equation which presents the maximum number of significant variables). Each of the models provides satisfactory predictions of which dimension of strategic investment decision making processes is determined by managerial and other contextual factors, such as decision characteristics (e.g. type of strategic investment decision / decision uncertainty) corporate goals, corporate performance (subjective and objective measures), firm characteristics (e.g. firm size) and management factors (e.g. type of academic education). The explanatory power of the models, which ranges from (*R square*=0.331) to (*R square*= 0.406), on average exceeds (0.37). This result is adequate compared to other related research, such as Dean and Sharfman (1993) and Papadakis *et al.*, (1998). Table 7.9 shows how well the independent variables explain the dependent variable. For example, model (1) reveals the relative importance of independent variables to the dependent variable (*R square*= 0.406). It is important to point out that the aim of running regression models was not to provide the best regression equation (the equation which provides the maximum number of significant variables), but to explore the relative influence of each contextual factor.

7.7.1. Procedural rationality (Model 1)

The results provided by the procedural rationality model show that decision characteristics significantly influence the procedural rationality dimension of strategic investment decision-making processes. For example, Model (1) reveals that decision uncertainty significantly increases the procedural rationality dimension. This result is inconsistent with the findings of Dean and Sharfman (1992) that high uncertainty decreased rationality. In contrast, uncertainty will increase the procedural rationality of decisions, as more information collection and analysis will be needed to fill the gap between the information one has and the information one needs to carry out a task. This is consistent with the view of

Bourgeois and Eisenhardt (1988), that uncertain issues require greater information processing, and this initiates a more extensive search for information.

With regard to the type of strategic investment decision, Model (1) demonstrates the relationships between procedural rationality and different types of strategic investment decisions. For example, the introduction of fundamentally new product lines and the introduction of electronically integrated operations are more related to procedural rationality, whereas the acquisition of another company and a substantial increase in production capacity are less related to procedural rationality, due to the negative coefficients. These results support the study of Papadakis *et al.* (1998) regarding the significant role of strategic investment decision characteristics in determining strategic investment decision-making processes. Procedural rationality is significantly influenced by shareholder wealth as an aspect of corporate goals.

Subjective measures of corporate performance, such as the ability to expand in the future and reduced inventory levels, are positively related to procedural rationality. On the other hand, improved company image, reduced lead-times and experience with new technology decrease the procedural rationality dimension of strategic investment decision-making.

As regards objective measures of corporate performance, Model (1) shows that net profit margin and return on equity are positively related to procedural rationality. However, these relationships are not statistically significant. Hence, the results conflict with the study by Papadakis *et al.* (1998), which provides evidence regarding significant positive associations between return on assets and other dimensions of strategic decision-making processes (rationality, financial reporting, and hierarchical decentralization).

Firm size, expressed by total assets, is positively correlated with procedural rationality. This result confirms the observation made by Mintzberg and Waters (1982). They noted how organisation size affected the rationality of strategic decision-making. A similar result was also confirmed by other studies (e.g. Dean and Sharfman, 1993; and Papadakis *et al.*, 1998). As argued by Papadakis *et al.* (1998, p. 135), "this result seems to be at odds with the conventional wisdom that

as companies grow they tend to move toward more procedural and formalized decision-making”.

Top management’s type of education as a dimension of top management characteristics is positively related to procedural rationality. This result confirms the findings of the study by Papadakis *et al.* (1998).

7.7. 2. Strategy formulation (Model 2)

The results provided by the strategy formulation model show that decision characteristics significantly influence the strategy formulation dimension of strategic investment decision-making processes. For example, Model (2) reveals that certain types of decisions, such as a merger with another company or the introduction of fundamentally new product lines, are positively related to strategy formulation.

Also, Model (2) shows positive significant associations between decision uncertainty and the strategy formulation dimension.

Strategy formulation is less influenced by growth (increase in total assets, sale) as an aspect of corporate goals, because of the negative coefficients.

Subjective measures of performance, such as consistency with corporate strategy and quality and reliability of outputs, are positively related to the strategy formulation dimension. By contrast, negative coefficients again show that an improved company image and the ability to expand in the future are less related to the strategy formulation dimension.

No significant relationship can be found between strategy formulation and either firm characteristics or management characteristics.

In general, Model (2) reveals that the strategy formulation dimension depends more on decision characteristics and on subjective measures of corporate performance, rather than on other factors such as objective corporate performance, firm characteristics such as firm size, or top management characteristics.

7.7. 3. Political behaviour (Model 3)

Model (3) shows that some types of strategic investment decisions, such as a merger with another company and the introduction of fundamentally new product lines, are positively related to the political behaviour dimension.

Also, Model (3) reveals a significant positive association between the political behaviour dimension and corporate goals such as shareholder wealth.

Two subjective measures of corporate performance (improved company image and requirements of customers) significantly increase the political behaviour dimension of strategic investment decision-making processes.

The results of Model (3) show that objective measures of corporate performance, such as net profit margin and return on assets, increase the political behaviour dimension of strategic investment decision-making processes. The results support the study of Papadakis *et al.* (1998), which reported that both politicization and the problem-solving dimension are positively related to objective corporate performance (growth in profits).

In general, Model (3) reveals that the political behaviour dimension depends more on corporate goals, corporate performance (subjective and objective measures), and firm characteristics (e.g. firm size), rather than on other factors (e.g. decision characteristics or management characteristics). This result is inconsistent with the study of Papadakis *et al.* (1998), which found that size is largely insignificant in almost all regression models except for comprehensiveness / rationality, which increases with size. In contrast, Model (3) reveals that the political behaviour dimension increases with size, expressed by turnover, but decreases with size when this is expressed by number of employees or total assets.

7. 8. Conclusion and implications for theory

This chapter has examined the relationships between the process of strategic investment decision-making and the context in which these decisions are taken, and yields several findings:

- 1) It incorporates, by means of multivariate analysis, the selected dimensions of strategic investment decision-making processes and contextual factors in integrated models.
- 2) All the regression models provide good predictions of the extent to which the process dimensions of strategic investment decision-making are determined by a range of contextual factors.

- 3) The results of regression models suggest that neither the procedural rationality perspective, the perspective of strategy formulation, nor the political behaviour perspective can alone sufficiently explain the actual processes of strategic investment decision-making. These results confirm the research hypothesis that strategic investment decision-making may be viewed as the interplay of multiple perspectives such as procedural rationality, strategy formulation, and political behaviour. Accordingly, it is difficult to view the process of strategic investment decision-making as based only on one perspective, due to the internal and external organisational factors that influence its dimensions.
- 4) Models (1), (2) and (3) confirm the proposed hypotheses regarding the influence of managerial and contextual factors on strategic investment decision-making process dimensions. Each of the contextual factors examined in this study has a unique linkage with each of the three dimensions discussed. Accordingly, it seems that neither the decision characteristics (e.g. type of strategic investment decision, decision uncertainty), the corporate goals, the corporate performance, the firm characteristics (e.g. size), nor the top management characteristics (e.g. top management's type of education) alone effectively influence strategic investment decision-making processes.
- 5) The results of this study support the contingency view of strategic investment decision-making and show that each contextual dimension contributes in a unique manner to the description of strategic investment decision-making. According to this perspective, there is no acceptable model that explains the processes of strategic investment decision-making, because they depend on the contingent and contextual factors relevant to the situation. According to contingency theory, the process of strategic investment decision-making varies according to the situational and contextual factors and the specific circumstances and situations in which the organization operates. "Firms in different environments may use very different processes in making the same decision" (Fredrickson and Iaquinto, 1989, p.538).

- 6) In general, the results of regression models suggest that strategic investment decision-making processes are more complex and less systematic than the normative literature would suggest. This study confirms the existence of a strategy (which may be either intended or emergent (see. Mintzberg, 1987 and 1994) which is communicated throughout the organization and assumed to be known to decision-makers. It appears that decision-makers in large UK companies are experienced executives who also use judgment and intuition, and are not just technocrats anchored on financial calculations. This does not mean of course that financial assessment techniques have to be discarded. Financial evaluation techniques and the strategy of the company together with intuition judgements constitute the basic elements of strategic investment decision-making processes. Strategic investments imply more qualitative processes of judgement, negotiation, and inspiration. This is consistent with the view of Dean Jr and Sharfman (1996).
- 7) It seems that strategic investment decision-making processes may follow an incremental / adaptive model which has a number of characteristics that distinguish it from other rational, optimising and satisfactory models (Romelaer and Lambert, 2001). According to the incremental/adaptive model, decision-makers do not have all the information they need, but use their experience to generate alternatives. They are confident of the likely consequences and the effective decisions are those which are consistent with the overall strategy of the organization. The incremental/adaptive model suggests a realistic approach to the complexities and uncertainties in decision-making. Uncertainty and scarce information are the rule, not the exception. Because choices are uncertain, decision-makers are always prepared to reverse their decisions if the results are not consistent with corporate strategy.
- 8) Despite the fact that interesting results are provided by the regression models, which reflect a good explanatory power over the adopted process dimensions of strategic investment decision-making, there remains a significant percentage of unexplained variance.

- 9) This study has examined the multidimensional aspects of strategic investment decision-making processes and the multiple relationships with the main variables of the study. Further research can be done in order to replicate the same factors or dimensions, to support the validity of this study, or to incorporate additional factors and variables not considered in the course of it.

Chapter Eight

Conclusions

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Chapter Eight

Conclusions

It was noted that strategic investment is an important determinant of the future success of many organisations. Strategic investment decision-making usually involves substantial financial expenditure. Poor investment decisions can not only misdirect financial resources, but can undermine the future strategic direction of the organisation. Normative models of the strategic decision-making process in general and the strategic investment decision-making process in particular were critically reviewed. The traditional concept of capital investment decisions is that they occur as an ordered process, moving from project definition, analysis and acceptance, implementation and post audit. They take place within process of organisational decision-making. The thesis reviewed several approaches to financially analysing capital investment projects of varying degrees of technical sophistication.

In this study the researcher considered a broader perspective of what drives strategic investment decision-making practice. Strategic investment decision-making depends on financial, accounting and strategic criteria. The researcher welded these together by critically analysing each disciplinary perspective and

reviewing the relevant literature. A model of the strategic investment decision-making process was introduced as a framework for discussing the contextual factors that influence strategic investment decision-making process.

It has been noted that there is a theory practice gap in our understanding of strategic investment. Prescribed, sophisticated techniques designed to support strategic investment decision-making are not invariably used in practice in the way we might expect. Sophisticated financial analyses go some way towards assisting strategic investment decisions but cannot alone provide the answers. Decision-makers use these financial tools together with strategic considerations. The survey results suggest that strategic investment decision-making is neither an art nor a science but both. There is enough science that decision-makers are not left to rely exclusively on experience, but there is enough art that without experience and judgment, real success may not be attained.

This chapter reviews and draws together the major contributions of the research project. It begins by summarising the research findings and their implications for theory. It ends with a summary of the strengths and weaknesses of the current study and suggestions for further research.

8. 1. Summary of research findings

Before considering the future of strategic investment decision-making theory and practice it is useful to reflect on the ideas presented so far:

Often decisions for strategic investment are made at higher organisational levels. This is consistent with expectations that higher-level personnel have a strategic view of the organisation's direction, and focus more on innovation in the market place and the competitive environment. Strategic investment decisions are generally derived from an explicit corporate strategy and are concurrent with the long-term strategic direction of an organisation. There is a long-term business strategy and there is an annual plan consistent with strategy.

A standard presentation format is adopted for all investment proposals (strategic or non-strategic). Financial assessment, risk assessment and other non-financial

assessment (strategic factors) are the main issues within the investment proposal. Expected financial returns of strategic investment projects (or non-strategic projects) remain the most important factor that companies look at when they make decisions about strategic investment projects. An investment proposal must show sufficient profitability to be implemented. A strategic investment proposal will be rejected if its expected financial return does not meet the minimum requirements of return on investment.

The quality of the investment proposal depends on the available information. Decision makers need to conduct environmental scanning, gathering information which is mostly externally oriented and non-financial. If it is a major investment in a new business or a new company or acquisitions new products or new geography, then the time to prepare the investment proposal depends on the time needed to gather the information and to determine whether it can make the necessary financial returns. This can be a year or longer. Practitioners are satisfying rather than optimising in their information search behaviour regarding strategic investment decision-making. In some cases, it is just not possible for practitioners to be 100% satisfied with the integrity of that information. If they want to be 100% satisfaction they may miss the opportunity, because they spend so much time gathering the information. Thus, obtaining information required for full project definition is often costly

Decision-makers use more than one technique for evaluating investment projects with different levels of importance. Practitioners give the highest importance to the discounting techniques (NPV and IRR). The NPV technique was rated higher than the IRR. These results are consistent with the findings of Arnold and Hatzopoulos (2000). PB method is still widely used by companies either as a primary or secondary evaluation technique. This is consistent with the findings of Tomkins and Carr, (1996), Abdel-Kader and Dugdale (1998) and Pike (1988, and 1996). It is noticeable that the use of computation, specifically the use of NPV, IRR and PB calculations provides the leading quantitative methods of assessing major investment projects. Decision-makers are dominated by shareholder wealth goals. They focus on the financial objective (maximise shareholder value).

The survey results suggest that sensitivity analysis is the most widely technique employed for assessing the risk of strategic and non-strategic investment projects. A theory-practice gap remains regarding the adoption of sophisticated techniques of risk analysis. This finding supports Ho and Pike (1992), Abdel-Kader and Dugdale (1998) and Arnold and Hatzopoulos (2000).

Despite the commercial promotion to sophisticated models such as ROA for appraising strategic investment projects, and the enthusiasm of their key advocates, such models appear not to have been adopted as much as might have been expected. For example, practitioners believe that the ROA is an academic exercise rather something that is useful for businesses. They believe it is theoretically the correct thing to do but practically it is not feasible in their business. It is important to bear in mind that some interviewees were even not aware of the term "ROA" the expression frequently used by researchers to describe investment flexibility. This result is consistent with Busby and Pitts (1998).

The approval of strategic investment proposals is not based wholly on the computed signal derived from financial analysis. Company strategy is an important criterion in strategic investment choices. Practitioners use strategic investment criteria that go beyond discounted cash flow calculations, as the latter cannot capture all relevant information or reflect strategic aims. Strategic investment proposals whose expected financial returns meet the minimum financial requirements may be rejected if they are not consistent with the firm's competitive strategy.

Interviewees believe that non-financial criteria (e.g. customer requirements, keeping up with competition, and obtaining greater manufacturing flexibility) are of particular significance and these criteria should be included into the investment proposal. However, these non-financial investment criteria (strategic factors) are insufficient to gain approval for investment projects (either strategic or non-strategic). Many practitioners consider strategic analysis but not at the expense of financial analysis.

Following evaluation, strategic investment projects require consideration at several levels in the organisation hierarchy until finally approved or rejected.

However, the decision outcome is rarely based wholly on the computed signal derived from financial analysis. Considerable judgement is applied in assessing the reliability of data underlying the appraisal. The results of the empirical study suggest that decision-makers adopt 'holistic' approaches incorporating both financial and strategic considerations in the evaluation of strategic investment proposals. Experienced decision-makers also use judgement and intuition, and are not just technocrats anchored on financial calculations. Interviewees affirmed that a strategic investment proposal whose expected financial return meets the minimum requirements of return on investment could be rejected if it does not satisfy the expectations and intuition of top managers.

To obtain the final approval to proceed with a particular project, a specific capital authorisation request has to be prepared for the project. The nature of this authority can vary between decisions. It is noticeable that investment proposal authorisation levels vary according to company size. Capital expenditure limits at different hierarchical levels were among the traditional accounting-based control systems most frequently used to guide the investment decision process. Managerial behaviour is influenced by pre-decision control mechanisms at an early stage of the strategic investment process; setting authorisation levels, standard formats for investment appraisal, formal procedures to be followed, hurdle rates and influencing the proposal by identifying strategic areas for growth.

In developing the theory and practice of strategic investment decision-making, it is important to take into consideration the following:

1. While NPV is the preferred analysis technique, it has practical difficulties, as do all techniques in capital investment decision-making. Since the determination and treatment of risk is problematic, various approaches to assessing risky investment projects were discussed. Such approaches included the simple risk-adjustment method (based on deterministic assessment and intuitive adjustments such as increasing the discount rate or shortening the required payback period) and risk analysis from management science (probability analysis, computer simulation and sensitivity analysis). The utility of these approaches depends on the

significance of risk in the project being evaluated, and the information available to decision-makers. In practice there is often insufficient information to allow a comprehensive application of these techniques.

2. It is important to recognise non-financial information can be as important as financial information.
3. Strategic investments can be viewed as an integral part of the strategy process. The long-term objectives of an organisation can only be achieved if long-term investments in productive capital, technology and marketing are directed towards these objectives. Strategic investments reflect a growing awareness of the link between investment and strategy. Good analysis ties the details of strategy to their financial implications. Decision-makers treat financial analysis of capital investment projects as a part of a broader strategic analysis. An integrated interactive approach to strategic investment decision-making as part of the organisation's strategy adds depth and direction to investment decisions. While financial analyses have an important part to play, they cannot produce meaningful answers without consideration of the organisation's strategic objectives. Increasing recognition of the link between strategy and strategic investment projects presents a significant opportunity for advancement in effective strategic investment decision-making.
4. The empirical evidence suggests that there is a theory practice gap in the field of strategic investment decision-making. Theoretically recommended approaches are not always used in practice. In other words, executives do not practice what academics preach. They prefer to continue to use traditional appraisal techniques rather than adopt new techniques. Traditional and relatively unsophisticated methods of investment appraisal continue in practice despite the academic offerings of more sophisticated techniques. Practitioners believed that these traditional techniques enable them reach the optimal solution to a problem. This conclusion is consistent with Scapens (1991) who argues that simple techniques for arriving at the optimal solution to a problem should not be rejected solely on the grounds that they are simple techniques.

8. 2. Identifying the implications for theory

The study has examined relationships between the process of strategic investment decision-making and the context in which these decisions are taken. Among the major outcomes of the empirical analysis is the justification of a multidimensional classification of the characteristics/aspects of strategic investment decision-making processes in Chapter Seven. The results of multivariate analysis suggest that the process of strategic investment decision-making is characterised by three internally consistent and reliable features/aspects: (1) procedural rationality, (2) strategy formulation, and (3) political behaviour.

All the regression models provide good predictions of the extent to which the process dimensions of strategic investment decision-making are determined by a range of contextual factors; (1) decision characteristics (e.g. type of strategic investment decision, decision uncertainty), (2) corporate goals, (3) objective measures of corporate performance, (4) subjective measures of corporate performance, (5) firm characteristics (e.g. size), and (6) top management characteristics (e.g. type of education).

The results of regression models provide evidence that neither procedural rationality, strategy formulation, or political behaviour alone can adequately explain the processes of strategic investment decision-making. It is difficult to view the process as based only on one perspective due to the internal and external organisational factors that influence its dimensions.

Model (1), (2) and (3) in Chapter Seven validate the proposed hypotheses regarding the influence of managerial and contextual factors on the dimensions of the strategic investment decision-making process (see section: 7.7). Each of contextual factors examined has a link to each of the three dimensions of strategic investment decision-making processes identified. Strategic investment decision making processes are not dominated by one feature such as the decision characteristics (e.g. type of strategic investment decision, decision uncertainty), the corporate goals, corporate performance, the firm characteristics (e.g. size) or top management characteristics (e.g. top management's type of education) solely.

The present study validates the contingency view of strategic investment decision-making and shows that contextual dimension contributes to its enactment. There is no single universal model that explains the processes of strategic investment decision-making. Strategic investment decision-making processes vary according to the situational and contextual factors /specific circumstances and the situations in which the organisation operates.

8. 3. Strengths of the current study

The survey reported has a several novel aspects compared with previous similar surveys:

- A. The triangulation of research methodologies as a systematic combination of quantitative and qualitative methods of data collection and analysis introduced a new research methodology to strategic investment decision-making literature by utilising interviews and postal questionnaire as research techniques. Most previous empirical studies were conducted based on one research methodology (survey or field study). The researcher believes that combining survey data with fieldwork was a good, rigorous combination for exploring these sorts of research questions. Further, these approaches towards data collection put into practice the concept of triangulation to reduce systematic bias.
- B. Most of the qualitative factors reported in the management accounting literature were examined. Previous surveys had not done this but had treated these factors as one group (e.g. Pike, 1989; Joseph *et al.*, 1996) or only investigated a few factors (e.g. Papadkis, 1993).
- C. Unlike previous surveys, this survey reported results regarding investment appraisal techniques used in evaluating strategic and non-strategic investment projects.
- D. While most previous surveys only reported simple descriptive statistics without statistical analysis of the data produced, the current survey made a statistical comparison based on a Mann-Whitney, Kruskal-Wallis one-way ANOVA test regarding the importance of financial techniques and other

non-financial criteria used in strategic investment projects and non-strategic investment projects.

- E. The sample size was large enough to permit the application of multivariate analysis techniques.
- F. Researchers (e.g. Arnold, and Hatzopoulos, 2000) state that a large number of empirical studies of capital budgeting have been surveys and most have provided an overview of different valuation methods used. They point out that such research, however, fails to address the decision-making process within the organisational context. This study has paid attention to how strategic investment decisions are actually made within the organisational context, including identification of investment opportunities, the development of proposals into projects, and early screening to match with strategy.
- G. This research project simultaneously examined the combined effects of various contextual factors on the process of strategic investment decision-making (including managerial, organisational, and decision characteristics).
- H. It includes multiple manufacturing groups, multiple firms within each manufacturing group, and multiple decisions within each company.
- I. The final merit of this study relates to it being conducted inside the U.K. Recently, a new wave of case studies examining specific strategic decisions in various countries has emerged. Most research on strategic decision-making have taken place outside the U.K. Thus, this study provides quantitative and qualitative evidence on strategic investment decision-making practices in large U. K. companies.

The above-mentioned methodological points are considered to be among the strong features of the research project.

8. 4. Limitations of the current study

Despite the interesting results provided by the regression models which contain good explanatory power, there remains a significant percentage of variance that is unexplained.

Some degree of caution is needed in generalising the results of any sample-based survey to a wider population of firms (Scapens, 1990). Every survey has some merit, telling us something of the practices at the date of the survey in responding firms (Pike, 1996). However, Graham and Harvey (2001, p.189) point out that “the survey approach is not without potential problems. Surveys measure beliefs and not necessarily actions”. Some degree of caution is needed, then, in generalising the results of any sample-based survey to a wider population of firms or actual practice (Scapens, 1990). However, the high response level mitigates the former problem to a degree. Caution is needed when comparing its findings with previous surveys, due to variations of sample-sizes and different questions asked. Nevertheless, there is considerable comparability, particularly with the research conducted by Pike (1982, 1988, and 1996), Abdel-Kader and Dugdale (1998), and Arnold and Hatzopoulos (2000). These results are presented where possible as benchmarks for comparison.

The functional approach enables the researcher to produce objective generalisations and explanations of causes. However, this approach may not capture dynamic change effects. Thus any of the final results may not stand over time.

8. 5. Suggestions for further research

In this final section, the researcher highlight some areas that remain to be further explored:

- 1) The empirical results of the present study have shown that decision characteristics, firm characteristics, top management characteristics, corporate goals and corporate performance are additional domains of importance to strategic investment decision-making. The study has articulated the validity of the contingency approach in studying strategic investment decision-making processes. The contingency approach to strategic decision making should be further developed to confirm and expand the findings of the current study.

- 2) This study has examined multidimensional aspects of strategic investment decision-making processes and the multiple relationships with the main variables of the study. Further research can be conducted in order to replicate the same factors/dimensions to support the validity of this study or incorporate additional factors/variables.

- 3) Strategic investment decision-making is a multi-stage organisational process involving identification of investment opportunities, development of project proposals and alternatives, investment evaluation, and post-implementation control. In further research, attention needs to be directed to other stages of the decision-making process such as the implementation stage, control and the review of performance. For example, it is necessary to explore the relative impact of various organisational control mechanisms on strategic investment decision-making processes. As strategic investment decisions are usually involve large sums of money and have a significant impact on the firm's competitive position and future operating performance, they comprise an important business activity. Effective control must be exercised to help ensure the quality of the firm's investment programmes and that they support the strategic priorities and the realisation of the company's long-term goals. In other words, strategic investment decision-making can be viewed not just as an economic or political activity but also as a management control issue. For the primary purpose of management control is to ensure that the behaviour and decisions of people are consistent with the organisation's goals and strategies. An appropriate management control system is a primary way to provide adequate strategic guidance to the strategic investment process. Further research can examine how management control systems are designed and used in an organisation to align strategic investment decisions with the firm's strategy.

- 4) Information technology supports decision-making effectiveness by providing the ability to store and recover large amounts of information

more quickly and economically. Improvement of an organisation's communication capabilities may influence performance through improved strategic decision-making (Anderson, 2001). To date, however, no clear evidence can be found in the strategic management accounting and strategic management literature concerning the relationship between rationality (understood as the use of information technology) and the effectiveness of strategic investment decision-making (understood as the effects of strategic investment decisions on organisational outcomes such as performance).

- 5) Benchmarking is playing an increasingly important role as guidance for more systematic research to identify investment opportunities. In this study, the literature on benchmarking was integrated into the research framework. To date, however, management accounting research on benchmarking has been small. There is a need for empirical investigation of the weights of variables, or the best combination of variables for determining benchmarking success and capturing combinations of financial and financial measures. In other words, further research can be undertaken to identify and model which variables are critical for successful benchmarking efforts when evaluating strategic investment projects.

I hope that other researchers will attempt to replicate and extend the reported findings and overcome the limitations of the present study.

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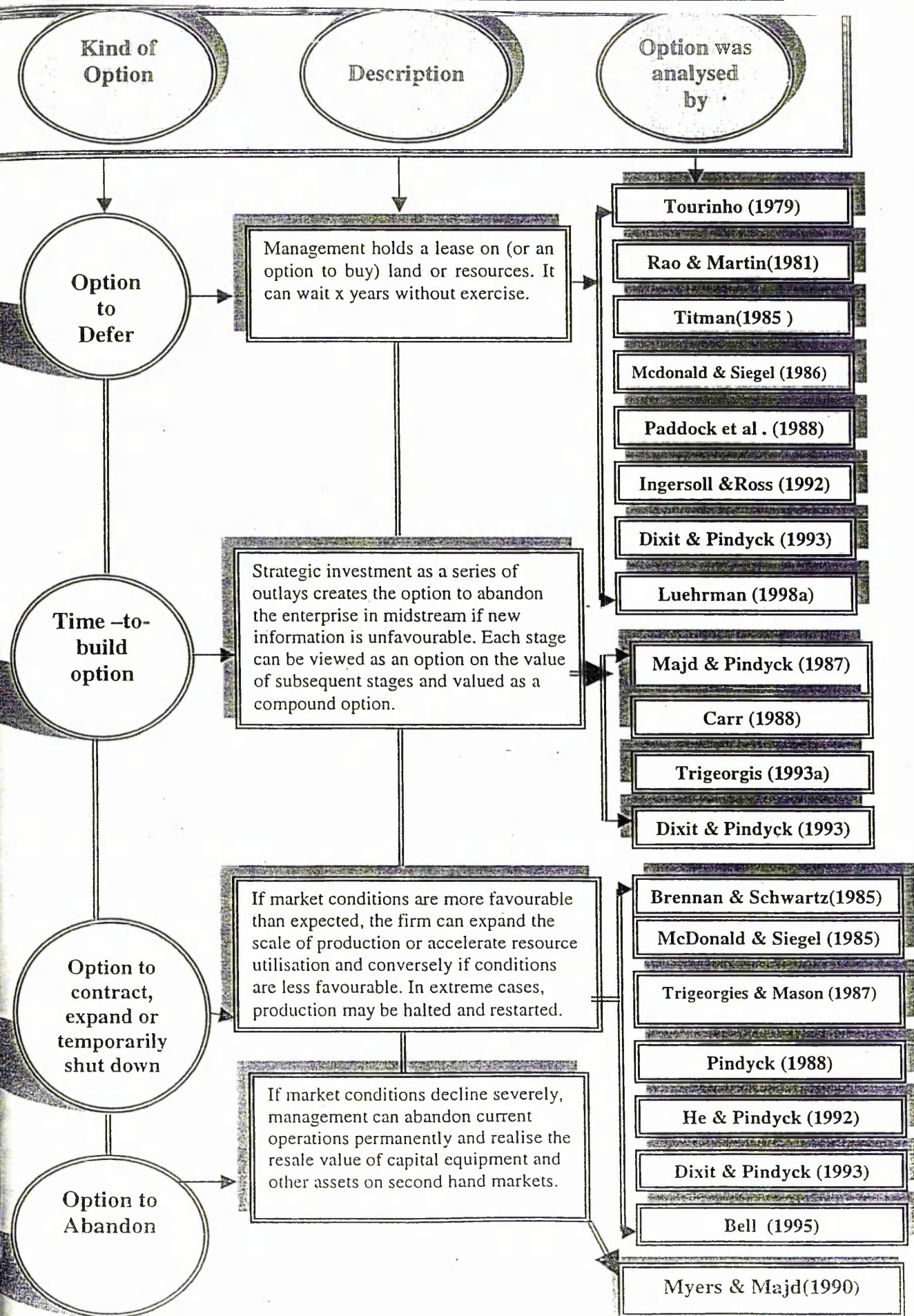
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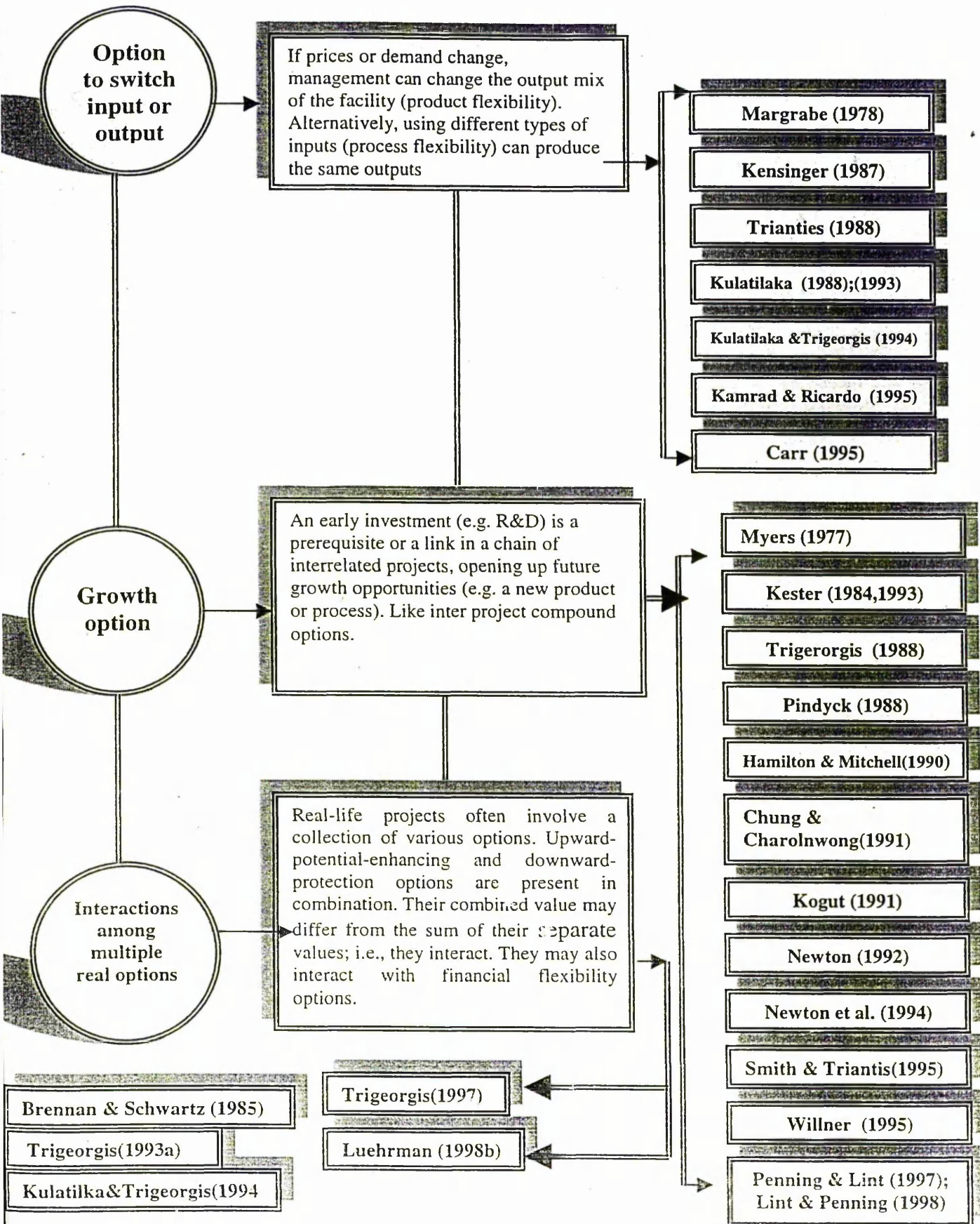
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- Appendices -

Appendix (1): The main definitions provided by the U.S. Department of Commerce (1988) for a host of AMTs. (Source: Kotha, and Swamidass (2000).

■ Computer aided design (CAD)	Use of computers for drawing and designing parts or products and for analysis and testing of designed parts or products. Automated drafting technologies.
■ Computer aided manufacturing (CAM)	Use of CAD output for controlling machines used in manufacture of the part or product. Pick and place robots. A simple robot, with 1, 2, or 3 degrees of freedom, which transfers items from place to place by means of point-to-point moves. Little or no trajectory control is available. Robots other than pick and place. Use of sophisticated robots that can handle tasks such as welding or painting on an assembly line.
■ Flexible manufacturing cells (FMC)	Two or more machines with automated material handling capabilities controlled by computers or programmable controllers, capable of single path acceptance of raw materials and single path delivery of a finished product.
■ Flexible manufacturing Systems (FMS)	Two or more machines with automated material handling capabilities controlled by computers or programmable controllers, capable of multiple path acceptance of raw materials and multiple path delivery of a finished product. A FMS may also be comprised of two or more FMC's linked in series or parallel.
■ NC/computer numerically controlled (CNC) machine(s)	A single machine either NC or CNC with or without automated material handling capabilities. NC machines are controlled by numerical commands punched on paper or plastic, while CNC machines are controlled electronically through a computer residing in the machine.
■ Programmable controllers	A solid-state industrial control device that has programmable memory for storage of instructions, which performs functions equivalent to a relay panel or wired solid-state logic control system.
■ Computer-aided inspection performed on incoming or in process materials.	This denotes the use of computers for inspecting incoming materials.
■ Computers used for control on the factory floor	These include computers that may be dedicated to control, but which are capable of being reprogrammed for other functions. It excludes computers imbedded within machines, or computers used solely for data acquisition or monitors.
■ MRP MRP II systems and I	Use of computers and computer modules for controlling the entire manufacturing system from order entry through scheduling, inventory control, finance, accounting, accounts payable, and so on.
■ LAN for technical data and LAN for factory use	Use of LAN technology is employed to exchange technical data within design and engineering departments. LAN for factory use denotes the network employed to exchange information between different points on the factor floor.
■ Inter-company computer networks linking plant to subcontractors, suppliers, and/or customers	This denotes the computerized networks used to exchange information with the firm's external constituents.





Here the term **strategic investments** refers to capital spending to protect, enhance or alter a firm's competitive capabilities, e.g. introducing major new product lines, installing new manufacturing processes, acquisitions or mergers. Such investments may be distinguished from routine asset-replacement decisions.



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Q1. Please indicate which of the following have taken place in your company in the last (5) years.
(Please tick the appropriate box)

- | | |
|---|--|
| <input type="checkbox"/> Acquisition of another company. | <input type="checkbox"/> Introduction of fundamentally new product lines |
| <input type="checkbox"/> Merger with another company. | <input type="checkbox"/> Introduction of electronic commerce capabilities. |
| <input type="checkbox"/> Substantial increase in production capacity. | Other strategic changes (please specify): |
| <input type="checkbox"/> Introduction of electronically integrated operations
(Including ERP systems). | <input type="checkbox"/> |
| <input type="checkbox"/> Introduction of computerised production processes. | <input type="checkbox"/> |

Q.2 Do you agree or disagree with the following statements. (Circle the appropriate number)

	(1) Strongly disagree	(2) Disagree	(3) Neutral	(4) Agree	(5) Strongly agree
■ Strategic investment decisions emerge through the formal planning processes of your firm.	1	2	3	4	5
■ Strategic investment decisions derive from an explicit corporate strategy.	1	2	3	4	5
■ We have formal procedures for evaluating strategic investment decisions.	1	2	3	4	5
■ Investment opportunities are identified and proposed by top management.	1	2	3	4	5
■ Lower level managers in the organisation are involved in strategic investment decisions.	1	2	3	4	5
■ Strategic investment decisions are influenced by the relative power of various groups in the firm.	1	2	3	4	5
■ The company culture is unfavourable to strategic investment decisions.	1	2	3	4	5
■ Strategic investment decisions are influenced by negotiations among groups in the firm.	1	2	3	4	5
■ It is not clear what kind of information we need to appraise strategic investment decisions.	1	2	3	4	5
■ Financial evaluation techniques are often used in <u>the early analysis</u> of strategic investments.	1	2	3	4	5
■ Financial evaluation techniques are often used in <u>the final choice</u> of strategic investments.	1	2	3	4	5
■ The evaluation of strategic investments is left to the judgment top management.	1	2	3	4	5
■ A strategic investment proposal will be rejected if its expected financial return does not meet the minimum requirements of return on investment.	1	2	3	4	5
■ A strategic investment proposal whose expected financial return meets the minimum requirements can be rejected if it does not fit with the firm's competitive strategy.	1	2	3	4	5
■ A strategic investment proposal whose expected financial return meets the minimum requirements of return on investment can be rejected if it does not satisfy the expectations and intuition of the top managers.	1	2	3	4	5
■ A strategic investment proposal whose expected returns fall below the required level can still be accepted for strategic reasons.	1	2	3	4	5

Q.3-How frequently does your firm use the following financial techniques when evaluating strategic investment projects. (Circle the appropriate number)

	Never	Rarely	Often	Mostly	Always
Internal rate of return.	1	2	3	4	5
Net present value.	1	2	3	4	5
Payback period.	1	2	3	4	5
Average accounting rate of return.	1	2	3	4	5
Other (please specify):					
■	1	2	3	4	5
■	1	2	3	4	5
■	1	2	3	4	5

Q.4- How frequently does your firm use the following financial techniques when evaluating non-strategic investment projects (e.g. routine asset replacement projects). (Circle the appropriate number)

	Never	Rarely	Often	Mostly	Always
Internal rate of return.	1	2	3	4	5
Net present value.	1	2	3	4	5
Payback period.	1	2	3	4	5
Average accounting rate of return.	1	2	3	4	5
Other (please specify):					
■	1	2	3	4	5
■	1	2	3	4	5
■	1	2	3	4	5

Q.5-How frequently does your firm use the following risk analysis techniques when evaluating strategic investment projects. (Circle the appropriate number)

	Never	Rarely	Often	Mostly	Always
Adjust required payback period to allow for risk.	1	2	3	4	5
Adjust required return on investment to allow for risk.	1	2	3	4	5
Adjust discount rate to allow for risk.	1	2	3	4	5
Adjust forecast cash flows to allow for risk.	1	2	3	4	5
Probability analysis.	1	2	3	4	5
Computer simulation.	1	2	3	4	5
Beta analysis (Capital asset pricing model).	1	2	3	4	5
Sensitivity /scenario analysis (e.g. "good" vs. "bad").	1	2	3	4	5
Other (please specify):					
■	1	2	3	4	5
■	1	2	3	4	5

Q.6-How frequently does your firm use the following risk analysis techniques when evaluating non-strategic investment projects. (Circle the appropriate number)

	Never	Rarely	Often	Mostly	Always
Adjust required payback period to allow for risk.	1	2	3	4	5
Adjust required return on investment to allow for risk.	1	2	3	4	5
Adjust discount rate to allow for risk.	1	2	3	4	5
Adjust forecast cash flows to allow for risk.	1	2	3	4	5
Probability analysis.	1	2	3	4	5
Computer simulation.	1	2	3	4	5
Beta analysis (Capital asset pricing model).	1	2	3	4	5
Sensitivity /scenario analysis (e.g. "good" vs. "bad").	1	2	3	4	5
Other (please specify):					
■	1	2	3	4	5
■	1	2	3	4	5

Q.7 If your company uses discount methods to evaluate investment projects, please indicate the minimum discount rates after tax required by ticking the appropriate box	Less than 5%	5-10 %	10-15 %	20-25 %	25-30 %	More than 30%
<input type="checkbox"/> When evaluating <u>strategic investment projects</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> When evaluating <u>non-strategic investment projects</u>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q.8 If your company uses the payback period method to evaluate strategic investment proposals, indicate Which of the following best reflects the required payback period. Please tick the appropriate box

Less than 1 year	1-2 years	2-3 years	3-4 years	4-5 years	More than 5 years
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Q.9 If you have used one or more of the following criteria in evaluating strategic investment projects, please indicate their relative importance by circling the appropriate number.

	(1) Not important	(2) Below average importance	(3) Average importance	(4) Important	(5) Very important
<input type="checkbox"/> Consistency with corporate strategy.	1	2	3	4	5
<input type="checkbox"/> Improved company image.	1	2	3	4	5
<input type="checkbox"/> Requirements of customers.	1	2	3	4	5
<input type="checkbox"/> Keeping up with competition.	1	2	3	4	5
<input type="checkbox"/> Obtaining greater manufacturing flexibility.	1	2	3	4	5
<input type="checkbox"/> The ability to expand in the future.	1	2	3	4	5
<input type="checkbox"/> Quality and reliability of outputs.	1	2	3	4	5
<input type="checkbox"/> Reduced lead-times.	1	2	3	4	5
<input type="checkbox"/> Reduced inventory levels.	1	2	3	4	5
<input type="checkbox"/> Experience with new technology.	1	2	3	4	5

Q.10 Does your company use the following techniques or information to guide strategic investment decisions? (Please tick the appropriate box and indicate their importance by circling the appropriate number).

	(1) Not important	(2) Below average importance	(3) Average importance	(4) Important	(5) Very important
<input type="checkbox"/> Coordination with investment decisions of other firms (e.g. through use of industry level data or technology roadmaps)	1	2	3	4	5
<input type="checkbox"/> Real options approach.	1	2	3	4	5
<input type="checkbox"/> Balanced scorecard.	1	2	3	4	5
<input type="checkbox"/> Benchmarking.	1	2	3	4	5
<input type="checkbox"/> Value chain analysis.	1	2	3	4	5

Q11 Which of the following has been the primary indication of success in your company over the last 5 years. (Please tick the appropriate box and indicate their importance by circling the appropriate number).

	(1) Not important	(2) Below average importance	(3) Average importance	(4) Important	(5) Very important
<input type="checkbox"/> Profitability (net profit).	1	2	3	4	5
<input type="checkbox"/> Efficiency (low costs).	1	2	3	4	5
<input type="checkbox"/> Growth (Increase in total assets, sales).	1	2	3	4	5
<input type="checkbox"/> Shareholder wealth (dividends plus stock price appreciation).	1	2	3	4	5
<input type="checkbox"/> Utilisation of resources (ROI).	1	2	3	4	5
<input type="checkbox"/> Economic value added (EVA).	1	2	3	4	5
<input type="checkbox"/> Market leadership (market share).	1	2	3	4	5
<input type="checkbox"/> Technological Leadership (innovation, creativity).	1	2	3	4	5
<input type="checkbox"/> Survival (avoiding bankruptcy).	1	2	3	4	5
Other (please specify).					
<input type="checkbox"/>	1	2	3	4	5
<input type="checkbox"/>	1	2	3	4	5

Q12 Please indicate how you consider the following benefits of strategic investments by circling the appropriate number.	(0) Not a benefit at all.	(1) A benefit mainly in financial terms.	(2) A benefit mainly in non-financial terms.	(3) A benefit equally in financial and non-financial terms
<input type="checkbox"/> Consistency with corporate strategy.	0	1	2	3
<input type="checkbox"/> Improved company image.	0	1	2	3
<input type="checkbox"/> Improved product quality.	0	1	2	3
<input type="checkbox"/> Improved competitive position.	0	1	2	3
<input type="checkbox"/> The ability to expand in the future.	0	1	2	3
<input type="checkbox"/> Greater manufacturing flexibility.	0	1	2	3
<input type="checkbox"/> Increased delivery speed to customers.	0	1	2	3
<input type="checkbox"/> Increased market share.	0	1	2	3
<input type="checkbox"/> Reduced scrap/rework costs.	0	1	2	3
<input type="checkbox"/> Reduced manufacturing lead times.	0	1	2	3
<input type="checkbox"/> Reduced floor space requirements.	0	1	2	3
<input type="checkbox"/> Reduced costs in product design.	0	1	2	3
<input type="checkbox"/> Reduced after sale costs such as warranties.	0	1	2	3
<input type="checkbox"/> Reduced inventory levels.	0	1	2	3
<input type="checkbox"/> Savings from less frequent set-ups.	0	1	2	3
<input type="checkbox"/> Faster response to market needs.	0	1	2	3
<input type="checkbox"/> Easier production scheduling.	0	1	2	3

Q13 Please tick the appropriate box for each category.

Industry	Sales revenue	Your background	Your position
<input type="checkbox"/> Manufacture of electrical machinery and medical instruments.	<input type="checkbox"/> < £100 million.	<input type="checkbox"/> Accounting and Finance.	<input type="checkbox"/> Finance director/ (CFO)
<input type="checkbox"/> Manufacture of radio, television, and communication equipment and apparatus.	<input type="checkbox"/> £100 –499 million.	<input type="checkbox"/> Engineering.	<input type="checkbox"/> Chief Executive Officer (CEO)
<input type="checkbox"/> Manufacture of computers and related products.	<input type="checkbox"/> £500-999 million.	<input type="checkbox"/> Operations.	<input type="checkbox"/> Chief Operational Officer (COO)
<input type="checkbox"/> Manufacture of motor vehicles, trailers and semi- trailers.	<input type="checkbox"/> £1-5 billion.	<input type="checkbox"/> Mathematics.	Other (please specify):
<input type="checkbox"/> Manufacture of chemicals and chemical products.	<input type="checkbox"/> £6-10 billion.	<input type="checkbox"/> Science.	
<input type="checkbox"/> Manufacture of wood, rubber and plastic products.	<input type="checkbox"/> >£10 billion.	<input type="checkbox"/> Social science.	
<input type="checkbox"/> Manufacture of food products and beverage.		Other (please specify):	
<input type="checkbox"/> Extraction of crude petroleum and natural gas & mining of metal, uranium and other mining.			
Other (please specify):			

■ Once the analysis is complete, a small number of respondents will be visited or telephoned to discuss some of the issues arising – interview lasting no more than 15-20 minutes.

■ I am willing to be visited for further discussion. (tick box)

Results of the Survey: I would be pleased to provide you with a summary of the survey results on completion. If you would like to receive such a summary, please give the following details so that the survey results can be forwarded to you.

Name	
Telephone	
E-mail address	
Company name and address	

Please return this questionnaire in the enclosed self-addressed (pre-paid) envelope.

□□□□□□□□□□ Thank you for your kind participation in this survey □□□□□□□□□□

Appendix (4): A copy of the official headed letter attached to the questionnaire.

**Strategic Investment Decision-Making
&
Investment Appraisal Techniques**



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Dear.....

This survey is part of a research project to understand better the kinds of capital budgeting techniques on which large U.K. companies rely for the justification of strategic investments. The enclosed questionnaire is being sent to only a small number of large U.K. companies in order to establish current practices regarding the techniques used in evaluating strategic investment decisions.

You have experience that would be of value to this study, and I would be very grateful if you would complete the questionnaire and return it to me in the enclosed free post envelope. It will take no more than 10 minutes to complete. I should stress that all the information you provide will be treated in the strictest confidence. Only aggregated results will be published, with no individual responses divulged.

If you have any queries or would like further information about this project please email me at MSRYHMFA@stud.man.ac.uk or call me on 0161-275 5030.

Thank you in advance for your assistance.

Yours Faithfully

M. Fadi Alkaraan

PhD candidate

The Manchester School of Accounting and Finance,

The University of Manchester

Mezzanine Floor, Crawford House

Booth Street East,

Manchester, M13 9PL

An Independent Survey Funded by The University of Manchester



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of MANCHESTER

Interviewee:
Job Title:
Department:
Company:

The primary purpose of conducting this interview is to illustrate how strategic investment decisions are taken by management within companies in terms of the main reasons for this investment, the key factors affecting the procedure of strategic investment projects.

I- Identifying and selecting of strategic investment projects

- What is your company's strategy in identifying and selecting strategic investment opportunities.
- Could please explain/outline the formal procedure for evaluating strategic investment proposal in your company.

II- The importance of financial appraisal in strategic investment decision -making

- Which financial analysis technique is preferred to the others? Why?
- Why do practitioners not adopt the sophisticated techniques of risk analysis such as CAPM?
- Why are sophisticated approaches (e.g. ROA) not adopted for evaluating strategic investment projects as much as might have been expected?
- What sort of non-financial criteria do the companies usually use? Are these criteria documented in the proposal of the strategic investment project?

III- The importance of business strategy in strategic investment choices

- How important is business strategy in strategic investment choices?
- How important are intuition and judgement in evaluating strategic investment decisions?

The End

Thank you very much for your participation

Appendix (6): Decision-making process for exploration projects- Rio Tinto Company

Area selection

1. Evaluation of economic potential and an assessment of health, safety, environmental and community issues that may impact on an exploration programme.
2. Designated areas of high ecological or cultural sensitivity and countries with serious internal security problems are eliminated at this stage.
3. Exploration rights are secured for a selected area prior to the commencement of exploration.

Target identification

This stage involves geophysical surveys, geochemical surveys or geological mapping.

Target testing

This stage involves the preliminary sub-surface evaluation of the better prospects. Work may include limited trenching, drilling and access road construction. Work may last for several months during which strict measures are taken to minimise environmental and community impacts.

Resource delineation

Resource evaluation

This stage involves more detailed investigation of a deposit under the direction of a Rio Tinto business. Additional metallurgical studies are carried out to assess metal recoveries from the ore and a preliminary assessment is made of project economics. A potentially attractive project for Rio Tinto will be identified from perhaps one in two of the deposits that proceed through resource evaluation.

Feasibility

This is the final stage in the evaluation process. Mining and processing engineers, as well as a host of other specialists, evaluate the project. They assess the likely mining method, the costs of mining and processing, the most economic mining rate, the size of the processing plant, the environmental and social effects, the capital required for development, the resulting cash flow from sales of minerals, the payback time and the return on investment. The study estimates data for each year of the potential mining operation until the resource is depleted. The feasibility study is then used by management to decide whether the deposit meets Rio Tinto's investment criteria. An environmental impact assessment is carried out as part of the feasibility study and is submitted to regulatory authorities and other stakeholders for review. If consent for a mine is granted by the authorities, the licence is changed and mine construction can begin.