STRATEGIC USE OF INFORMATION TECHNOLOGY:

An Empirical Investigation Into The Level of Strategic Use of IT and The Determinants of Competitive Advantage

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Dedication

For my mother and in memory of my beloved father.

ABSTRACT

Strategic use of information technology (SUIT) has often been linked to the success of an organisation. Its impact on the organisation's profitability, access to market, efficiency, productivity, effectiveness, and on industry as a whole is well recognised. Despite its widespread advances in recent years, there remains a dilemma. No agreement exists concerning what constitutes SUIT. There is little empirical evidence to support a link between SUIT and organisational competitiveness. The development of measures to determine the level of SUIT and evidence of empirical relationship between SUIT and performance are also not adequately represented in current IT research. Research into factors determining SUIT has been strongly influenced by success stories of companies which illustrate strategic effects of IT but a large-scale empirical study to confirm the existence of these factors and to establish their relationship with SUIT is still lacking.

This thesis attempts to fill the above vacuum in the IT research. Based on a large-scale mail survey of 149 companies, a reliable measure of SUIT was developed. Tests of relationship showed clear evidence of a strong relationship between SUIT and the competitiveness of an organisation.

Several distinctive factors have been identified to have influenced SUIT. The findings support the need to align IT with business strategy, the need to improve communications between IT staff and top management, the need to delegate authority to line managers close to customers, the need to invest more in IT resources and to expend more effort in analysing subtle changes in the business environment prior to making IT and business decisions.

This thesis provides meaningful input to the body of knowledge about IT and competitive advantage as it establishes an empirically-based framework integrating SUIT, contextual variables and organisational success. It adds better understanding for managers in search of superior decisions about IT investment and to exploit IT opportunities for success.

Future research is needed to extend the findings and enhance the validity of the measurement instrument presented in this thesis. It is suggested that a longitudinal study be carried out to explore a cause-effect relationship between the variables.

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CHAPTER ONE

INTRODUCTION

1.1 Background research problem

Information technology (IT) as a source of organisational success has become a recurrent theme in literature over the past two decades. Academicians and practitioners alike emphasise its importance as being a powerful force for industrial development, productivity and growth (Abernathy and Clark, 1985). IT is said to be the lifeblood of an organisation (Steiner, 1969), an engine for business doing what the steam engine did in the days of the Industrial Revolution (Scott Morton, 1991). It is the most powerful competitive weapon, a strategic business factor for business survival (Treacy, 1986) and perhaps the single most important source of major market share changes among firms (Porter, 1985). It is widely recognised as a new systemic enabler to initiate change in products or services and the marketplace. Its acceptance as a vital force in the competitive environment of modern firms is almost universal (Maidique and Patch, 1988).

Despite widespread recognition of the potentials and the popularity of IT, there are a number of criticisms regarding the notion of strategic use of IT. Firstly, critics often question the role of IT as a source of competitive advantage. They argue that IT is merely a tool and, in itself, is incapable of producing significant benefit to the organisation. Benefits do not flow from the mere use of IT but from human and organisational innovations (Scott Morton, 1991). There is a tendency to think of IT as the only driving force behind competitive success. Hence undue emphasis is placed on IT, ignoring other factors influencing competitiveness. IT has been said to destroy profits (Frohman, 1985), it can destroy existing industries (Cooper and Schendel, 1988), it can be a competitive burden (Warner, 1987) and it can be a source of conflict because it may tilt the balance of power among groups who base much of their power on information (Angell and Smithson, 1991).

Secondly, critics often suggest that IT does not provide long-term competitiveness. Early innovations from IT can be easily imitated, back-engineered and surpassed by better quality, more cost effective products or services. They question the sustainability of organisational competitiveness and long-term benefits brought by IT. This leads to the question of whether IT can genuinely lead to sustainable competitive advantage (Sutherland, 1991), and whether IT can be truly a strategic tool or merely a strategic necessity (Clemons, 1986).

Thirdly, critics question the value of existing conceptual frameworks in helping managers exploit IT. Earl (1988) argues that descriptive and prescriptive frameworks founded on categorical case studies are useful only as a pedagogical tool, whose value emerges only in classrooms. As a unifying structure, the framework approach presents very interesting academic exercises, but its present level of development is still insufficient (Andreu et al., 1991) to extend broad frontiers of knowledge in the IT area.

Finally, other critics, such as Clemons (1986), contend that most of the successes from IT have been accidental. He argues that most of the well-publicised applications were developed initially not as a tool to influence or change the market but as a response to the shortage of labour or an inability to reduce or share costs of development. In other words, these applications were applied without initially recognising their strategic significance, but simply out of the need to respond to a particular problem.

In responding to these criticisms, various authors maintain that the problem is not related to IT, but to the implementation of IT and an organisation's propensity to adopt a strategic view of IT. Barney (1992) points out that pure technology offers little strategic advantage; its value, however, comes from using the technology to take advantage of the unique assets of the firm such as its history, reputation, culture, management skills and market power. IT alone cannot be the answer to competitiveness; it is a tool, and like other types of organisational resources, its benefits can only be realised through systematic development and proper management (Hackett, 1990). Parsons (1983) points to firms' lack of understanding on how IT will impact the firms' strategic position or how IT can be used to support strategy and to the fact that IT is not being managed in a manner consistent with the strategic needs of the firm. Others like Earl (1989) and King et al (1989) blame the lack of empirical research, which would be of value to a wider audience and managers, especially research on factors influencing the strategic use of IT. Generally, these authors call for closer examination of environmental, organisational and managerial factors that contribute to the strategic use of IT to enable organisations to build and nurture themselves so as to be able to exploit the IT potentials.

A review of past literature relating to IT and competitive performance suggests that there is a vacuum of research in at least two broad areas: 1) conceptualisation of strategic IT, and 2) a methodological approach to exploring issues relating to strategic IT and its factor determinants. This vacuum is thought to be the reason behind ambiguity surrounding IT research today. Conceptually, there is a marked lack of consensus and understanding about issues surrounding the meaning of strategic use of IT (SUIT), its characteristics, capabilities and the elements that determine the influence of IT on organisations (Bakopoulos and Treacy, 1986). There is a lack of clarity as to the term's actual meaning. No precise definition of the concept exists in the literature. No agreement exists concerning what constitutes SUIT. The term 'strategic use of IT' has been used inconsistently in different ways and in different contexts, rendering its usage imprecise, unstructured (King et al, 1989) and often misleading (Sutherland, 1991). It remains unclear as to what the characteristics of strategic use of IT are and to what extent an IT application can become strategic. Without such understanding, it is difficult to appreciate the value and contribution of IT in an organisation.

Methodologically, it has become apparent that research in IT hitherto has been based primarily on case studies of companies using IT. While studies of this nature more fully explore the opinions and behaviours of respondents, they are company specific and suffer from the lack of generalisability. Furthermore, most of the existing literature in strategic IT have tended to focus on the successful uses of the few established systems (airline reservations, distributorship, cash management) of particular companies (Delta Airlines, OTIS, Benetton, Interflora). It is often confined to a specific industry e.g., tourism (Feeny, 1987), healthcare (Kim & Michelman, 1990) or for a particular function e.g., pricing (Beath & Ives, 1986). Critics argue that because researchers use different methods for different company situations and because different questions are asked of different respondents in different environments, the interpretation of results and comparisons across respondents will be severely limited.

In addition, many of the previous studies strongly linked strategic use of IT with success. Unfortunately, no attempt has been made to support this relationship - advances in IT research have gone so far but fall short of empirically providing evidence for this important relationship.

To bridge this research gap, it is imperative to develop an understanding of the fundamentals of SUIT, its meaning, and its dimensions and to understand the relevant concepts underlying SUIT. Treacy (1986), in his article entitled, 'Toward a Cumulative Tradition of Research on Information Technology as a Strategic Business Factor', calls for a richer understanding of a working vocabulary that leads directly through established bodies of research to answer critical questions in IT. Referring to research in IT, he said:

> *"A parsimonious characterization of IT would serve to answer many questions. What do we mean by IT, beyond electronic computing and communicating technologies? What are the salient features of IT? How can one efficiently characterize diverse types of IT? Can we compare and contrast two different systems in terms that will have currency ten years from now? If not, we are in some difficulty" (p. 13).*

He went on to say:

> *"Without a rich working vocabulary about the types and qualities..., it is very difficult to develop insights that are neither unlikely conjecture nor obviously plain.*
>
> *Empirical testing creates another reason why it is important to develop rich, but precise descriptions of important constructs. Measurement, the foundation for empirical testing, is critically dependent on precise definitions. Without an agreement of 'what', it is impossible to assess 'how much'" (p. 14).*

It is even more important to develop some form of a measure to evaluate the level or degree of SUIT in organisations. This is because, apart from providing a benchmark to assess the level of strategic use, the development of this measure would help clarify the unstructured concept of strategic IT and help to examine the attributes which influence the degree of SUIT in practice. If these can be established and understood, then the determinants of the strategic use of IT can be better studied which allows empirical testing of the various theoretical frameworks as well as the assumptions created by conceptual and anecdotal studies. Once established, this instrument can be used as a mechanism to empirically test the existence of associations between SUIT and variables such as organisational characteristics, management orientation and organisational competitiveness. Only then can the role of IT in influencing organisational performance be better understood and valued.

1.2 Objectives of the study

The main theme of this thesis centres around a few fundamental questions, such as, 'What do we mean by the term strategic use of IT?', 'What criteria do we use to assess if an IT application is strategic?', 'What does it take to have an IT application which is strategic?', 'Can the level of strategic IT usage explain the degree of organisational success?', 'What factors influence strategic use of IT in an organisation?', and 'Why some companies, facing the same environment, are better at seizing IT opportunities than others?'. While addressing these issues and empirically exploring the uses of IT in organisations across broad sectors of industry, the primary objectives of this study are:

- To develop an instrument to measure the degree of strategic use of IT in an organisation,
- To study the relationship between strategic use of IT and organisational performance,
- To identify the relationship between organisational factors (principally structure, style, distinctive competence) and the strategic use of IT (that is, the context within which strategic applications of IT are created and sustained),
- To explore the characteristics of organisations and their managerial activities which explain how and why companies operating in more or less the same competitive environment have been better at using information technology than their counterparts.

1.3 Context of the study

This study explores the strategic use of IT in companies operating in an information intensive industry. The 'IT' domain is explored within the context of two principal elements: 1) information, and 2) technology, both of which are deemed to be the elements to competitive success for organisations. Information, and technology, either together or individually, are suitable for strategic analysis; they have been cited as offering major business and management opportunities which can be used to gain competitive advantage, to improve productivity and performance, to enable new ways of managing and organising, and to develop new businesses (Earl, 1989). They can be used to change macro-forces external to the firm by altering the balance of power among existing competitors.

Meanwhile, the context within which IT is investigated is an information-intensive industry - an industry characterised by critical dependency on information for the smooth running of the information systems activity (McFarlan et al., 1983) and in which a high degree of intellectual work is done by the customer in their selection, purchase, use, and maintenance of products.

Three sectors form the basis of this study. They are:

- banking, finance and insurance;
- hotel, tour agencies and airlines;
- retail, wholesale and distribution sectors.

These sectors possess characteristics appropriate for strategic IT analysis: information is extensively and intensively used in the day-to-day operation of the companies operating within these sectors of industry. The strategic impact of IT in an information intensive industry can be dramatic (Benjamin, et al, 1984; Porter and Millar, 1985; McFarlan, et al, 1983; and Earl, 1988). IT has been recognised as the means of delivering goods and services critical to success. The level of information exchange and its intensity is high because firms are dealing with a large number of customers and suppliers, parts and processes, and it takes a long cycle time to deliver a product or service. The firm's product or process tends to have high information content and hence requires extensive use of information. In general, the impact of IT on the overall performance of the firm in these sectors is very significant and consequently provides a suitable platform for this research.

1.4 Significance of the study

One of the distinctive contributions of this study to the field of information management is the development of an instrument to measure the degree of strategic use of IT in organisations. The instrument measures the level of usage of IT for strategic purposes and this level of usage is determined by assessing the way IT is being used to support critical areas of the business to meet pre-determined objectives and the way in which IT brings significant changes to the firm's long-term business performance. No such instrument has been developed to date and because of its exploratory nature, the instrument will undergo rigorous tests to ensure that it achieves a high standard which can be reliably used by managers in their organisations. Embedded in this instrument is a measure of the degree of IT orientation which provides managers with a mechanism to determine if their organisation is ready for strategic IT application or if the organisation has the necessary competencies before investment in IT is made.

Another contribution of this study can be seen from a methodological standpoint. A large-scale mail survey is used to gather information, which in itself, is a contribution to the empirical work (or lack of) in IT. This form of data collection offers a new perspective for exploring strategic usage of IT in organisations and an ability to formulate general conclusions about relationships and about strategic implications of IT. Understandably, this approach can be complex and difficult. However, such complexity and difficulty should not deter anyone from carrying out research of this nature because, as Treacy (1986) points out:

> *"Almost every aspect of empirical testing is difficult in the IT area. (This is because) key areas are not adequately defined, valid measures of them have not been developed, treatment cannot be controlled, controlling other confounding effects is very difficult, and sampling generally is a problem. But, we should not give in to these difficulties, for if we do, we confine ourselves to conjectures. Instead, the practical problems of testing should be allowed to influence the design of our research, the type of models we develop, and ultimately, the topic we choose to study." (p. 15).*

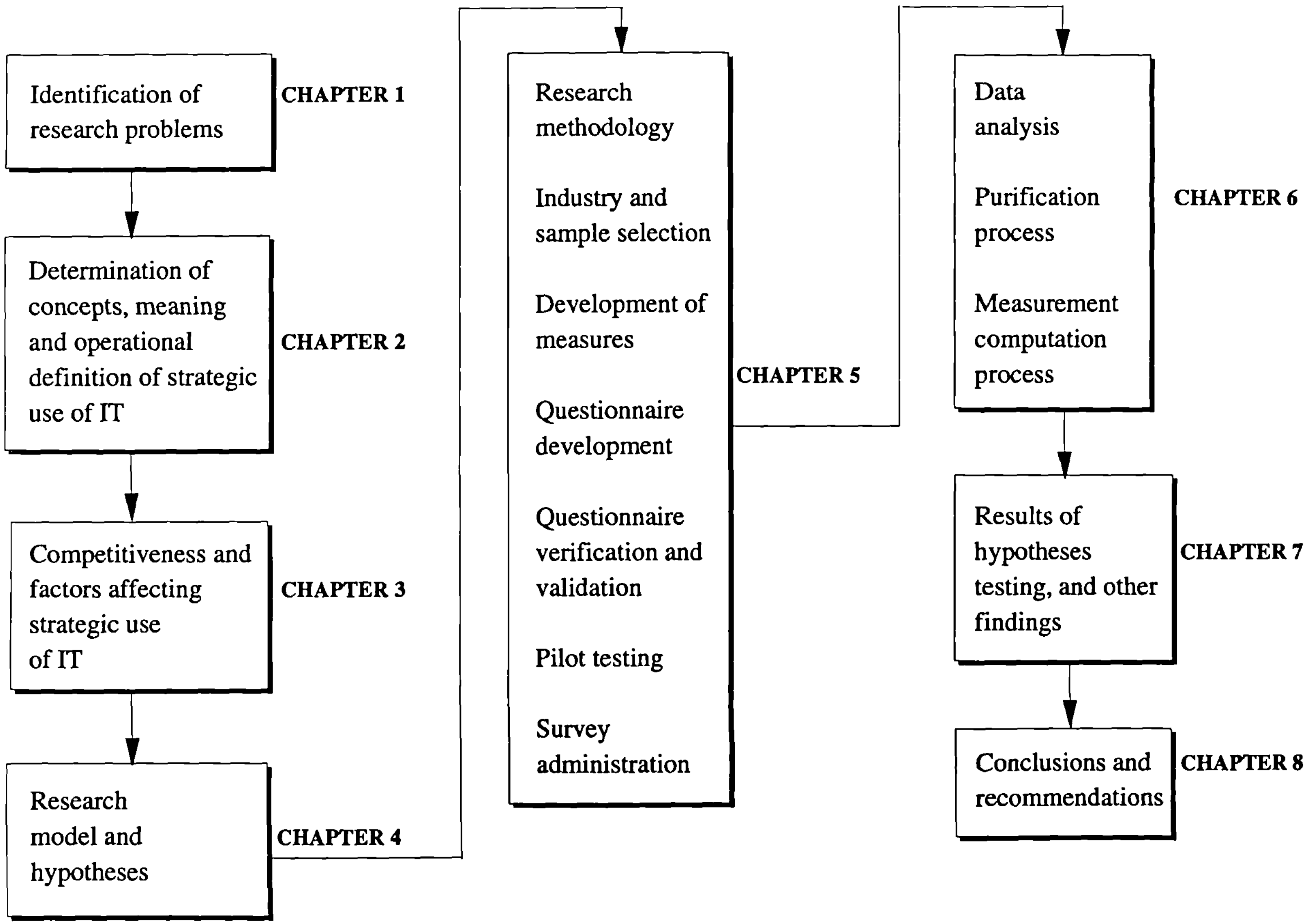
As an initial step to address these potential difficulties, this thesis discusses relevant concepts in an attempt to derive the meaning of SUIT and its dimensions, which become the basis upon which a measurement for SUIT is constructed. Such measurement is then tested for reliability and rigour after issues relating to sampling and controllability of factors have been addressed.

Through large-scale empirical work, this study also examines factors, drawn from a plethora of case studies of IT applications and previous contributions of IT as a source of competitive advantage, which influence the degree of strategic use of IT. In the process, it provides empirical evidence of the relationship between strategic use of IT and organisational performance, and generalisation about the industry based on the sample studied.

1.5 Organisation of the study

Figure 1.1 shows an overview of the research process which is embedded in various chapters of the thesis. Chapter One gives an overview of the thesis, the identification of research problems, the reasons for undertaking this research and the significance of the study. Chapter Two reviews IT literature in an attempt to bring together various descriptions of strategic IT into a working definition. Concepts underlying strategy and strategic use of IT are examined. From the review of the literature, characteristics and capabilities of IT are identified and summarised into dimensions which make up strategic IT. This leads to a conceptual and operational definition of the strategic use of IT which form the basis of a measurement of SUIT. Chapter Three describes key factors often associated with SUIT and organisational success. Embedded in the discussion are implied association between variables which are subject to testing. Chapter Four gives a description of the hypotheses to be tested and a research model. Chapter Five outlines the research methods used in collecting data for analysis. Various research methods are explored before a particular method is chosen. As this study is survey based, questionnaire development and its administration as data collection means are given emphasis. Issues relating to sampling procedures, controllability of variables are discussed. Development of a good measure, including aspects of reliability and validity have been given considerable attention. Chapter Six reports on the statistical analysis and approach to developing the measure for SUIT. Purification process and measurement computation are dealt with in detail, emphasising reliability and robustness of the measure. Chapter Seven offers an in-depth discussion on the testing of hypotheses as well as critical analysis of other findings. The final chapter, Chapter Eight, summarises the results and concludes by offering recommendations for managers and suggestions for further research.

Figure 1.1 - Overall Chapter Layout



CHAPTER TWO

CONCEPTUAL FRAMEWORK:

STRATEGIC USE OF INFORMATION TECHNOLOGY

2.1 Introduction

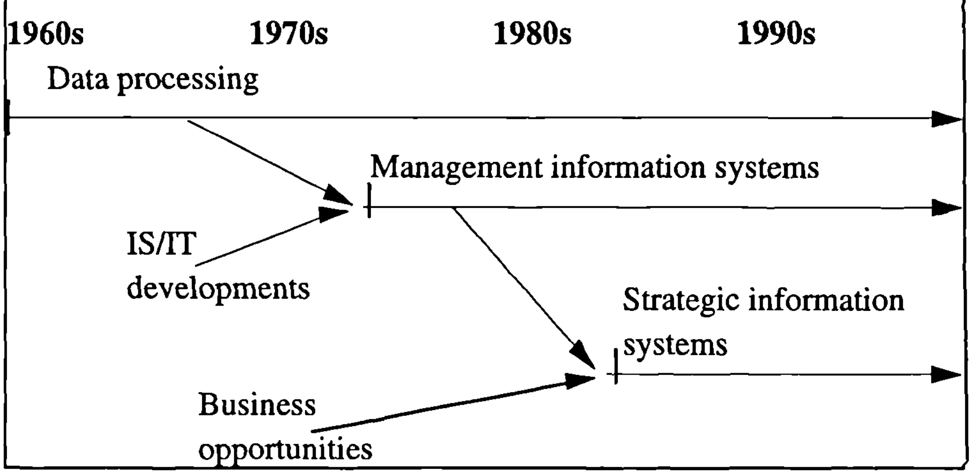
Two of the principal aims of this thesis are to study the relationship between strategic use of IT (SUIT) and organisational performance, and to explore contextual factors that influence the strategic use of IT in organisations. To help understand the relationship between strategic use of IT and performance, the concept underlying SUIT is examined, based on previous literature on strategy, as well as on IT and *competitive advantage.* The findings then become the basis upon which the strategic use of IT framework is developed.

The first part of this chapter explains the evolution of strategic use of IT in the field of management as an underlying theme to strategic IT framework. This is followed by a review of elements which make up the strategic IT. The review attempts to integrate various viewpoints into a working definition of SUIT and in the process, highlights salient characteristics of SUIT and proposes dimensions upon which measurement instrument for the degree of strategic use of IT can be developed.

2.2 Evolution of Strategic Use of IT

The evolution of computerisation and IT has taken place predominantly within the last thirty years. Since the 1960s, information deployment in organisations has passed through major transitions which Ward, et al., (1990) classify as 'the Data Processing (DP) era', 'the Management Information Systems (MIS) era', and 'the Strategic Information Systems (SIS) era', each of which has its distinctive but non-mutually exclusive characteristics as depicted in Figure 2.1.

Figure 2.1 the three-era model: relationship over time



Source: Ward, et al., (1990)

In the DP era (1960s onwards), computers have been used to automate routine processes for purposes of improving organisational efficiency. Computerisation of routine tasks became the managerial concern. Activities in most organisations concentrated on developing systems for improving internal data processing and in getting 'the things done right'. Systems flexibility was not especially important because the focus was to reduce administrative costs through technology-driven systems developed by technical staff. Cost control was stringent to justify initial capital outlay. Benefits derived from IT were unplanned and appeared to be an outgrowth of management concern for organisational efficiency rather than ones that were planned with strategic intent. During this period, success was associated with systems design that could perform operations to improve functional efficiency. As such, measurement criteria such as cost savings and productivity became popular, and were associated with organisational success.

In the MIS era (from 1970s onwards), the influx of mini-computers with increasing power and sophistication has helped managers in the analysis of automated data to satisfy their information needs. Analysis and presentation of aggregated information for effective decision making became the managerial concern. Activities in most organisations concentrated on using vast quantities of information for management information relating to the internal workings of the organisation, hence, the term 'management information systems'. The use of and demands for information provided by the system significantly increased. Problems of fragmentation and duplication developed as sharing of data slowed the development of the user applications, resulting in each department developing systems independently according to their individual needs. Managers were pre-occupied with integrating these independent systems as organisations came to realise the benefits to be gained from integrating the information rather than fragmenting it into functional subsystems. The focus was on organisational effectiveness, in getting 'the right things done' and in trying to meet management information needs through integration of disparate systems into a coherent source for management decision support systems. As in the DP era, strategic implications of IT were unplanned and appeared to be an outgrowth of the management concern for organisational effectiveness and improved decision-making. During this period, success was associated with the degree to which managers could make incrementally important decisions from the information made available by the system. As such, measurement criteria such as cost-benefit analysis and financial benchmarks were prevalent.

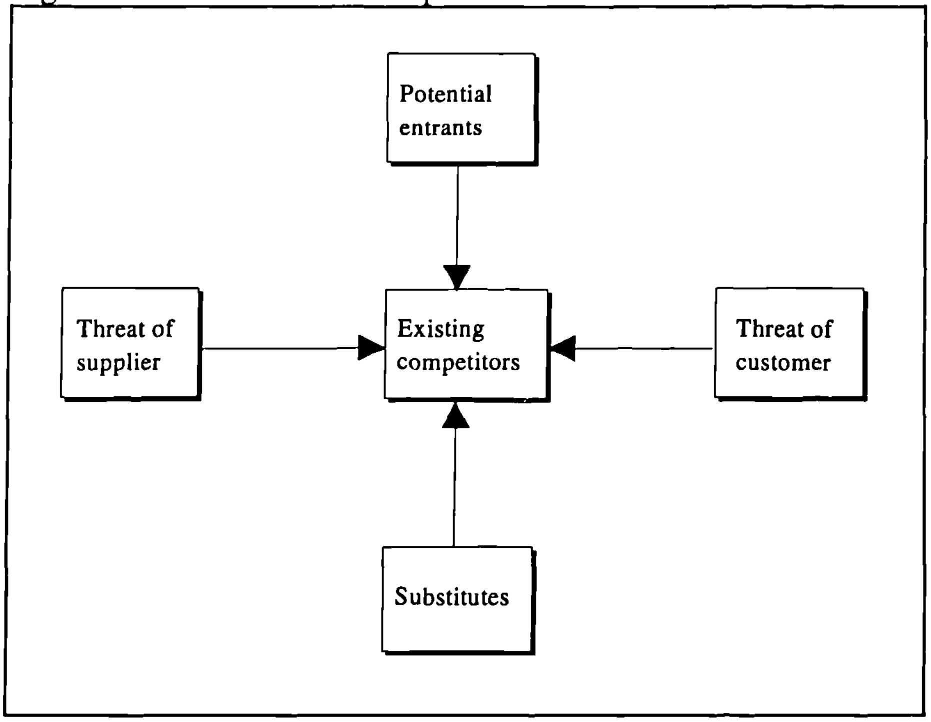
In the SIS era (from 1980s todate), the increased sophistication of micro-computers and software has led to the use of information and computer technology at the executive and strategic levels of an organisation. The business environment, customers, suppliers and competitors have been major instigators of IT uses. To remain viable, organisations are not only concerned with being efficient and effective but also competitive. Analysis and provision of aggregated data is deemed inadequate until such information brings significant impact on organisation performance. The prime objective now is to stay competitive while at the same time, providing satisfactory returns to stakeholders. Strategic planning has gained recognition although strategic use and the implications of IT have been haphazard. During this period, 'things must go right' for business to flourish. Success is often associated with being able to out-perform others. As such, success is measured by the organisation's ability to be competitive in terms of cost, differentiation of products and services provided, and ability to capture niche markets.

The contribution of IT throughout these evolutionary stages has become more significant. The level of sophistication has also increased significantly. Managerial involvement has been elevated. The scope of application has widened and its impact greatly expanded. Success criteria have been broadened. Strategic significance of IT has begun to be recognised by an increasing number of organisations and has attracted much attention in popular journals in recent years. Research in IT has tended to focus on a varied area, ranging from use of IT for efficient organisational operation to competitive exercises to out-manoeuvre rivals. At a strategic level, research in IT has become increasingly popular as businesses begin to experience rapid changes in the business environment and as their ability to use IT as a strategic option becomes more limited and as the need to ensure early strategic interventions gain rapid acceptance.

Gorry and Scott Morton (1971) are among the first to use IT for significant organisation payoffs. Their work on decision support system which used IT to support unstructured, ambiguous decisions has provided an impetus to manage managerial decisions for organisational leverage and as a means to improve results for organisations. Their focus, however, was on using computer technology to improve managerial decision making through model building and learning.

A shift in emphasis from technology to strategic emphasis occurred as a result of Porter's work on competitive strategy in 1980 which links business operation to three generic strategies: cost leadership - which enjoys lower cost structure to enable firms to compete on price; differentiation - which relies on offering superior products or services at a premium price; and focus - which concentrates on speciality markets, as a means of achieving competitive advantage based on the analysis and positioning of a company amidst five competitive forces (Figure 2.2).

Figure 2.2 - Porter's five competitive forces model



As a framework, the five competitive forces model describes the external environment of a firm based on five components: suppliers, customers, existing rivals, potential competitors and possible new products substituting those presently produced by the firm. Applications directed in unison with any of these types of generic strategies and targeted at competitive market forces are potentially strategic. This work has spawned much research relating to IT in the 1980s linking IT to generic strategies to achieve competitive advantage. For example, Lucas and Turner (1982) observe that IT can be used to achieve strategic managerial objectives in three fundamental ways: firstly, through greater efficiency in the existing operation, in reducing variable costs through automation of routine activities, or in improving services to clients through better use of information. Secondly, IT can be used to improve strategic planning processes by improving effectiveness of decision support systems, and thirdly, IT can be used to open new markets through development of differentiated products or services that rely on or incorporate IT directly. Parsons (1983) expands the idea by suggesting that if IT is to be used as a competitive weapon, it is important to understand how its use affected the competitive environment and the strategy of the firm. He classifies three levels at which IT could have an impact. At the industry level, IT can change the market by new offerings of products and services, IT can change economics of production through fundamental change in production processes. At the level of the firm, IT can affect the relationship between customers, suppliers and competitors. IT can act as a barrier to new entry and tilt the balance amongst competitors. At a strategic level, IT can be used by organisations to become low-cost leaders, to differentiate products and services, or to customise products to meet the needs of the niche markets.

Scott Morton and Rockart (1983) expand this theme by linking IT directly with Porter's generic strategies. From their perspective, IT can be used to search for opportunities and change the basis of competition when analysed from a value-added-chain perspective (Porter, 1980). Value chain refers to activities within which a company creates value at each level of these activities as it performs the tasks to produce products or services to customers. It is where a manager carefully analyses each step of the process to identify critical points where value can be added by using IT.

Towards this end, the impact of IT on the organisation's strategy is well recognised and has attracted significant research in strategic IT. In reviewing a burgeoning growth of research in this area since the early 1980s, Treacy (1986) classified the published research into descriptive - those that recapitulated occurrence of companies using IT strategically (for example, Rockart & Scott Morton, 1984; Wiseman, 1985; Clemons & Row, 1988); into prescriptive - those that covered prescriptive frameworks for managing IT (for example, Keen, 1981; Gerstein and Reisman, 1982; McFarlan, et al 1983; McFarlan, 1984); and into techniques - meant for identifying IT opportunities (for example, Barrett, 1982; Benjamin et al., 1984; Porter & Millar, 1985; Ives & Learmonth, 1984; Notowidigdo, 1984; Bakos & Treacy, 1986; Earl, 1989). Others explored the impact IT brings to organisations and the marketplace (Parsons 1983; Cash, 1984; Cash, et al, 1983; Treacy, 1986; Ewusi-Mensah, 1989; Grindley, 1991). Most of these writers have relied heavily on case studies of successful applications of IT, the most ubiquitous of which are the American Airlines SABRE system, McKesson's ECONOMOST system and the American Hospital Supplies system. A growing literature of this nature has also begun to emerge in the UK (Feeny, 1987, Earl, 1989, Sutherland and Morieux, 1991).

In summary, the evolution of IT to its present use and the role IT plays in strategic decisions of companies competing in a marketplace is very clear. Because of this, information, technology and strategy are considered appropriate for the purposes of studying their implications on organisational behaviour and constitute important elements upon which the conceptual framework for this thesis is based.

2.3 Conceptual framework

The term strategic use of IT which has evolved over the last decade has been largely associated with organisational competitiveness. Despite its popularity, the true nature of strategic use of IT has not been fully explored in the literature. The concept is new and not a great deal has been written to develop it. There is no established theory in strategic IT and serious study towards this direction has began to emerge only recently. The conceptualisation of the strategic use of IT has proved to be difficult and complex. The first area of difficulty is the lack of a clear definition of the term. Without a rich vocabulary of 'what it is', it is very difficult to gain insights into the concept of strategic use of IT.

A second difficulty with the conceptualisation of strategic use of IT has been its association with competitive success. This is mainly due to the problem of gaining consensus on a definition of success. A variety of measures, levels, sources and methods have been used to measure success (Craig and Hart, 1992). While financial and market measures dominate the literature, 'soft' measures which include perception of success, degree of innovation and quality of working life have gained increased popularity. Undoubtedly, research and discussions on strategic use of IT is inextricably intertwined with success.

Notwithstanding the above, the underlying concepts and the way IT is applied to render it strategic must first be made clear.

2.3.1 The concept of strategy

The concept of strategy originates from the military field. A military strategy involves the deployment of resources to meet the objectives pre-ordained by national leaders (Andrews, 1971; Baker 1991). Over the years, the concept had been adopted in the business context by various authors. For example, Chandler (1962), in explaining the growth of industry in the USA, broadly describes 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. Following Chandler's work, Andrews (1971) studies the concept of strategy and broadly defines it as the pattern of objectives, purposes and goals and major policies and plans for achieving these goals. According to Mintzberg (1979), strategy is a plan, a set of intended actions made in advance and is consciously developed, aimed at achieving a purpose; strategy is a ploy - which seeks to out-manoeuvre or deceive an opponent; strategy is a pattern of streams of important action taken consistently by a organisation over time regardless of whether that action has been intended or not; strategy is a position - a match between organisation and environment and strategy is a perspective which is imbedded in the minds of decision makers and reflected in their intention or action. Though broadly defined, these dimensions complement one another. Plan implies intention, pattern produces action, ploy means the strategy that emerges, position introduces a context external to the organisation and perspective means collectivity of concepts.

Hofer and Schendel (1978) adopt a narrower concept of strategy and regard it as a fundamental means an organisation will use to achieve its objectives. Their definition of strategy is 'the pattern of present and planned resource deployments and environmental interactions that indicates how the organisation will achieve its objectives' (p.25). They emphasise the extent organisational functions interact in ways most appropriate to the organisation, skills that will help the organisation achieve its objectives and the competitive advantage an organisation develops through this pattern of resource deployment. Their definition leads directly to the conclusion that an organisation's strategy emphasises:

- the extent to which present and planned organisational functions interact in ways most pertinent to the organisation in terms of product-market segment, geography, technology or the distribution channel.
- resource deployment (sometimes called distinctive competencies), and skills that will help the organisation achieve its objectives.
- competitive advantage or 'unique' competitive positions an organisation develops through a pattern of resource deployment.

Others, like Cannon (1968) and Glueck and Jaunch (1984), suggest that the concept of strategy includes direction-action decisions which are required competitively to achieve the purpose of an enterprise that is designed to ensure that the basic objectives of the enterprise are achieved through proper execution by the organisation.

Michael E. Porter's influential works in competitive advantage and strategy (1980, 1985) provide a new dimension in the underlying economic structure and strategy of firms operating in an industry. As has been mentioned earlier, Porter categorises three types of competitive strategies: cost leadership, differentiation and market niche. Cost leadership strategy requires pursuits of cost reduction programs, overhead control, and cost minimisation in functional areas to yield above-average returns. Differentiation calls for the creation of a unique product or service offering as the primary strategy target. Differentiation yields above-average returns due to brand loyalty by customers who in turn, are prepared to pay a higher price for the product. Market niche strategy focuses on a particular customer group, segment of product line, or geographic market. Market niche strategy yields above-average returns by building around serving a particular target very intensively, more efficiently and effectively than competitors who compete on broad fronts. According to Porter, economic structure and industry competition continually drive down profitability of a firm until the firm is able to influence the collective effect of five competitive forces; the rivalry among industry competitors, the bargaining power of buyers, the bargaining power of suppliers, the threat of new entrants and the pressure from companies offering substituted products or services. Companies wishing to gain a competitive edge should build defences against and influence these forces. In his view, the concept of strategy lies in the way a company finds a position where the company can best defend itself against these structural determinant forces, or can influence them in its favour.

The concept of strategy, in the context of this paper, can therefore be taken to mean:

> *'a fundamental means of deploying organisational resources that determines how the organisation will achieve its goals and objectives; and a pattern of actions leading to defences against or influencers on the environmental forces.'*

This concept recognises the actions resulting from the strategic process and the actions taken to achieve an organisation's objective. It places due emphasis on resource deployment within the organisation and the organisation's means and responses to external influences necessary to achieve organisational superior performance. This concept also recognises the components that determine the organisation's efficiency and effectiveness and emphasises resource deployment and competitive advantage which match the emphasis given in this research. It treats strategy as a means to achieve the organisation's objective and provides an appropriate platform for analysis and discussion because of the context used in this thesis.

2.3.2 Strategic Use of IT

Three components of strategic use of IT are 'information', 'technology', and 'strategic use' - each underlies the core theme of strategic use of IT.

Information is defined as 'data that have been evaluated for some use' (King, et al., 1989, p. 52) which carries meaning to an individual who needs the information, to the organisation in which he is located, and to the type of problem that he faces (Mitroff, et al., 1974) and any piece of knowledge which may rationally be applied to a decision by a person who has authority and responsibility to take that decision (McCosh, et al., 1981). The use of information *per se* as a component of strategy has been recognised clearly as a product as well as a component of a product that can be used strategically. As an example, Dun & Bradstreet, an information storehouse, generates millions of dollars worth of revenue from selling financial information as a product, and continually repackages and sells new information obtained from clients who purchase its information (Business Week, 1983; Gannes, 1985). Its European counterpart, Reed Telepublishing, has since 1985 been selling travel information electronically to travel agents across Europe through view data terminals (Fripp, 1991). Information sold is in the form of processed data changed from its raw form into a product useful to users of the information. Similarly, Merrill Lynch, in financial services, repackages information on customer's cheque, savings, investment and credit card accounts into a product which, since

1978, has been able to maintain customer loyalty and innovative leadership (Clemons and Row, 1988). In other firms, information has been used to gain market leadership in service, to improve customer support, to improve products and to develop new ones. Otis and General Electric, for instance, have used information to detect faults within elevator systems supplied by them which, in turn, allowed faults in the system to be corrected even before the faults have come to the knowledge of the companies using them. The ability to anticipate and monitor problems and to solve customer complaints through IT enhances the firms' market leadership advantage.

Information can be used to support company strategy. Firms pursuing a growth strategy, for instance, scan information databases to identify prospects of companies that meet specific criteria. In doing so, they are using new data or using available data in new ways to widen choices in making better strategic decisions and in maintaining competitive advantage. In essence, every value chain activity has physical and informational contents, both having potential opportunities for creating competitive advantages. The focus on information and how it can be used constructively for advantage is an important contribution in strategic IT. Not only does it shift the interest away from technology, it significantly elevates the role of information in decision making.

Meanwhile, technology is defined as a set of elements comprising hardware (ranging from large-scale mainframe computers to microcomputers), software (ranging from traditional languages to expert systems), networks (ranging from broad-band to narrow-band telecommunications networks), workstations (ranging from complex computer capabilities designed for engineers to user-friendly computers for professionals and managers), robotics (ranging from sophisticated electronic robots for factory floors to devises for high street transactions, such as automated teller machines) and smart chips (Scott Morton, 1991). It is the hardware and software used to collect, transmit, process and disseminate data in an organisation which includes both the physical component which makes up the information system architecture, and the systems software which enables it to function as an integrated whole (King et al, 1989). Malone et al., (1987) view technology as an electronic communication means to create a computer-based market where business transactions can be done within the market which is electronically integrated. Equally the technology component can be used strategically as a means of achieving corporate objectives. Technology has dramatically increased the establishment of inter-organisational links between businesses, spurred on by the benefits of sharing or exchanging information through the use of communication technologies. An example of this is the ubiquitous American Airline's Semi-Automatic Business Research (SABRE) system which uses technology to directly link key business entities, e.g., travel agents, hotels, credit card companies, for their strategic advantages (Fortune, 1983). Malone, et al. (1987, 1989) discuss the strategic implications of technology in reducing costs of co-ordination, in co-ordinating internal operations, in creating personalised markets, outsourcing, and as an intelligent aid for strategic purposes. Dow Jones & Co., for instance, uses its page transmission technology to transmit a voluminous amount of data across international boundaries using satellite technology and hence, has been able to substantially reduce the costs of producing national and international newspapers (Fisher, 1984; Fortune, 1985). In creating products to meet the need of a personalised market, Bennetton, Europe's biggest producer of clothing, has customised fashion designs to suit customer needs by using video screens and computers to translate designs very quickly into patterns according to customer's specification. Then it uses technology to deliver the output through a network to agents and representatives (Fripp, 1991).

Taking both information and technology together, a broad definition of information technology, taken from the work of Porter and Millar, (1985) is:

> *'the information that businesses create and use as well as a wide spectrum of increasingly convergent and linked technologies that process the information' (p. 149).*

For the purpose of this research, information technology refers to an all-encompassing hardware, software, communication elements and systems architecture associated with collecting, processing, transmitting and disseminating information as well as data which provides meaning and knowledge to be applied by a person who has the authority and responsibility to use that data to solve the problems he faces.

Originated from the word 'strategy', the term 'strategic use' is described in the IT literature as being that of action, policy, plan or application that is aimed at achieving a company's success, as embedded in the company's strategy. Since the success of a company is an outcome of events, the concept of strategic use may have its roots in several different concepts depending on the consequences or the outcome it produces as a result of its employment. For example, strategic use produces operational efficiency to an organisation (Banker and Kauffman, 1988), or organisational value in terms of market share and size (Berger et al, 1988), or productivity (Strassman, 1988), or impact on five competitive forces

(Porter, 1985), or alliance (Wiseman and MacMillan, 1984) or co-ordination (Porter and Millar, 1985), all of which are dominant criteria for assessing the extent of a strategic application.

The concept may also be seen to have been based on the key attributes it has in influencing other events. For example, strategic use can influence the direction of a company; it can support plans, policies (Huff and Beattie, 1985); it can create new plans and techniques as well as shape the overall objectives of the company (Rackoff, et al, 1985). Since strategic use aims ultimately at achieving company success, the means by which information and technology are used must ultimately support the objectives pre-ordained by the company. Thus, given the objectives of this study, the term 'strategic use' refers to the employment of a resource, technique, idea, or other attribute from which the outcome of such an employment produces benefits to an organisation that are consistent with or support the objectives pre-ordained by the organisation.

While strategic use of IT can be broadly defined as the fundamental means of deploying information and technology to produce desired outcomes to meet the strategic objectives of an organisation, it is important first to explore existing literature for descriptions of strategic use before a coherent meaning is derived.

A review of the literature in IT tends to point towards two categorical descriptions of strategic IT; one that is based on the attributes or capabilities of IT, and the other based on the outcome of such capabilities.

As an attribute, strategic use of IT is described as a system or application that can be used as a means of promoting and supporting the strategy of an organisation. In this regard, IT is seen as having features and capabilities which act as a catalyst towards fulfilling the strategic intent of the organisation.

King and Kraemer (1989) attempt to define strategic systems by classifying them into two categories. In the first category, strategic applications are based on models expounded by Porter (1980, 1985) and Wiseman (1985) and focus the applications to support strategies for differentiation, cost reduction, concentration on a particular niche, innovation, growth and alliance. It involves establishing links and interaction with the environment to achieve organisational goals. In the second category, a strategic application is initially formulated to improve an organisation's productivity and efficiency. Over time, the organisation becomes aware of its strategic potentials and begins to use IT for strategic purposes.

Rackoff et al., (1985) describe strategic use of IT as a system or application that is employed to support or shape an organisation's competitive strategy, its plan for gaining and maintaining competitive advantage. Its use directly supports the creation, modification and implementation of an organisation's implicitly and explicitly stated strategic plan (Huff and Beattie, 1985). To be strategic, an application must be a key element of the organisation's strategy and must have a profound influence on the organisation's ability to achieve a sustained comparative advantage, either by it playing a direct role in the implementation of or supporting the company's strategy (Sabherwal and King, 1991). For example, an expensive accounting system cannot be considered strategic if its implementation merely results in efficiency in reporting without it being used to monitor product availability or product planning for a firm seeking to be a low-cost producer or for a firm where product availability is the critical success factor.

Another attribute of a strategic system is that it must be a critical part of the business, be innovative and be difficult to reproduce. An application is considered strategic if the organisation's production, sales and service functions are critically dependent on the system (Alter, 1991). Criticality refers to the level of dependency an organisation has on IT such that it determines the success or failure of the organisation. In the airline industry, for example, information on seats and on customers is highly critical to the industry such that strategic management of the information often determines the success and failure of companies operating in the industry.

IT that can nurture an environment for learning is potentially strategic. Schutzer (1991) suggests that a competitive system must generate behaviour changes that result in improved performance. It requires a detailed knowledge of what the competition is doing. Implicit in this suggestion is the notion that a strategic system evolves through learning which supports continuous improvements over the long term. Although this type of system may be subject to imitation and does not remain exclusively with the initiator, a strategic system designed to maintain competitive parity over the long term suffices if:

- it can create an environment conducive to the continued generation of innovative solutions and system,
- it can create an environment that supports the production of a continuous stream of small improvements. With such an environment in place, the business remains vital, innovative and competitive.

Clemons (1986) further suggests that an application must be able to withstand the duplication of the application by competitors, during which time the firm must harvest the benefits while it accrues to the firm. This calls for scale advantage, development of base skills and managerial experience or patent protection for proprietary applications. According to Clemons, an application may be 'interesting' but is unlikely to be strategic unless it is supported by at least one of the following defensive barriers:

- scale or scope advantage
- superior managerial willingness to redesign the organisation
- superior managerial vision or willingness to accept risk
- superior skill base or experience in information technology
- superior managerial experience in exploiting innovation
- continuing innovation to maintain competitive position
- existing infrastructure that can be exploited
- patents or statutory protection (p.135).

Whether an IT application is derived through strategic process or it evolves through organisational learning and experience, the role IT plays and the attributes it must have to be considered strategic are clear. Its employment must support the strategy of the organisation. It must be a key element of the business, applied in critical business functions, and supported by an environment conducive for learning and generation of fresh ideas to take place.

In identifying the role of IT at various phases of an organisational development, McFarlan (1984) proposes a strategic grid which positions an information system in various types of companies to map the dependence of a company on a particular system in relation to the impact it brings to the business. A 'support' system implies that the system serves merely to support company information needs without putting the company in jeopardy should the system fail to provide the necessary information to the company. The company can survive without the system because it is not vital to the business. A 'factory' system implies a system which allows processing of a large volume of data but does not have high potential to produce future advantage. In the 'turnaround' quadrant, the company's dependence on the system is low but the impact it brings to the business can be very high. Companies in this quadrant consider IT as not being vital to the business but consider it important to develop, operate and maintain it due to the significant impact it could bring to the business. Finally, in the 'strategic' quadrant, a company depends heavily on IT and the impact IT brings is high. Referring to the last quadrant, McFarlan poses six questions to determine if IT is strategic to the firm:

- whether IT can be used to create economies of scale not matched by competitors,
- whether IT increases customers' dependencies on the system such that it becomes more costly for them to switch to major competitors,
- whether IT potentially changes ground rules of competition,
- whether IT allows linkages with suppliers,
- whether IT can be resold as a product through sale of data or information,
- and whether IT can change the basis of competition.

The most common view of strategic use of IT often maintains that strategic IT originates from its use at the strategic level of the organisation (Anthony, 1965; Gorry and Scott Morton (1971). In other words, unless IT is used to support strategic decisions, its use is considered tactical and transactional. Their strategic significance has not been recognised because they are regarded traditionally as routine systems having mundane potential benefits. However, Andreu et. al., (1991) have found that various transactional systems that are in existence today are potentially strategic and capable of generating competitive outcomes given the right skills and the right environment of the organisation. They contend that all kinds of IT systems have a strategic dimension and can provide firms with competitive advantages in the marketplace regardless of where they are applied in the organisation. Implicit in his argument is that all these applications must be based on the strategic intent of the firm.

The other category of strategic IT that is described in the literature is based on the outcome of IT capabilities. In this regard, strategic IT is seen to produce an outcome that brings significant impact to an organisation. To be strategic, an IT application must bring increased profit and increased market share to the organisation (Clemons, 1986). It is a system an organisation develops that significantly affects the overall conduct and success of the organisation (Fripp, 1991). Its impact on profitability and business performance is exhorted by other management authors. For example, Weill and Olson (1989) reiterate that strategic application must significantly change business performance as measured by one or more of the key indicators. It adds significantly to the company's bottom line (Ashmore, 1988). It fundamentally changes the way the firm competes in its industry and ultimately improves the business performance (McNurlin, 1986). It contributes to attaining a strategic goal, and fundamentally changes the way it competes in its industry (Canning, 1986).

Strategic applications have close interface with the outside world, outwith the organisation. It brings benefits to players in the marketplace e.g., customers and suppliers which in turn bring benefits to the organisation in terms of the growth in the market share and eventually profitability.

Wiseman (1985; 1988) reiterates that strategic use of IT entails outcomes it creates on three key classes of targets: customer, supplier and competitors. These target groups are conceptually similar to the ones proposed by Porter (1985). Customer targets are organisations and individuals who use the firm's products or services and intermediaries involved in two-way access between the firm and end-users. Supplier targets include organisations which provides various production factors needed by the firm to produce goods or services to satisfy customer needs. Competitor targets are organisations offering substitutable goods or services and are either direct, potential and substitute competitors. Substitutes and new entrants are subclasses within the competitor targets suggesting that potential competitors are categorically new entrants, potentially offering substitutes to the marketplace.

Strategic application is outward looking, aimed at providing new services to customers and suppliers (McNurlin, 1986). It helps differentiate products from its competitors, such that customers directly perceive the value of the system to them through providing information and services with the product, customising products, eliminating delays, improving reliability, making products easier to use, bypassing intermediaries, or reducing transaction times. IT is of strategic importance if its use influences buying decisions by contributing to price reduction, or differentiating products by quality, content and value.

Alter (1991) considers a system to be strategic if:

- it helps differentiate products from competitors,

- customers directly perceive the value of the system to them (by providing information and services with the product, customising products, eliminating delays, improving reliability, making products easier to use, bypassing intermediaries, or reducing transaction times),
- the product's production, sales and service require the system (supports it or is based on it),
- it opens up new markets through facilitating business presence in new geographical areas.

Ashmore (1988) adds that strategic use of IT depends on the magnitude of change they generate, and on the dynamics of the marketplace. IT is of strategic importance if its use:

- influences buying decisions (that is, by contributing to price reduction, or differentiating products by quality, content, value).
- opens up new markets (that is, facilitating business presence in new geographical areas).

According to Ashmore, whether or not the application is strategic is not as important as whether it is valuable to the business in attaining its objectives. This does not mean less emphasis on the strategic values of IT but more emphasis being given to the changes and achievement of the business goals IT can bring.

Meanwhile, Weill and Broadbent (1990) define strategic IT as any investment in IT with a purpose of gaining a competitive advantage and gaining market share through sales growth. Their view is supported by other authors who suggest that an application is strategic if it either provides the company with a competitive advantage or reduces the competitive advantage of a competitor (Bergeron, et al., 1991; Sabherwal and King, 1991).

To gain competitive advantage or to reduce competitive advantage of competitors, Bakopoulos and Treacy (1986) propose a causal model of competitive advantage to identify critical areas where IT can be applied to achieve bargaining power and comparative efficiency of the firm. Bargaining power is achieved if IT helps buyers reduce their search time and effort to acquire a particular product or service. This gain in time and effort on the part of the buyer is translated into the likelihood of repeat demands for services offered by the firm. Bargaining power is achieved if IT contributes to improving product features, making the product or service more unique and appealing to potential buyers either through enriching the information content of the product or through communication means.

From the above discussion, it becomes clear that strategic use of IT involves a coherent match between IT application and the strategy of a firm; it is a critical part of a business and its usage must add value to the organisation such that it builds sufficient defence or ability to influence external forces to the organisation's benefits. It calls for development of resource characteristics which are difficult to reproduce or imitate; is innovative; and results in major changes leading to achievement of the company's goals through the creation of an environment conducive for such characteristics to take place and develop. Most importantly it results in long term business performance. It can be concluded, therefore, that the term strategic use of IT means:

the employment of IT resources in critical areas of the business functions in harmony with the direction and goals *pre-ordained by the firm in order to ensure internal consistency of the business and to influence the forces in the marketplace. It originates from an environment conducive for such employment to take place that leads to significant improvements in the firm's long-term business performance.*

The above definition recognises a close linkage between the use of IT and strategy. It emphasises internal coherence through efficiency and effectiveness, and external impact which influences competitive forces; an idea closely associated with internal and competitive strategy which respectively is concerned with the development of an efficient and effective organisational structure for achieving goals and objectives and with competitive forces within the industries in which the organisation operates (Bakopoulos and Treacy, 1986). The significance of profitability as a long term goal is made clear and naturally strategic use of IT must be geared towards profitability and meeting shareholders' wealth objectives.

2.4 Dimensions of Strategic Use of IT

The discussion thus far brings together disparate thoughts about the notion of the strategic use of IT and characteristics of strategic applications. To put into operation the concept, however, is a difficult task, especially when the description given in the literature relating to strategic IT and its impact is vague and imprecise. For example, the suggestion that a strategic application has to be a key element of the organisation's strategy is dubious unless the extent an application can be considered a key element of the strategy can be measured. This, and other loosely-used terms such as comparative and competitive advantage, perhaps explain why there is little attempt among researchers to develop some form of a measure to assess the strategic use of IT.

This difficulty is exacerbated by the absence of a comprehensive theory of IT application (Ebers and Ganter, 1991). Sabherwal and King (1991) recognise the difficulty in operationalising the concept and later admit that they could not find any existing measure in the literature (King and Sabherwal, 1992).

Notwithstanding that, an assessment of the strategic nature of IT can be made based on the following dimensions, drawn from the previous discussion:

- **Strategic vision**: i.e., the employment of IT must be in harmony with the vision, direction and goals pre-ordained by the organisation in achieving long-term business performance,
- **Strategic impact**: i.e., such employment of IT resources must be applied in critical areas to have a significant impact on the business functions,
- **Strategic targets**: i.e., such employment has strategic targets and helps to create defences or influence the forces in the marketplace,
- **Strategic sustainability**: i.e., such employment is based on core skills which are unique and difficult to imitate by rivals in order to sustain the organisation's leading edge, and
- **Strategic integration**: i.e., such employment facilitates integration of cross functional activities within and outwith the organisation.

It is apparent that an IT application is not strategic by virtue of its sophistication and complexity. It cannot be strategic if it only provides 'organisational support' for greater internal efficiency. It is not strategic if an investment in IT serves merely to 'keep up' with actions of competitors (King et al, 1989) and it is not strategic if its introduction fails to produce results that support the company strategy and long term profitability.

To employ IT in a truly strategic sense, it is essential for top management to ensure that the above dimensions are present and that they are properly assessed. In most industries, the degree to which these dimensions are present differs from one organisation to another. An organisation can gauge the extent to which its IT usage is strategic based on an appropriate assessment and appraisal of these dimensions, details of which are discussed in the following section.

2.4.1 Strategic vision

Strategic vision is the *sine qua non* for a strategic system or application. Without it, an application is potentially doomed to fail. A strategic vision is the ability to understand how an IT application is used to support or shape the firm's competitive strategy that in turn helps to navigate the firm's strategic path (Wiseman, 1985). It encourages the search for opportunities to gain competitive advantage, and once the advantages are found, the organisation helps co-ordinate resources to support them.

Strategic vision comes in varying degrees and in various forms. It must be present in organisations if a systematic search for opportunities is to be carried out successfully, and for the mechanisms of the organisation to be co-ordinated towards achieving the pre-defined objectives.

An important element of the strategic vision is ability to harmonise IT usage with the organisation's strategy. Harmony means consistency and dependency of IT with strategy. How well IT supports and interacts with the organisation's strategic process determines how well IT application is in harmony with strategy. An organisation with low cost strategy has no harmony with its IT when the latter offers many options and flexibility but is expensive to operate. By definition, this form of IT usage is less strategic than a competing firm whose distribution and manufacturing technology permit the lowering of cost factors. Similarly, a firm having a differentiation strategy would fail to harmonise its IT with strategy if its cost-efficient processes reduces the firm's ability to differentiate its products or services. A firm with niche strategy is in harmony with its IT application if the latter is able to permit better identification of needs and subtle variations in the market in order to customise product offerings.

Strategic vision dimensions can be measured by examining whether or not a firm implicitly or explicitly develops a long term path for its IT alongside the corporate strategy. This can be done by scrutinising the firm's IT and corporate strategy and by examining the extent to which IT is used to influence and support strategic plans and the direction of the firm. A firm can be said to possess a higher degree of strategic vision if it adopts a well-defined path for IT in support of the long term corporate strategy and if it demonstrates a stronger commitment to achieve this vision by making sure that IT helps achieve this vision.

2.4.2 Strategic impact

IT must be employed in critical areas to have maximum impact on the business. Criticality depends on the priority given to key functions of the business which have the most impact on the organisation, either in minimising cost or maximising value which in turn is reflected in the organisation's market share or profitability. Criticality is fulfilled when a system or an application matches the critical success factors for a firm. For instance, if an organisation is competing on a low cost basis, its IT must alleviate labour costs and facilitate in procuring and delivering products at the lowest possible costs. In areas where value is critical to differentiation (as in creating new segments or enhancing product capability), the use of IT becomes more strategic if it is able to specifically promote differentiation, innovation and creation of new markets.

Strategic impact or criticality can be measured by determining the extent to which an IT application helps to significantly reduce costs in areas where cost is a major element of the product or promotes differentiated, highly specialised or unique products. Alternatively, since the objective is to measure the impact it has on the organisation, the strategic impact can be measured through outcomes such as increase in market share or profitability or efficiency in operation.

2.4.3 Strategic targets

Effective management of the competitive forces can bring a potent impact on the firm's long term profitability. The ability of an organisation to utilise IT to influence competitive targets for example, customers, suppliers and competitors, is deterministic of its ability to sustain its performance in the marketplace. Success is often derived from the degree of influence an organisation has over target groups. Because these groups are the key to meeting the firm's strategic goals, their impact on the firm can be dramatic. The degree to which an IT application has as its objectives the intention to influence these strategic targets determines the degree of strategic use of IT.

Strategic targets can be measured by determining the extent to which an application is perceived to have 1) influenced customers buying behaviour, 2) reduced suppliers bargaining power, or 3) established linkages with suppliers, and 4) built entry barriers for other competitors. The greater the degree to which these targets can be successfully influenced, the higher is the degree of strategic use of IT.

2.4.4 Strategic sustainability

Strategic applications requires skill base for their continued sustenance. Prahalad and Hamel (1990) call this 'core competence'. From the IT standpoint, it includes collective skills which grow over time as learning takes place. The strength of the collective skill base depends on the ability of the organisation to allow innovations and creative thinking to develop. IT applications become more strategic if they help to create and nurture development of the skill and expertise, ideally to the extent that there is no 'strategically equivalent substitutes' for this skill (Bharadwaj et al, 1993). The organisation strength will increase if IT supports, for instance, the motivation of employees (Boynton, 1993). The higher the skill base that exists in the organisation, the higher the propensity of the organisation to accommodate variations in the marketplace and the higher its ability to innovate.

Strategic sustainability can be measured by assessing the extent to which an application provides motivation to employees in the organisation for them to be able to continually come up with innovations to sustain a competitive edge over competitors. More specifically, this can be measured by, 1) the ability of IT to make work more exciting by experimenting with new ideas, 2) the expected duration for which an application has an advantage over its competitors, and 3) the difficulty for competitors to copy the IT system.

2.4.5 Strategic integration

Strategic integration ensures the operational and managerial support required to facilitate achievement of the organisation's objectives. An internally-cohesive organisation is more resilient to changes because of its ability to modify and co-ordinate process flows in response to those changes.

Strategic integration calls for efficiency and effectiveness in the running of the organisation by co-ordinating, controlling and integrating the work flow to support the strategic direction of the firm. It ensures dissemination of information across boundaries, facilitates access to resource allocations, and opens links with other internal and external functions. It establishes systems directed at achieving a 'dynamically-stable' organisation (Boynton, 1993). Efficiency is evaluated from the ability to streamline operations to ensure that it leads to faster and more reliable operations and communication capabilities. Effectiveness is evaluated from the ability to use IT to enable co-ordination across 'value-added' functions which leads to higher productivity (Strassman, 1985; Doswell, 1985) and innovation.

Although efficiency and effectiveness are regarded as the traditional domains of IT, they remain essential components in the strategic dimension of IT. These elements provide the cohesion required from within the firm, central in supporting internal strategy, and are the foundation for the long term success of the firm.

Strategic integration can be gauged by examining the extent to which the organisation uses IT 1) to co-ordinate various functions within an organisation; 2) as an information support to enable functional areas to consult one another; 3) to help managers identify new opportunities; and 4) as a means to exploit slack resources. The higher the degree to which IT is being used to co-ordinate, help managers to identify new opportunities and exploit slack resources, the higher is its degree of strategic use of IT.

The essence of the strategic use of IT encompasses five dimensions mentioned above. The degree to which these elements are present in the IT intervention determines the degree to which IT can be used strategically. In a competitive environment, the prime focus of all organisations is to ensure that the introduction of applications is based on a clear strategic vision, formulated in harmony with the objectives pre-ordained by the firm, aimed at critical elements of the business functions as well as specific strategic targets, all of which has roots in the internal strengths of the firm in producing continuous streams of quality, innovative thinking.

The five dimensions for assessing the degree of strategic use of IT represented above take into account all the elements that must be considered before an application can be called strategic. Managers can assess the degree of strategic use of IT in their organisation by evaluating the existence of, and the degree to which, each of the elements is carried out by the organisation. Using a judgmental scale, each item within these dimensions is measured, and assessment can be made as to the level of strategic use of IT by aggregating the score of each of the items. How one can go about measuring the strategic use of IT is discussed in Chapter Six.

2.5 Summary

This chapter explores the concept of strategic use of IT and attempts to integrate various viewpoints into an operational definition. Five dimensions of SUIT have been developed. It is argued that IT is used strategically if it is applied in critical areas of the business. It must be used to facilitate cross functional exchange of activities within and outwith the company and be directed at the competitive forces in the marketplace. Underlying these dimensions is the ultimate goal of all firms, that is, to enhance shareholder's *wealth by maintaining long term profitability*. In way in which IT is used to support the goals of the firms also determines the degree to which IT is used for strategic purposes.

Finally, to complement these dimensions, insights into how these dimension can be evaluated are provided by suggesting *measurement criteria* that would help managers assess the degree of strategic use of IT within their organisations. Details of the measurement will be discussed in Chapter Six.

CHAPTER THREE

FACTORS AFFECTING THE STRATEGIC USE OF IT AND COMPETITIVENESS

3.1 Introduction

Having discussed the concept of strategic use of IT (SUIT), the meaning of SUIT and the development of dimensions of SUIT in the previous chapters, this chapter examines factors affecting the use of IT in organisations and in the process explores the relationship of SUIT with variables of interest, often mentioned to have influenced the use of IT in organisations. It examines environmental, managerial, IT orientation and structural factors influencing SUIT within the context of organisational competitiveness, and provides a framework for formulating hypotheses regarding their relationship with SUIT as a basis for empirical testing.

3.2 Organisational Competitiveness and SUIT

Management and strategy literature often suggests a link between SUIT and competitiveness. During the last decade, academicians and practitioners have observed how strategic use of IT has affected business performance. The growing number of success stories about companies using

IT that have been reported in the popular business journals (from examples of the ubiquitous American Airlines' SABRE, Baxter-Travenol's ECONOMOST systems to new and sophisticated inventions on a more national and global scale such as the Singapore Tradenet system, etc.) suggests a growing awareness of a strong linkage between SUIT and success of organisations. Such suggestion of a link is anecdotal and is based on an individual case of companies which has reaped benefits from innovative uses of IT. There have been inadequate attempts to systematically analyse its effect on performance through large-scale empirical testing. In the absence of such empirical work, it is difficult to explain how IT impacts corporate performance on a broader scale.

One of the earliest endeavours to empirically validate relationship between IT and organisational performance was carried out by A T Kearney (1984). In a report published for the UK Department of Trade and Industry, Kearney found that companies lagging in the use of IT are six times more likely to have a poor financial performance than the companies leading in the use of IT. Leading companies refer to those whose IT plans are formally aligned with business plans, whose cost justification for a project is formalised and whose IT portfolios are aligned with business priorities and needs. Lagging companies, on the other hand, are those which have no formal cost justification and priority allocation systems, and which depend on operational systems such as a basic accounting system in their day-to-day operation. Two hundred and thirty-five senior executives were asked to assess the extent to which IT usage had met the business and customer service objectives of the organisation they represented and the result was matched against return on capital employed as a performance measure. The result showed that companies lagging in the use of IT were six times more likely to have a poor financial performance in their respective sector and hence concluded that there was a strong correlation between lagging companies and poor financial performance. While the evidence of the magnitude of the association between IT and performance is a significant finding of this report, further research needs to be carried out to complement and validate this important finding and to explain how IT is able to correctly influence managerial practice.

3.2.1 Organisational Performance

One of the main objectives of this study is to explore the relationship between SUIT and organisational performance. It is important therefore that performance measurement be clearly defined before such a relationship can be examined. This, unfortunately, is a difficult task because there is ambiguity as to what organisational performance is and how it can be measured. Performance is viewed differently by different organisations and there are various approaches used to measure performance. Meanwhile, researchers have offered a variety of definitions of organisational performance. Some view it from a financial standpoint, or a 'hard factor' viewpoint. Others view it from a 'soft factor' approach, such as the ability to persuade customers or the ability to improve process capabilities. There has been little consensus over what constitutes a performance measure.

Many authors have used performance to mean competitiveness or success, and employed various terms to describe competitive or successful companies. Peters and Waterman (1982) call them 'excellent and innovative' companies. Goldsmith and Clutterback (1984) and Baker and Hart (1989) call them 'successful companies'. Kearney (1984) uses the term 'leading companies'. Despite this broad labelling of successful companies, it remains difficult to find a precise definition of competitiveness or success.

Feurer and Chaharbaghi (1994) claim to have defined competitiveness from a holistic approach. According to them,

> *'Competitiveness is relative and not absolute. It depends on shareholder and customer values, financial strength which determines the ability to act and react within the competitive environment and the potential of people and technology in implementing the necessary strategic changes. Competitiveness can only be sustained if an appropriate balance is maintained between these factors which can be of a conflicting nature'. (p.58)*

Apparently competitiveness depends on a host of factors, is relative and is difficult to quantify. This reduces its applicability in research involving measurement of competitiveness with other variables. This difficulty is exacerbated by many different measures of competitiveness (Craig and Hart, 1992). While performance measurement is one of the elements in this study, it is beyond the scope of this study to discuss the merits and demerits of performance measurements as the readers can find a rather comprehensive discussion of the issue in main journals and popular publications (see Buckley, et al, 1988; Craig and Hart, 1992; Chan and Huff, 1992). However, a brief discussion of the relevant literature is appropriate to establish a basis of performance measurement used in this study.

There is a series of literature dealing with overall company performance and competitiveness. Craig and Hart (1992) refer to Saunders et al, (1991), Baker and Hart, (1989), Buckley, et al, (1988), Baker, et al, (1988) and others who have written extensively on organisational performance. They identified two groups of performance measures: 'financial' and 'non-financial' measures, also called 'objective' and 'subjective' measures respectively.

In strategy research, financial or objective measures has been the dominant approach used to measure business performance. Some of the most commonly used financial measures, among others, are:

1. return on investment (Beard & Dess, 1981; Dess & Robinson, 1984; Douglas & Rhee, 1989; Fredrickson & Mitchell, 1984; Govindarajan, 1988; Hambrick, 1983; Miller, 1987, 1988; Morrison, 1988; Robinson & Pearse, 1988; White, 1986),
2. sales growth rate (Dess & Davis, 1984; Dess & Robinson, 1984; Gupta & Govindarajan, 1986; Robinson & Pearce, 1988; White, 1986; Baker, et al, 1988), and
3. change in market share (Douglas & Rhee, 1989; Hambrick, 1983).

The main advantage of employing a financial-based performance measure is its objectivity. Financial data is often published and easily obtainable from many sources. It has been prepared according to strict accounting and reporting standards. However, it suffers serious drawbacks when used purely as a measure of organisational performance or performance of specific actions. Since financial published figures often reflect differences in accounting procedures, comparisons between companies based on these figures often produce erroneous conclusions. It has been criticised for not being dynamic and for its inadequacy to measure the competitiveness of a company over a longer term (Buckley, et al., 1988). Because it concentrates on short term, narrowly defined economic gains, it tends to become increasingly inadequate as a measure of IT performance as the benefits of the technology evolves (Doswell, 1990). This has led researchers to look at other measures of performance apart from financial measures which are but one aspect of business performance (Venkatraman and Ramanujam, 1987).

Non-financial or subjective measures are also used to capture a wider concept of business performance not measured by static financial measures. These measures are sometimes used as surrogate where there is difficulty in getting primary data (Woolridge and Floyd, 1990). The rationale for using a non-financial measure is to overcome the shortcomings of financial measures especially when dealing with performance measurement on specific attributes or actions which calls for assessment from experts or judges in the area of interest. For example, measuring the performance of a particular strategic business unit based on financial indicators is almost impossible due to unavailability of published data on the business unit. When performance measure is still required, researchers often resort to peer or self evaluation of the performance by asking experts to rate the performance of their own company and of their competitors (Anderson and Zeithmal, 1984; Douglas and Rhee, 1989). Because it depends on the assessment or opinion of people, it has been criticised for its lack of objectivity.

Despite this criticism, the use of subjective assessment is gaining popularity recently as an alternative (or complementary) to an objective measure. It has been suggested that the subjective measure, in the long run, will be as important as the more tangible, objective short term financial measure (Doswell, 1990). A subjective approach to measuring company performance was employed by leading researchers (Khandwalla, 1977; Buckley, et al., 1988 and Saunders and Wong, 1993). For example, in 1977 Khandwalla measured the index of subjective performance based on the manager's assessment of the company's ability, relative to its competitors, to generate:

1. long term profitability,
2. growth rate of sales,
3. financial strength or
4. public image.

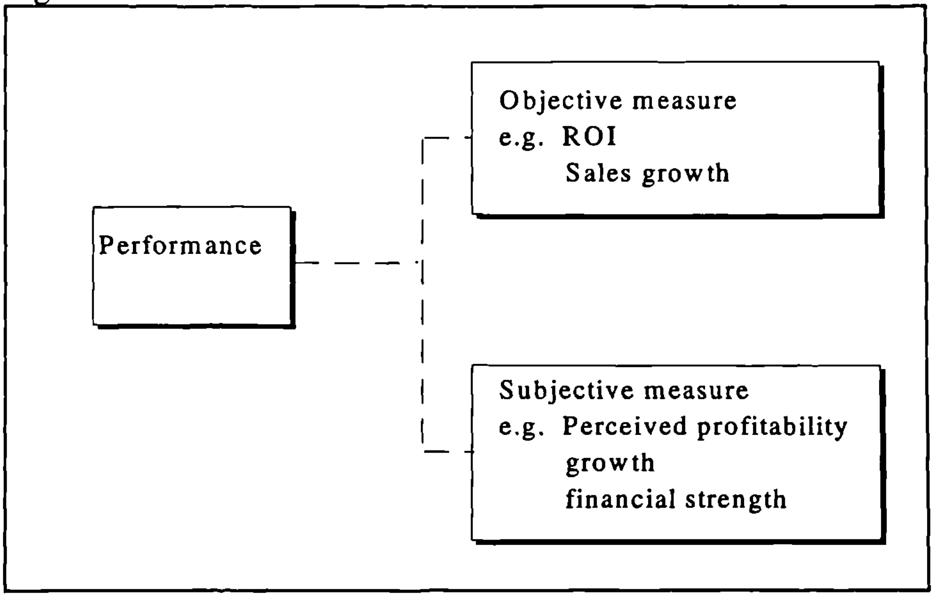
The subjective performance used in his study was found to be correlated fairly strongly with objective performance measures such as the company's 5-year profitability, and its 5-year growth rate of sales. Other management writers have used subjective indices such as perceived relative profitability or market share (Dess & Robinson, 1984; Miller, 1987, 1988; Robinson & Pearce, 1988), overall financial performance (Woolridge and Floyd, 1990), innovativeness (Goldsmith & Clutterback, 1984).

In more recent studies, Buckley, et al., (1988) and Saunders and Wong (1993) have similarly used managers' self-assessment to gauge the company's performance based on their perception of how the company performs relative to the industry in terms of return on investment (ROI), sales growth, and change in market share. These authors have found sufficient validity in using these measures as surrogate to objective measures. For example, Saunders, et al., (1992) and Khandwalla (1977) have shown a self-assessment measure of company performance to be consistent with peer evaluation and objective measures of performance. Venkatraman and Ramanujam (1986) and Dess and Robinson (1984) have validated the reliability of self-assessment measures to be in conformity with published sources, and with measures based on internal company evaluation respectively. Saunders and Wong (1994), however, caution that self-assessment measures must be used with care and where possible, be cross-validated using published sources.

The above review indicates that while greater emphasis has been given to financial measures in the past, there is a growing interest in the use of subjective measures given the context within which these measures are to be applied. While it is argued that no one approach is intrinsically superior (Venkatraman and Ramanujam, 1986), the use of subjective measure can be reliably applied. More recently, the use of both objective and subjective measures is recommended. For example, Chan and Huff (1992) suggest researchers use both objective and subjective measures drawn from primary and secondary sources for research in strategy and performance.

On the basis of the above, it is thought that both objective and subjective performance measures are appropriate for the purpose of this thesis. These two measures are represented in Figure 3.1.

Figure 3.1 - Performance measure



The two measures are mutually exclusive - one is based on objective measure while the other on subjective or perceptual measure - and no attempt has been made to combine the two into one composite dimension. This follows a suggestion made by Venkatraman and Ramanujam (1986) who caution that even when one tries to conceptualise business performance using financial and non-financial indicators, one should not combine these indicators to form one dimension as they reflect distinct dimensions.

3.2.2 Sources of performance data

The performance data for this study is obtained from two sources: For objective financial data, the information is obtained from a financial database, and for subjective performance, the data is obtained from the questionnaire.

Published financial data such as return on investment (ROI) and average sales growth are obtained from Lotus Corporation Private+ database which has detailed financial data of 140,000 companies in the UK. The ROI and sales figures are readily available from the database and can be used as a simple outcome-based financial indicator to reflect the fulfilment of the economic goals of the firm. These data, however, reflect the performance of the companies at an organisational level and in the absence of any objective indicators at the departmental or unit level, are used for the purpose of the study.

The subjective performance data is obtained from top executives who respond to the questionnaire and is used as indicators of the company's ability to generate long term profitability, sales growth and financial strength.

3.3 Factors Affecting Strategic Use of IT

Factors affecting organisational competitiveness have been widely researched in the management literature. However, research on factors influencing strategic use of IT has received limited attention (King and Sabherwal, 1992). Although a large number of authors have recognised the strategic potential of IT, there is still a marked lack of understanding of specific factors that organisations must deal with in the process of achieving competitive advantages through the use of their IT (Kim and Michelman, 1990). Clemons (1986) attributes this to the lack of research to determine factors influencing success. In one of the earlier studies regarding barriers and facilitators of IT in UK companies, the Department of Trade and Industry commissioned A.T. Kearney in 1984 to conduct a mail survey on 235 managers of small, medium, and large sized organisations across major industries to find out barriers to and opportunities for IT. The report concluded that the barriers were mainly managerial and environmental in nature. The study also showed that managers suffered a severe lack of interest and commitment to make use of IT within their business. Many companies tended to relegate IT planning and strategies to middle managers. As a result, many failed to align business and IT strategies and suffered lost opportunities which resulted in their inability to take full advantage of IT. Many were unaware of the actions of their competitors, making them susceptible to unknown threats by competitors.

Recent management literature has begun to emphasise the importance of non-technical factors in influencing the strategic use of IT and in creating and maintaining competitive advantage. As Emery (1990) points out:

> *'it is extremely difficult to gain a sustainable competitive advantage through the use of IT. Any advantage enjoyed by a firm is likely to be short-lived if it comes only from technology; a sustainable competitive advantage requires the organisation to build a capability that others cannot duplicate easily or quickly; the ability of an organisation to manage accelerated change more rapidly and effectively rather than from the existing products or services; a corporate culture that accommodates and accepts change that stems from hard-to-duplicate characteristics as the reward system, the ability of its co-ordination mechanisms to deal with fluid task assignments, management's view of its workers, and worker's feeling of shared participation, and an infrastructure that enables the organisation to cope effectively with continual change.' (p. vii)*

Non-technical factors such as an organisation's unique corporate culture and capabilities have been the centrepoint of Emery's idea of a competitive organisation. Accordingly a corporate culture that accepts change, and adapts to effectively cope with change would be in a strong position to exploit IT.

Beatty and Gordon (1988) categorise factors affecting successful implementation of IT into three: structural, human and technical. Structural factors relate to organisational configuration or systems such as delegation of authority, reporting structure, information flow. It can also include structural fragmentation such as lack of co-ordination and co-operation, a failure to perceive strategic benefits of IT investments. Human factors are those concerning communication, uncertainty avoidance and other behavioural aspects such as propensity or resistance to change, and psychological problems, while technical factors are technology capabilities such as a system's compatibility and information handling capability.

Kettinger, et al. (1994) suggest three sets of factors influencing sustainability and performance. They are environmental, foundation and action strategy factors. Environmental factors are factors that reflect specific situations such as unique industry characteristics, changes in regulatory environment, competitor actions, etc. Foundation factors are factors that exist by virtue of the company's infrastructure which have evolved over time like size, location, breadth of product offerings, economies of scale, the amount of slack resources, capital base, learning curve, technological and information resources. A company which traditionally had an extensive database on customer profile has a strong foundation factor for an advertising campaign that would benefit the company. Finally, action strategy factors are factors requiring strategic direction and decisions which enable management to leverage IT to respond to changes and in the process help to pre-empt moves of competitors or create switching costs. A finance company which first facilitates payments of customer's bills through home-banking telecommunication is an example of an action strategy factor.

Johnston and Carrico (1988) investigate industry and organisational factors which enable companies to use IT strategically and find three industry and three organisational factors which significantly influence the likelihood of exploiting IT for strategic purposes. They find that the presence of significant information content in a key relationship with customers or suppliers influences organisational propensity to exploit IT strategically. A higher information content and usage in an industry usually leads to the development of strategic use of IT. This is because the high volume of transactions within and between organisations taking place in the value chain enables a continuous search for opportunities in order to compete and survive. The second factor is limited product life cycles. Limited product life influences strategic IT because companies saddled with products which have limited life often use IT in an attempt to find ways to avoid obsolescence using IT. Johnston and Carrico quote the airline industry as an example where unbooked seats are offered through a complex reservation management system which allows seats to be sold at no loss to the airline. Hotel chains have a similar use of IT that maximises the use of perishable inventories while minimising inventory loss. The third industry factor is increased competitive pressure, driven by industry deregulation, technological change or foreign competition. In this case, IT is used as a strategic response mechanism to safeguard against attempts to reduce the competitive advantage of existing businesses by new competitors. Among the internal organisational factors identified by Johnston and Carrico are strong top management leadership and initiatives, integration and alignment of IT and strategy functions, and communications between IT and management. Success among companies studied by the authors closely related to the degree of presence or absence of these factors in the companies.

Other authors like Scarborough and Lannon (1988), Wilson (1989) and Galliers (1991) attribute organisational and human factors, such as attitude, commitment and involvement of management, rather than technical to be the key factors in determining the success of IT implementation.

Neo (1988) studies factors facilitating the use of IT in organisations by analysing 14 well-known published cases of organisations which have been successful in using IT for competitive advantage. From a review of information systems literature, he identifies 9 factors upon which he analyses the cases. The factors are:

1. alignment of IT and business strategic planning
2. communication between IT specialist and managers
3. explicit consideration of IT role in business
4. competitive pressure
5. analysis of internal operational needs
6. analysis of market and customer needs
7. existing strength in IT
8. extensive computer facilities

9. management vision and support

His study shows that successful IT applications are developed from existing systems which evolve to meet changing needs and demands. Top management support and organisational environment conducive for innovations to take place are found to be critical in facilitating the organisation intent on using IT in the marketplace. All other factors are found to facilitate strategic IT except for competitive pressure. An explanation for the lack of support for competitive pressure is that the use of IT in these companies may be the first in the industry. Its use may be driven more by the need to innovate and maintain leadership in the industry rather than due to competitors, unlike subsequent users who may be motivated to do so due to competitive pressure.

In the healthcare industry, a study was conducted by Kim and Michelman (1990) who find that three groups of factors played a major role in influencing the process of achieving competitive advantage through the use of IT. They are:

1. breaking the political barriers to allow conflicts to be resolved
2. integration of independent systems
3. ability to identify strategic opportunities from IT

Breaking political barriers inevitably shifts the power of some people. Often this is not an easy task. Because of the complexities and political sensitivities involved, the study also suggested that proper IT planning and its integration with business planning is vital. Top management support is critical to arbitrate political issues while integrating various independent activities within the organisation.

The ability to identify strategic opportunities from IT differs from organisation to organisation (King, et al., 1989) and it is these differences that make one organisation more competitive than others (Clemons and Kimbrough, 1985). Organisations, therefore, have to reconcile organisational facilitators and inhibitors to be able to generate defendable, long term strategic application. In their study of 84 companies to evaluate facilitators and inhibitors of strategic use of IT, King et al., (1989) listed the following facilitators and inhibitors (in order of importance):

Organisational facilitators of the strategic use of IT are:

1. strong technical support within my company.
2. extensive computer facilities
3. pressure from competition.
4. strong financial position of my company.
5. strong market position of my company.
6. strong top management support.
7. strong planning capability.
8. need for innovation
9. upward pressure from middle management

Organisational barriers to the strategic use of IT are:

1. other priorities are more important than IT.
2. difficulty in assessing contribution of IT.

3. lack of appropriate planning.
4. budget constraints.
5. lack of knowledge and awareness of IT potentials.
6. politics in my company.
7. ill-defined management objectives.
8. lack of understanding of user needs.
9. lack of management support.
10. lack of communications between IT staff and management

In a later study, King and Kraemer (1989) identifies two factors to be strongest organisational facilitator to effective performance: 1) existence of appropriate resources (strong technical support and expertise, the firms leadership position, financial position), and 2) competitive pressure. Major inhibitors are lack of appropriate planning, lack of top management support, difficulties in assessing benefits, ill-defined objectives, budgetary constraints, low perceived importance of concept, power and politics.

Reich and Benbasat (1990) investigate factors influencing strategic systems development in 'first-mover' organisations and suggest that the success of the development of IT system as influenced by the following factors:

1. organisation's strong drive to be number one in the business
2. an influential champion who recognised and personally monitored development of the system
3. a very proactive IT staff and competence
4. organisation's avoidance to IT planning guidelines

5. high competitive rivalry, and
6. comprehensive pilot testing

In their study into implementations of marketing databases, Fletcher and Wright (1994) attribute difficulties in implementing marketing databases to the lack of top management support and well-defined strategy, fragmented organisational functions and lack of skills in ensuring quality data for the databases. Meanwhile, another study by Bakopoulos and Treacy (1986) identifies five commonly-cited problems leading to under-utilisation of IT in organisations. They are attitudinal related and mainly due to:

1. senior management ignorance of IT and its potential uses
2. poor communication between IT and business managers
3. resistance to change
4. a lack of focus on opportunities for competitive advantage
5. a lack of good measure of valuable impact which inhibits investment

Overall, the general conclusion derived from research into factors affecting IT adoption in an organisation is that organisational factors are more important than technical factors although they are often not recognised by the firms (Fletcher and Wright, 1994). For the purpose of this thesis, non-technical factors are given emphasis. These factors which are deemed to influence strategic use of IT are classified into four groups:

1. Environmental factors
2. Managerial factors
3. IT orientation factors
4. Structural factors.

IT orientation, a subset of managerial factor, is treated separately due to the emphasis given to IT in this thesis. Each of these factors is discussed in greater detail in the following sections.

3.3.1 Environmental factors

Environmental factors influence the way organisations adapt themselves in order to survive and prosper. Factors such as the rate of change in technology, government regulations and the intensity of competition have been shown to influence the rate of innovation and have a significant impact on profitability (Khandwalla, 1972; Miller and Friesen, 1983). Environmental factors are measured in terms of how market is percived to be changing and the level of competitiveness in the industry as perceived by individual organisations. Using the traditional model of innovation where innovation is considered not as a natural phenomena but encouraged by challenge and threats, Miller and Friesen postulate that innovation takes place when there is environmental pressure. Accordingly, because there is a need for innovation, environmental pressure such as competition, hostility and heterogeneity positively correlate to innovation. By the same token, it can be argued that similar correlation exist between environmental characteristics and the degree of strategic use of IT. Miller and Friesen classify environmental variables into three dimensions:

a) Environmental dynamism

This type of environment is characterised by the uncertainty in the rate of change in the industry as well as the unpredictability of actions by competitors and customers (Lawrence and Lorsch, 1967; Thompson, 1967). Competitor's products in a highly dynamic environment change rapidly, as does the fluctuation in customer's needs. Myers and Marquis (1969) find that firms operating in a hostile and dynamic environment are more likely to be innovative. In stable environments, however, firms are less likely to be as innovative (Burns and Stalker, 1961)

The need for a higher degree of strategic use of IT also becomes apparent in dynamic environments. A dynamic environment necessitates a higher strategic use of IT to be able to cope up with the change dictated by this environment. Hence, it is safe to postulate that the more the firm perceives the environment to be dynamic, the higher would be the degree of strategic use of IT in that organisation.

A dynamic environment also calls for a deeper level of analysis to be carried out by the firm. This is to enable firms to have the best possible alternative solutions to cope with the changing environment. The more analysis performed by decision makers faced with a dynamic environment, the more likely it is for innovative opportunities to be discovered (Miller and Friesen, 1983), and the more IT can be used strategically to support these opportunities once identified. Firms which perceive the environment to be dynamic are expected to carry out a more in-depth analysis of the environment before a decision is taken.

In-depth analysis is also important to match the changing needs of the marketplace. Firms that are able to find a 'fit' between decision making behaviour and the environment will be more likely to succeed. Hence firms which carry out more in-depth analysis of the environment are more likely to exhibit a higher degree of SUIT than the ones which do not.

b) Environmental hostility

Environmental hostility represents the degree of threat posed by the intensity of competition and by the fluctuations in the firm's principal industry (Khandwalla, 1977; Miller and Friesen, 1987). This is evidenced by the intensity and fluctuation in price, product, technology and distribution, regulatory restriction, shortages of labour or raw materials and shrinking markets. Under such conditions, IT can be strategically used in the direction that alleviates the effects of these forces on the firm. IT can be the answer to the labour shortage and to identifying a specific target market due to the shrinking market. If this is true, it can be argued that the more hostile the environment, the higher would be the degree of strategic use of IT required for an organisation to be able to cope with the hostility dictated by this environment. Hence, it can be postulated that the more hostile the environment perceived by the organisation, the higher would be the degree of strategic use of IT in that organisation.

3.3.2 Managerial Factors

The role of management has been found to be a crucial element in the strategic use of IT and organisational success. As organisations begin to experience intense competition, the role of management has become crucially important in using IT and exploiting IT. Present day management calls for scrupulous attention to IT in supporting key staff and managerial needs especially in relation to information, problem-solving and communication needs of company's decision-makers and planners.

Unfortunately, managers are still less aware of what and how strategic IT can be as a tool. Many use IT only where it provides a direct benefit to getting their job done; usually by just doing it faster and better (Gerrity and Rockart, 1984). Many operate under budgetary constraints and are motivated to spend resources wisely. As a result, a purchase of a computer for few thousand pounds requires strict financial justification.

Prescriptions about managerial roles towards strategic management of IT for competitive advantage have been offered by many leading authors. The roles can be broken down into the following:

a) Management involvement and support

Management involvement and support has been shown to be an important prerequisite for success in project development and execution. Similarly in strategic use of IT, management involvement and support has been frequently associated with success and failure of IT projects. Galliers (1991) studies general management problems in implementing IT and finds that among the key factors inhibiting planning and implementation are commitment and involvement of management. McCosh et al. (1981), in their review of IT literature of the 1970s, identify four recurring reasons for disappointing business computing. They are: using computers to tackle wrong problems, lack of top management support, poor user involvement and inadequate attention to behavioural factors. Lack of top management support has been found to be one of the major inhibitors to strategic applications of IT in organisations in the US (King, et al., 1989).

Earl (1989) finds that the lack of management attention is the primary cause for low adoption of computing and of systems failure during the DP era and these are still seen today. He quotes a report by Kearney (1984) which identifies management factors as the distinguishing factors between laggard and leaders in exploiting IT successfully. The distinguishing factors, among others, are top management support and board level direction of IT activities.

Based on the above, it is expected that in organisations wherein top management involvement and support is prevalent, there will be a higher degree of strategic use of IT than in those whose management involvement is less prevalent.

b) Management focus and direction

Successful companies are run by people who have their priorities straight, their values clear, their directions right, and a strong grasp of the culture (Clifford and Cavanaugh, 1986). The same view is shared by Morone (1993), who notes that firms that are especially good at making use of technology are run by a management who exhibits a distinctive leaning to technology; they pursue a strategic focus which they build around their unique capabilities and they exhibit an underlying style of decision making driven by the need to stay ahead. Frohman (1982) suggests that projects must have a clear direction based on management focus and they should be selected on the basis of support they will provide in maintaining their technological direction in specified areas. Ill-defined objectives has been found to be one of the major inhibitors to strategic applications of IT in organisations in the US (King, 1989).

Based on the same rationale, it is expected that in organisations where top management has a clear focus and direction, there is a higher degree of strategic use of IT than those whose management's direction and focus is less clear.

c) Management style of leadership

Management leadership and style has become prevalent in discussions of what contributes to success. Baker and Hart (1989) call it the 'SM factor'; McKinsey's (1983) 'Seven S'; Likert (1961) 'participative management'; Goldsmith and Clutterback (1984) 'leadership style'; Bass (1985) 'transformational leadership' all of which suggest a sufficient degree of association with success. From the IT standpoint, Fripp (1991) suggests that because of its strategic nature and application, strategic application of IT is best done by a product champion who is in a powerful enough a position to insist on the necessary changes. This calls for a leader who has authority and respect as well as style, or a management leadership which actively foster growth and nurture strategic thinking within an organisation. Based on the same rationale, it is expected that organisations which are characterised by strong leaders have a higher tendency to exploit IT than those whose leaders are weaker.

3.3.3 IT Orientation

Closely related to the managerial factor is the IT orientation factor. IT orientation is seen as essential in the success of an overall corporate information system and requires the strength of a company's commitment to information. According to Fletcher, et al. (1992), a company which recognises the value of information will be more prepared to invest in technology and are more likely to encourage the necessary skills required to use the technology.

IT orientation is defined as the degree to which an organisation recognises and commits itself to information and technology. The recognition and the commitment towards IT are exhibited by the extent to which an organisation is prepared to invest in resources and make itself accountable for the success and failure of IT. It is manifested in the following:

1. senior management educational background and experience
2. maturity of the IT department
3. physical prevalence, investment in IT

a) Management knowledge and experience

Senior management experience, educational background and involvement in planning and strategic decision making have also been stressed as important if the use of IT is to meet its desired objectives.

Frohman (1982) finds that companies which exploit technology well have three conditions in common. One of these is that top management who runs these organisations have technical education and work experience in their companies. Most of the companies Frohman studied have managers holding professional degrees or Ph.D.s, as well as technical experience in their organisations. They are comfortable with and fluent in technical topics.

The other condition is the synergy between the decision-making system and structure of the company which reinforce one another. For example, to exploit technology well, the company's system should be able to provide a close connection between business and technological decisions and that the systems and structure for decision making on technological matters are consistent with the company's other systems. This demonstrates the need for business managers to have the level of knowledge in IT and technical matters as well as for IT managers to have the level of business knowledge in business. It is necessary, therefore, to establish a close partnership between IT and business managers to be able to push IT into full force in the business.

b) Maturity of the IT department

IT maturity has been consistently shown to facilitate strategic IT use (Lederer and Mendelow, 1987, 1988; Ragunathan and King, 1988; Sullivan, 1985). It can be defined as the stage within which organisations achieve a certain level of development and growth, measured in terms of a manager's knowledge about IT, top management involvement in IT planning, and the integration of IT and strategy function. It shows the propensity of the organisation to recognise the contribution of IT staff in achieving the objectives of the organisation.

Maturity of the IT department is often associated with Nolan's (1973; 1978) stage hypothesis. According to Nolan, the organisation learns to assimilate IT technology through four (and later, six) stages of growth; Stage I - initiation, slow steady growth; Stage II - contagion, high exponential growth; Stage III - control, absolute declining growth; Stage IV

- integration, managed steady growth. IT application at each stage of the curve differs (Earl, 1989). For example, applications during the initiation stage are oriented towards cost reduction, efficient computing and mainly for operational control. Later, as the organisation expenditure and experience in managing the IT resources progress, applications are geared more towards database enquiries and strategic planning applications. Benbasat et al. (1980) make use of Nolan's model and developed eleven maturity criteria to differentiate maturity of organisations. By using profile analysis, the authors classify 35 companies as being 'more mature' and 'less mature' based on hardware expenditure, IS usage history, organisational location of IS, user awareness, role of senior management, setting of IS objectives, IS budgeting process, IS performance evaluation, IS planning, IS control mechanism, and IS portfolio mix. Their findings and classification are summarised in table 3.1.

Table 3.1 - Maturity characteristics

Maturity Characteristics	*More Mature*	*Less Mature*
Usage history	15+ years	6-7 years
Hardware expenditure	$40,000/month	$2000-5000/month
User awareness	40% can actively participate in systems analysis, but dependent on IS staff	Not capable or interested in participating
Senior management	Involved through a steering committee	Little involved
Organisational location	Independent authority	Under accounting function
IS objectives	Derived from overall company objectives	Set by IS manager only
Evaluation basis	Contribution to organisational priorities	Cost savings (50%) Meeting budgets (25%) User satisfaction (25%)
IS planning	Linked to company plans in co-operation with planning committee	Established informally by IS manager
Control mechanism	Charges users, enforces documentation standards, requires progress reports	Lacking; no chargeout
Portfolio mix	80% operational control 15% management control 5% planning systems	85% operational control 15% management control

Source: Benbasat, et al. (1980)

The level of authority of the IT department, more importantly, the perceived status of the IT manager is beginning to be recognised as one of the important factors influencing success and failure of IT applications. This is because authority is seen as indicative of the ability to push forward ideas across the organisation and to decision makers in the organisation. Pyburn (1983), in his exploratory study to identify factors for IT planning success, concludes that because of the need to communicate effectively with senior management, the IT manager must be of high stature, well respected by his superiors and often involved in discussion of problems and opportunities of the business. Low status managers are either viewed negatively or considered 'part of the woodwork'. To enable collaboration between functions, it is necessary that top management composition consists of representation from IT or someone with IT inclination to enable IT strategies and planning to be formulated at the highest level. Such representation is an indication of the commitment and direction of IT in the organisation.

c) Physical prevalence/investment in IT

Firms that have extensive resources at their disposal and recognise them as their assets may gain a competitive edge by deploying them in support of or to strengthen their business (King et al., 1989). The existence of extensive computing facilities in the organisation and the level of investment in IT can help gauge the commitment of organisations toward IT. Burchett (1988) finds that organisations that have gained competitive advantage through strategic use of IT are spending seven percent or more of the total revenue on IT while those that do not appear to gain advantage spend less than two percent. In this thesis, the extent of physical prevalence of IT in an organisation is examined as an indication of organisational commitment towards IT.

3.3.4 Structural Factors

Structural variables are often regarded as an important antecedent in the strategy literature (Hage and Aiken, 1969). An organisational structure is a network of durable and formally sanctioned organisational arrangements and relationships designed to reduce internal and external uncertainty, permit the organisation to engage in a variety of tasks, and yet secure for it a high degree of co-ordination among these tasks so that it achieves its goals efficiently (Khandwalla, 1977). It is composed of individuals working in various jobs which are arranged in different structural configurations and patterns (Hage and Aiken, 1969) in an attempt to cope with the demands of the environment (Baker and Hart, 1989). According to Burns and Stalker (1961), firm's operating in a fast changing environment are best served by an 'organic' , or loosely-coupled, flexible structure. Peters and Waterman (1982), and Peters and Austin (1986) reaffirm this contention. They find that excellent companies adopt 'simple form' or 'lean staff' structures. Studies on the strategic use of IT have also incorporated characteristics of organisational decision making structure. For example, Pyburn (1983) concludes that for organisations facing a volatile and complex environment, an informal style of management with a flexible IT group would be most appropriate. Grindley (1991) argues that the only way to generate lasting technology-related competitive advantage is to develop an organisational structure which enables the organisation to generate successive innovations, or to handle implementation of technology more effectively than competitors.

Based on the above arguments, it is expected that organisational structure plays an important role in the strategic use of IT in organisations. The extent to which organisational structure affects the degree of strategic use of IT in an organisation is empirically tested based on structural attributes such as centralisation, formalisation, and the size of the organisation.

a) Centralisation

Centralisation is defined as the degree of control or delegation of decision-making authority throughout the organisation and the extent of participation by organisational members in decision making (Hage and Aiken, 1969). The less delegation and participation allowed to members of the organisation, the more centralised the organisation's decision making is. The effect of centralisation on performance and innovation is very much debated in the literature. On one hand, King and Sabherwal (1992) observe that strategic information systems applications are more commonly found in highly centralised companies. They argue that organisations with a centralised decision-making structure facilitate a high-level 'champion' to be effective in exploiting strategic applications of IT. This conclusion supports Fripp's (1991) contention about the role of product champion. According to Fripp, project approval and control techniques can best be done by a product champion who is powerful enough to insist on the required changes necessitated by strategic IT directions. King and Sabherwal's observation also strengthens previous findings by Khandwalla (1977) who finds that firms operating in a highly competitive environment show a superior profit performance if their decision-making structure and delegation of authority are more centralised. This is further supported by vonSimson (1990) who, in his study 30 billion-dollar companies, finds that more and more companies are re-centralising their operations. This is because of the advantages of centralisation such as common databases, large technological infrastructure, lower unit costs, the ability to exploit unexpected opportunities more readily and the availability of expertise at the corporate level.

On the other hand, some authors find that a decentralised organisation and decision-making structure are more favourable for a strategic information environment. They argue that strategic use of IT develops better in a less-structured, flexible environment within participative decision-making. Decentralisation is more favoured due to the ability of decision makers to get close to customers to whom IT applications can be used to support products offered to them. Khandwalla (1977) observes that decentralised companies produce superior profit if they operate in a relatively less competitive environment.

To reconcile these differences, vonSimson (1990) suggests a hybrid structure, that is, a model where organisations would have a centralised computing and communications network, which takes responsibility for staff recruitment, training and management rotation, establishes technological infrastructure and sets database standards and designs of application at the corporate level, while individual business units determine autonomously the areas of operation they can afford and choose their own project priorities.

In this thesis, it is hypothesised that centralisation or decentralisation structure influences the strategic use of IT in organisations. Given the competitive nature of the information intensive industry, it is expected that organisations which exhibit a decentralised decision making structure would have a higher degree of strategic use of IT than those which exhibit a centralised type of decision-making structure.

b) Formalisation

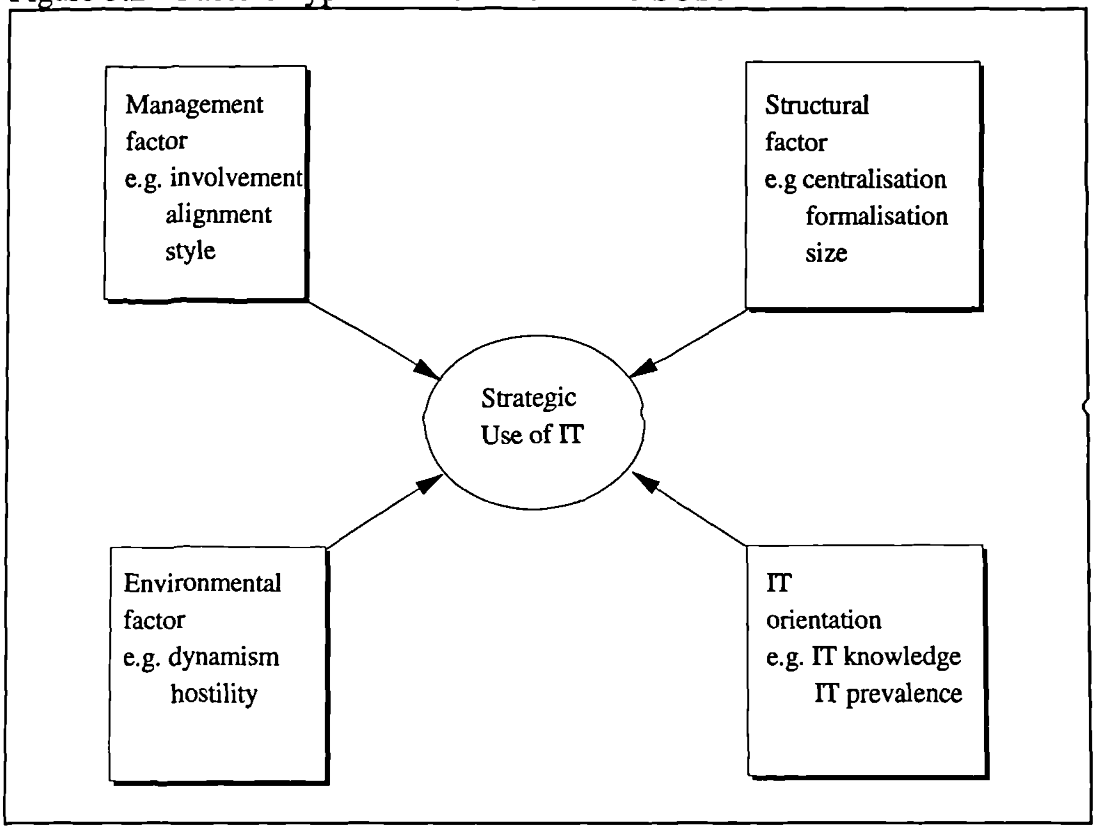
Routineness of work measures how much variety there is in work. It implies the formalisation of rules and procedure, communication and training. Hage and Aiken (1969) find that organisations with routine work are more likely to have a centralised decision making structure, have greater formalisation of organisational roles, are less likely to interact, and are more likely to have staff with less professional training. In other words, in these organisations, there is likely to be a lesser degree of participation in organisational decisions, a higher degree of adherence to a rules manual and a lower complexity of professional training. The existence of an elaborate job description, the authors also observed, is more prevalent and positively related to in organisations whose goal is towards efficiency rather than effectiveness or innovation. If this description of work routine is related to centralisation and formalisation, it can be inferred that the more routine the work of an organisation is, the more centralised and formalised is the organisation, and the higher the degree of strategic use of IT in such an organisation.

c) Size

Traditionally the influence of size on the propensity of the organisation to employ IT strategically has not been clear. For example, it is generally believed that bigger organisations have more resources to invest in better technology and skills and therefore would tend to use IT more strategically than smaller organisations. However, the opposite relationship may occur. Smaller companies tend to be better able to use IT strategically due to their less hierarchical structure and their flexibility in decision making compared to the larger ones. To clarify this issue, the existence and direction of a relationship between the size of the organisation and the degree of strategic use of IT is examined.

Having reviewed the aforementioned factors, a model is constructed as in Figure 3.2 to represent a summary of factors influencing strategic use of IT upon which hypotheses can be developed.

Figure 3.2 - Factors hypothesised to influence SUIT



Towards this end, models representing SUIT, business performance and factors affecting SUIT have been constructed. The chapter which follows consolidates all of these into a coherent research model for empirical testing.

3.4 Summary

This chapter discusses organisational competitiveness and issues relating to measurement of business performance. While financial performance has been dominantly used in the past, the use of non-financial measures are beginning to be popular among researchers in search of an alternative or surrogate to financial measures due to the shortcomings and unavailability of the latter. This chapter also examines factors affecting strategic use of IT in an organisation as a basis for testing hypotheses of their relationship with SUIT. Antecedent variables are grouped and analysed according to environmental, managerial, IT orientation and structural factors for their influence on SUIT based on the review of the literature. Hypotheses about their relationship are discussed. While there is strong agreement about the influence of certain variables on SUIT, there are also conflicting opinions about the relationship of other variables with SUIT or performance. The intent of the chapter, hence, is to explore those circumstances based on past literature as a basis for which the relationship between these variables and SUIT can be tested through an empirical study.

CHAPTER FOUR

RESEARCH MODEL AND HYPOTHESES

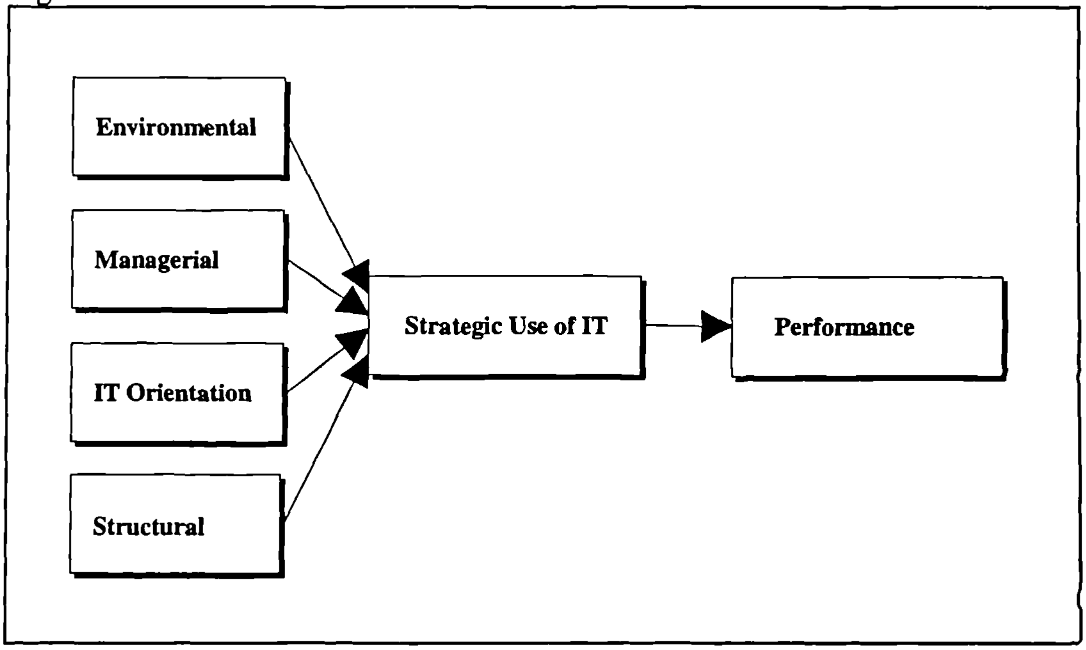
4.1 Introduction

This chapter presents research models as a framework to determine relationships between variables. It brings together the discussion in the previous chapters into testable research models and hypotheses. A two-tier relationship model is proposed. The first tier relates to a hypothesis that strategic use of IT (SUIT) is associated positively to organisational performance. The second tier concerns relationships between antecedent variables influencing SUIT in organisation. Bringing the two tiers together, it is suggested that contextual variables have an influence over the degree of SUIT, which in turn, influences the performance of an organisation.

4.2 Research model and hypotheses

An overall research model is represented in Figure 4.1. Environmental, managerial, IT orientation and structural variables are deemed to be antecedent factors which influence the degree of strategic use of IT in organisations. The degree of strategic use of IT, herein considered as an independent variable, in turn influences the organisation's performance, a dependent variable.

Figure 4.1 - Overall research model

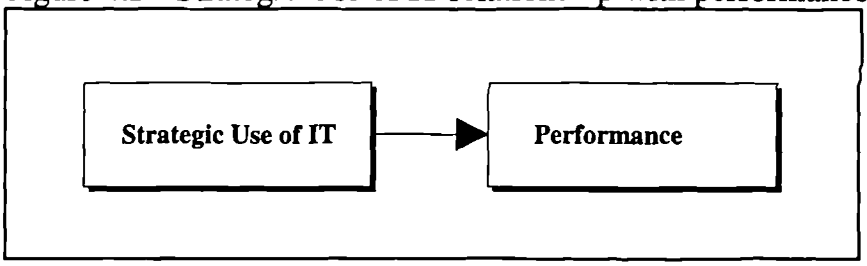


4.2.1 SUIT vs Performance

For ease of analysis, the model is broken down into a two-tier relationship. The first tier suggests a relationship between SUIT and organisational performance such that the degree of SUIT influences the performance of an organisation. It has been emphasised from the review of the literature in Chapter Two and Three that strategic use of IT has been strongly linked with organisational performance. This linkage, as explained, has not been proven except through implications from case studies of companies which have successfully employed IT. Large-scale empirical testing of this relationship is lacking. In this thesis, it is hypothesised that the relationship is positive, in that, organisations which exhibit a high degree of strategic use of IT tend to perform better than those which exhibit a low degree of strategic use of IT. This is depicted in the relationship in Figure 4.2. Hence,

Relationship 1] **Strategic Use of IT** → **Organisational Performance**

Figure 4.2 - Strategic Use of IT relationship with performance



Performance indicators used are based on both objective (financial) and subjective measures which are individually tested against SUIT. Three indicators are chosen. Return on investment (ROI) and three-year average sales growth are both financial indicators obtained from secondary sources, while the third indicator of performance is based on the subjective assessment of senior executives who expressed their opinion on the relative performance of their organisation compared to the industry average. Using these indicators, the following hypotheses were formulated:

> ***H1: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's profitability as measured by return on investment (ROI).***

H2: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's growth as measured by 3-year average sales growth (SALGROW).

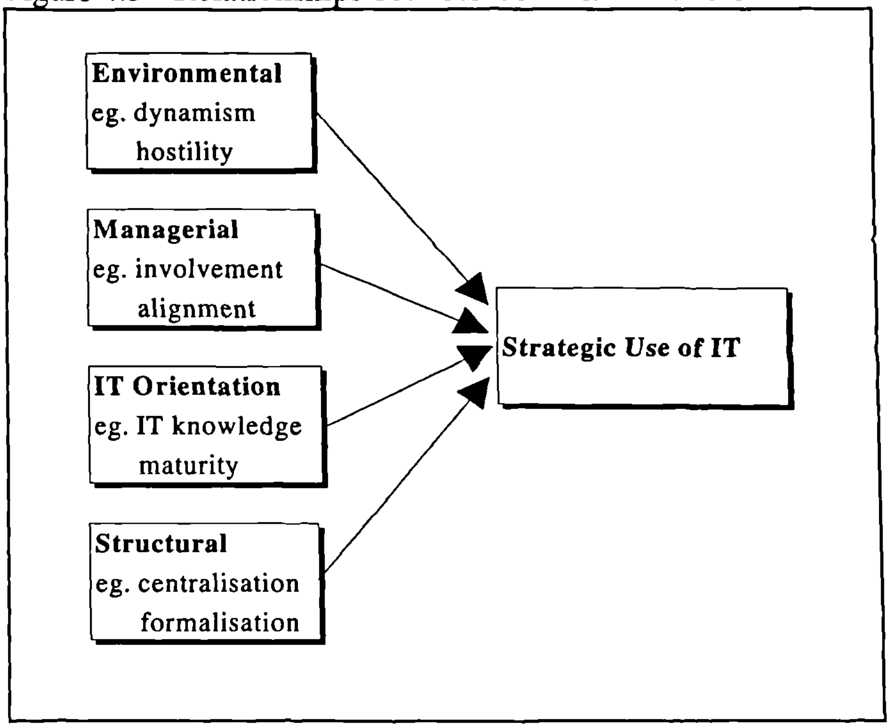
H3: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's competitiveness as measured by perceived success.

4.2.2 Contextual factors vs. SUIT

Various contextual factors have been suggested in the literature to have influenced the use of IT in organisations. These have been discussed in Chapter Three. Associations between the contextual variables and SUIT are represented in Figure 4.3.

Relationship 2] **Contextual Factors** ⟶ **Strategic Use of IT**

Figure 4.3 - Relationships between contextual factors and SUIT



Individual hypothesis is constructed based on the clusters as follows:

Environmental Factors

H4 - the more dynamic the environment is perceived by the organisation, the higher tends to be the degree of strategic use of IT in that organisation.

H5 - the more hostile the environment is perceived by the organisation, the higher tends to be the degree of strategic use of IT in that organisation.

Managerial Factors

H6: The more top management is involved in identifying, authoring and monitoring IT projects, the higher tends to be the degree of SUIT in the organisation.

H7: The more an organisation put its effort in analysing the environment and in reviewing its strengths and weaknesses, the higher tends to be the degree of SUIT in the organisation.

H8: The more an organisation supports and rewards innovation, the higher tends to be the degree of SUIT in the organisation.

H9: The more an organisation aligns IT plans with business strategic plan, the higher tends to be the degree of SUIT in the organisation.

IT Orientation Factors

H10: The more knowledgeable top management is about IT and IT staff is about the business of an organisation, the higher tends to be the degree of SUIT in the organisation.

H11: The more mature an organisation is in terms of its IT prevalence, the higher tends to be the degree of SUIT in the organisation.

H12: The higher the expenditure on IT (as a percentage of sales) is relative to the industry average, the higher tends to be the degree of SUIT in the organisation.

H13: The longer the IT planning horizon of an organisation is, the higher tends to be the degree of SUIT in the organisation.

Structural Factors

H14: The less centralised a decision making structure (the more lower level managers are given the authority to make their decision), the higher tends to be the degree of SUIT in an organisation.

H15: The less an organisation formalises or adheres to its procedures, the higher tends to be the degree of SUIT in the organisation.

H16: The bigger the size of an organisation (in terms of full time employees), the higher tends to be the degree of SUIT in the organisation.

H17: The older the IT department is, or the more experienced the IT department is, the higher tends to be the degree of SUIT in the organisation.

It is important to note that while this study attempts to verify the existence of the above relationship, it can only explain the effect of variability of one variable over the other variable in a linear relationship. Due to the design and the nature of the study, it does not explain the cause and effect relationship. For example, one cannot conclude that a higher degree of SUIT leads to better organisational performance and vice versa, or, the older IT department often leads to higher degree of SUIT and vice versa. However, one can say that a high degree of SUIT affects performance in that a variation in the performance can be explained by the variation in the degree of SUIT. Similarly, variations in the degree of SUIT can be explained by the variation in the age and experience of the IT department. Issues regarding this and details of how the survey is designed to verify the above relationships are discussed in the next chapter.

CHAPTER FIVE

RESEARCH METHODOLOGY

5.1 Introduction

The previous chapter sets out hypotheses of interest to be tested. In testing these hypotheses, the research approach must be carefully designed to capture data required to support such testing. An approach is taken depending on its suitability for a particular study. The purpose of this chapter is to review some of the research designs available before deciding on a particular research design. First, the types of research designs are discussed in general, followed by a discussion on the rationale for a particular design chosen for this study. Sampling is discussed in some detail including sample size determination and sample selection. Apart from questions relating to contextual variables, much of the chapter is devoted to questionnaire development on questions regarding the strategic use of IT (SUIT). Data collection procedures, response rates, tests of response bias and an overall framework for data analysis are discussed in the latter sections.

5.2 Research design

The research design for this thesis must be able to satisfy several objectives. First, it must be able to provide insights into understanding of a construct under study and allow the researcher to develop a measure of the construct based on a large number of respondents. Second, it must be able to test relationships between variables using statistical means. Third, it must be able to provide conclusions about characteristics of organisations across a wide spectrum of sectors. Fourth, it should allow the researcher some degree of control over who and what to measure without having to interfere with the natural setting of the subjects under investigation. Finally, the chosen research design must meet cost and time considerations in view of the types of information required and the availability of resources (Sproull, 1988).

Since the study involves empirical data collection from a wide spectrum of companies, the information gathered would have to be extensive, in that, data would be collected from a wide diversity of industry sectors. Extensive data allows a sufficient degree of generalisation to be made about a population. Extensive data is also required to satisfy conditions necessary for certain statistical procedures. At the same time, the information gathered would be intensive, in that the source of the information must be focused on specific organisations in order to measure a multitude of variables.

Before deciding on a particular research design for this study, it is important to review briefly some of the commonly used research designs and explain their advantages and limitations in general as they relate to this research. Churchill (1988) defines research design as simply 'a framework or plan for a study used as a guide in collecting and analysing data, a blueprint followed in completing the study'. It includes the elements to be examined and the procedures used to examine them. As a plan, its purpose is to have appropriate methods for testing hypotheses or answering research questions (Sproull, 1988).

Depending on the degree of control researchers have over who and what to measure, research designs can be broadly categorised into three types, each differs in the amount of control a researcher can have. They are:

1. Historical design
2. Experimental design
3. Non-experimental design

5.2.1 Historical design

Historical design is a method of studying the past, sometimes called 'archival research', in order to explain present events or anticipate future events. Sproull (1988, p.152) defines historical design as 'a research design for which the data and physical artefacts already exist and thus cannot be changed or manipulated'. One of the reasons a researcher would choose this type of design is because the researcher finds it more reliable to depend on public and official sources such as official manuscripts, newspapers, government reports and a variety of other sources rather than on accounts of a selected number of people (Dane, 1988). Relying too much on official documents, however, has its disadvantages. One of the main criticisms of historical design is the authenticity and accuracy of recorded data. It has been suggested that because these documents often contain confidential or sensitive information, they may be distorted or incomplete, hence, their authenticity is questionable. Historical design was also ruled out because, in determining the degree of strategic use of IT, information that is of strategic nature is very likely not documented. It is something that already exists in the heads of managers, whether they articulate it or not (Van Der Heijden and Eden, 1992). This type of information is not readily available in artefact form, and is often not documented due to its sensitive nature. Since this study involves a large number of companies, it is likewise not cost effective to examine artefacts about these organisations. Hence, the historical form of design cannot be used in this thesis.

5.2.2 Experimental design

Experimental design is a type of research design that is used to test cause and effect relationships between dependent and independent variables. Typically, it takes the form of an experiment, where a variable is strictly controlled to determine its effect on another variable. The independent variable, suspected to be the cause for the variations in the dependent variable, is manipulated under strict control of other deliberately-held-constant variables to see the effect on the dependent variable (Dane, 1988). The advantage of an experimental design is the ability to freely control and manipulate the independent variable. The effect of the independent variable on the dependent variable can then be separated and because of that, the researcher can directly draw conclusions about its effect on the dependent variable. This type of design, however, is limited to research where it is possible to control or manipulate the independent variable at the discretion of the researcher. A laboratory setting is ideal for experimental design. It is a popular method used in pure sciences where laboratory experiments are conducted under strict controls and where the variables (e.g., temperature, pressure) can be manipulated to analyse the causal effect of such manipulation on the dependent variable. However, in social science research which involves organisational decision-making or strategies, many variables (e.g., decision processes, management styles) cannot be controlled, or manipulated from the rest of the variables in an experiment. It is therefore impracticable to impose the laboratory situation upon organisations. This form of a design also forces the researcher to intrude into the natural setting of an organisation, a situation not practicable given the large number and the sensitivity of the organisations involved in this study. Even if this were practicable, it otherwise would not be possible to deliberately hold other variables constant due to the inherent nature of the organisations. For these reasons, the experimental research design is ruled out.

5.2.2 Non-experimental design

Also called ex post facto design, correlation design, non-manipulative design or survey design, non-experimental design is a type of research design in which the researcher systematically tests and makes inferences about relationships among variables without directly manipulating them. Unlike the experimental design, the non-experimental research does not have highly-controlled elements which allow a researcher to assume cause and effect relationships. Experimental variables are not introduced by the researcher in the non-experimental design but measures can be taken. The researcher normally has control over who or what to measure, when the measurement can take place and what to ask or observe (Sproull, 1988). Sometimes called correlational research, the purpose of non-experimental design is to observe or measure the relationship between or among variables. It does not require an experiment and can be carried out in a natural setting. This type of research design is most appropriate in research where the researcher cannot alter the natural setting of events, for example, the running of an organisation. The researcher is not able to modify or control the independent variables because the nature of the independent variables such as decision-making, intelligence or commitment, is such that they cannot be manipulated (Kerlinger, 1986). The disadvantage of the non-experimental research design is its results lead only to conclusions about association or relationships, not cause and effect (Sproull, 1988). The researcher can only make inferences about the relationships between these variables without being able to conclude whether one independent variable is the cause or effect of the dependent variable (Bryman, 1989).

There are several approaches to obtaining data using non-experimental design, but the two relevant ones are sample survey and case study methods. Although the distinction between the two is not very clear, there are, however, practical differences between them and each is discussed briefly below.

i) Sample survey research

Sample survey research looks at a particular phenomena or observation by means of a questionnaire or interview (Leedy, 1974). It involves obtaining information directly from participants by posing questions to them. The researcher's task is to collect information relating to the variables and based on the information gathered, to examine the patterns of relationship between the variables based on the responses presented at the time the question is asked (Dane, 1988). Survey research normally deals with studies on how people feel, perceive, how they behave and the object is to determine how these variables are related (Wiersma, 1991). The advantage of survey research is that its result can be generalised to represent the views of the population because it involves a large number of respondents, representative of the population. This tends to satisfy the objective of this research which attempts to seek information from a large number of companies in order to generalise findings across a wide spectrum of sectors. The disadvantage of this type of data collection method is that it could involve too much time and effort (Dane, 1988).

ii) Case study research

Case study research involves a small number of samples or 'cases'. It involves in-depth analysis through interviews or group discussions of a number of cases from which conclusions are drawn. Case study research is very relevant in studies that focus on the understanding of areas of organisation functioning that are not well documented and which are amenable to investigation through contact with the organisation (Brymen, 1989). It is best used in studies that require deeper understanding of how things happen rather than testing relationships between them (Gordon and Langmaid, 1988). The main drawback with case study research is that it is often accused for its lack of generalisability. This form of data collection is deemed not practicable for this research which investigates a large number of companies in order that a generalisation about the characteristics of the population as a whole can be drawn.

5.3 The chosen research design

The most appropriate research design that would best serve the purpose of this research is the non-experimental research design. In non-experimental design, organisations would be allowed to operate without the researcher intruding or changing the day-to-day running of the organisation. There are no external elements being introduced by the researcher during the conduct of this study that would change the way the organisation is being run. Data gathered relate to situations which have occurred prior to the study, about which measures regarding their use of IT and other attitudinal attributes can be taken. Since it is the intention of this study to describe the way things are happening rather than trying to change the organisation, this design seemed to be the most satisfactory.

Non-experimental design enables the study of the relationships between strategic use of IT and performance as it allows measurement of research subjects to assess the relationship between and among them. Correlation-based statistical procedures can be used (Sproull, 1988) on data collected using questionnaire information on a large number of participants and variables.

The choice of a non-experimental design also allows the researcher a degree of control over who and what to measure, control over the selection of companies to participate in the study, and therefore the ability to manipulate the likely choice of participants. This is necessary in order to be able to focus only on those companies which will satisfy the scope of the study, for example, size and industry sectors. Control over from whom information is gathered is also important. In this study information is gathered from senior executives in organisations across a wide spectrum of sectors in the information-intensive-industry in the form of a self-administered questionnaire.

Since this study involves measurement of a construct, it requires a large number of companies. Sample survey research is deemed the most suitable form of data collection, as opposed to the case study approach, to satisfy the need for the extensive information required. Sample survey is suitable because the study also involves simple tests of factor associations (Franz and Robey, 1987). A mail questionnaire seems to be the most suitable form of data collection instrument. Not only it is able to reach a large number of geographically dispersed organisations, but also it is the least time-consuming and the most effective administration data collection procedure (Dane, 1988).

Non-experimental design's main disadvantage, as indicated earlier, lies in its inability to manipulate the subject under study. The conclusions derived from non-experimental research reflects this shortcoming, in that, its conclusions cannot be as strong as if the study was conducted in a true experimental laboratory situation where cause and effect relationship can be established. While it would be ideal if this study was able to generate conclusions about the cause and effect relationship between strategic use of IT and performance, the inherent nature of this type of organisational research is such that it is not possible to do so. The conclusions derived under this non-experimental approach are based on correlational procedures which reflect the association or relationship but never that one variable 'causes' another (Sproull, 1988).

5.4 Choice of industry

Service-based information-intensive industry is chosen as the population to be studied. The rationale for choosing this industry is:

- Information intensive industry possesses characteristics appropriate for strategic use of IT analysis. Information is extensively and intensively used in day-to-day operation of the companies operating in this industry; IT has been regarded as the means of delivering goods and services; IT management has been critical to success.

- The strategic impact of IT in the information intensive industry is dramatic (McFarlan, et al, 1983; Benjamin, et al, 1984; Porter and Millar, 1985; and Earl, 1986).

- Service activities are the main source of competitive advantage (Quinn, 1990) where IT can play a major role.

- Service industry has one of the largest combined investment in IT amongst industries in the UK.

- The sectors in this industry represent a sufficiently large number of organisations to enable generalisation of findings across a wide spectrum of sectors.

- The sectors in this industry have been recognised to significantly contribute to the economy.

An information-intensive industry is defined as an industry within which the amount of intellectual work done by people as they conduct their affair is high, where the selection, purchase, use, and maintenance of the products require careful research and thoughtful consideration by the customer. A firm's value chain is information intensive if it requires intellectual efforts by employees (Linder and Ives, 1988). As McFarlan et al. (1983) put it, it is an industry characterised by critical dependency on information for the smooth running of the information systems activity.

There have been several attempts to classify the sectors and to describe companies operating in the information intensive industry. Porter and Millar (1985) describe an information intensive company on the basis of the intensity of information that is utilised across the company's value chain and the information content of the company's products. The company's value chain is information intensive if information is extensively used; it is critical to the company's primary activities like production, sales and marketing, internal and external logistics as well as to its infrastructure activities that support the primary activities. The information intensity is high because the company is dealing with a large number of customers and suppliers, parts, processes, and takes a long cycle time to deliver a product or service. The company has high product information content if the product or the process to produce or to deliver the product requires extensive use of information, and the impact on the overall performance of the company is great. They quoted banking, airlines and newspaper industries as having a high information-technology contents because the nature of these industries is such that they are dealing with operations involving substantial information processing and require buyers to process a lot of information before making their decision about a particular product or service.

Björnsson and Lundegård (1992) reclassify the industries identified by Porter and Millar into categories based on the volume and complexity of information used in the industry. Industries with high information volume and low complexity are those whose operation and information use is high but the nature of the information is not too complex. Examples are banking, airlines and newspapers. Construction and automobile manufacturers are examples of industries whose information use are high and the nature of information to be very complex. All the industries mentioned are in the information intensive industry.

It was not until the work of Sabherwal and King (1991) that identification of sectors and companies in information intensive industry becomes clear. In their article, 'Towards a Theory of Strategic Use of Information Resources: An Inductive Approach', they identify eight sectors which are in the information intensive industries. The sectors are:

- banking and finance, insurance, transportation, distribution and retailing, restaurants and hotels, information and news, publishing, and manufacturing sectors.

In identifying these sectors, King and Sabherwal sought the opinion of experts who had done research in the area of strategic information systems and undertook rigorous tests of mapping their opinions before concluding the sectors' information intensity. It was found that there was an extremely high degree of agreement among the experts about the relative magnitude of information intensity in the above sectors.

It is important to note that the classification of the above sectors was made in the US context. Due to the time, cost and manpower constraints, it is not possible to verify whether, in the UK, the same sectors would fall within the information intensive industry. However, a review of the UK literature points towards a similar classification of the sectors. For example, Earl (1989), in classifying sector framework of IT, categorises financial services, airlines and retailing as one sector, which he metaphorically called 'delivery' sector as opposed to other 'dependent', 'drive' and 'delayed' sectors. His classification of sectors is based on the strategic context and characteristics of IT which are found to be common among the financial, airline and retailing sectors. In other examples, financial services sector has been known to use information extensively for strategic purposes through various offerings of products and services to customers. This is well supported by a number of case studies which show how companies have gained competitive edge from using IT for strategic purposes. The introduction of videotex by Nottingham Building Society and electronic homebanking by the Royal Bank of Scotland demonstrates the favourable swing of business IT can give despite the size of the organisation. Information and technology are used to reach out customers and as a means to communicate with them on an interactive basis (for example, immediate access to information about balance and credit facilities). In the highly competitive holiday package sector, Thomson Holidays is a typical example of how information is used to offer customers various types of holiday packages to suit individual needs. Customers use the information to bargain for price and availability as a result of reduced information cycle and improved timeliness of information. Similarly, the retailing sector has undergone an electronic transformation with the introduction of IT and has used information as an asset to be exploited. Electronic point-of-sale found at the check-out counters in retailing stores, for example, captures a large volume of information which, in turn, is used to facilitate inventory planning, target advertising campaigns and establish pricing (Earl, 1986).

Based on the above, it is reasonable to use similar sectors for the purpose of the research population. The focus of the research subject for this study, however, is on service-oriented, information-intensive organisations and hence manufacturers have been excluded from the population. Such exclusion is believed to have made the group more homogeneous so that the findings can be generalised more accurately and meaningfully.

The population chosen for the purposes of this study comprise of:

- banking, finance and insurance
- hotel, tourism and airline
- wholesale, retail and distribution sectors.

5.5 Sampling frame

A list of privately-owned and public-quoted companies representing the above information-intensive sectors were identified from "Lotus UK Private+" (Private+) databases. Private+ database contains approximately

140,000 private and public companies in the UK. It provides detailed financial data, trading addresses and the names of company directors, and has mailing list facilities which enables the researcher to identify and conveniently direct 'personalised' questionnaires to the appropriate persons in the organisation.

From this list, approximately 1100 companies with more than £10 million sales were identified. After purging duplicates and deleting holding companies where subsidiaries were also listed, a list of 991 companies was produced. The breakdown of companies in each sector group is as follows:

Figure 5.1 - Breakdown of companies by industry sectors

SIC	**Sector**	**Number of companies**
6180	Pharmaceutical wholesale	95
6410	Food retailing	65
6450	Clothing retailing	77
6560	Mixed retailing	86
	Subtotal 323	
6650	Hotel	62
7500	Airlines	42
7700	Travel & tours	252
	Subtotal 356	
8140	Bank	43
8150	Finance companies	92
8200	Insurance	177
	Subtotal 312	
	Total	**991**

The company data, together with secondary information on sales, return on investment, inter-company rating and employment figures were transferred to Microsoft Excel 4.0 to determine sample size and to select samples for data collection.

5.5.1 Sample size determination

In determining the sample size, it is important to establish the number of samples which is neither too low to avoid the risk of inadequate information, nor too high to avoid the risk of being inefficient (Scheaffer, et al., 1986). There is also a need to strike a balance between obtaining data with great precision and cost. In this study, a simple random sampling technique is used to determine the sample size based on the formula suggested by Levin and Fox (1988) and Churchill (1988):

$$n = \frac{Z^2 \pi(1-\pi)}{ME^2}$$

where:

n	= minimum sample size required
Z	= value of standard normal variable which corresponds to confidence interval;
π	= population proportion
ME	= margin of error of estimation;

Following Levin and Fox's suggestion, a z-value of 1.96, representing a 95 percent confidence interval, and a population proportion, π , value of 0.30 (30 percent) were used. The π value was taken from the pilot survey response rate which was assumed to be the proportion of the total population anticipated (Levin and Fox, 1988). The margin of allowable error was estimated at seven percent. The resultant calculation shows that the minimum number of companies required for analysis is 165, calculated as follows:

$$n = \frac{1.96^2 X 0.30(1-0.30)}{(0.07)^2}$$

$$n = 164.64 \approx 165$$

Based on the calculated minimum sample size of 165, the number of companies to send questionnaires to was determined by using four probable rates of return; 25 percent, 30 percent, 33 percent and 40 percent. The number of companies produced was 660 (25%), 550 (30%), 500 (33%) and 413 (40%) respectively as shown in Figure 5.2 below.

Figure 5.2 - Sample size

Response rate	Total sample
25%	660
30%	**550**
33%	500
40%	413

To estimate the response rate to use in the determination of the total sample size, the response rate obtained from the pilot study is used which indicates a 30 percent response (please refer to section 5.7 below). Based on the 30 percent rate of return, the sample size was determined to be 550. The size appears appropriate considering time, cost and efficiency factors. Moreover, the anticipated 30 percent response rate is likely to be achievable judging from the experience in the pilot survey, complemented by a close follow up of reminders and a properly designed questionnaire.

5.5.2 Sample selection

The selection of the sample companies was done electronically using Microsoft Excel 4.0. The software generates random numbers which are assigned to each company in the population of 991 companies. A total of 553 companies were selected. From this list, mailing lists, mailing label, and 'personalised' covering and follow up letters were prepared using Microsoft Word for Windows software (please refer to a sample of these letters in Appendix A and B respectively). The questionnaires were then sent to 553 senior executives (chief executive officers and other directors) listed in the Private+ database.

5.6 Questionnaire development

A copy of the questionnaire used in this survey is reproduced in Appendix C. The questionnaire was designed to be as respondent friendly as possible to avoid imposing too much time upon busy executives. A number of questions used in this questionnaire were adopted from established research because they had been shown to possess high reliability and validity. The decision to adopt these questions was also in line with the advice given by Balian (1982) who suggests that in considering the use of published instrument, one must ensure that validity and reliability measures are available and are of acceptable levels.

Studies have shown that the number and quality of responses is positively correlated with the format and the layout of the questionnaire

(Berdie, et al., 1986). Several steps have been taken to ensure a satisfactory response rate. For example, the front page introduces the purpose of the questionnaire, the benefit one would get by answering, the assurance of confidentiality and the deliberate structure of the questions for ease of answering. A 7-point Likert scale has been used throughout. Respondents are asked to indicate their agreement or disagreement with a statement on a continuum. For example, one of the questions asks, 'If your competitors wanted to copy your IT application, how much difficulty do you think they would encounter in doing so?'. A respondent will choose possible responses ranging from 1 (not much difficulty) to 7 (a great deal of difficulty). A score of 7 infers the magnitude of agreement to the question and hence the attitude of the respondent while a score of 1 infers a disagreement.

The questions were structured in such a way that it is easy for the respondents to answer. The flow of the questions, which began with industry information and progressed gradually to those more specific to the company, is believed to be non-threatening to the respondents. The last questions were short, simple sentences about factors which facilitated or inhibited the use of IT. This structure was designed following Hoinville and Jowell's (1978) suggestion that the first few questions should be simple and relevant to encourage the recipient to start. The more difficult question should come in the middle, and the last questions should be of high interest to encourage them to complete the questionnaire. This suggestion appeared to have worked in this data collection exercise judging from the number of questionnaires received (please see discussion on response rate in section 5.7.1).

In addition, a pre-printed 'freepost' first class return envelope was provided with each questionnaire to facilitate the mailing process. Not only did the pre-printing make the questionnaire look more professional, but the provision of the first class return envelope was believed to have conveyed the sense of urgency and perhaps encouraged the respondents to reply. Studies have shown empirically that the provision of a reply-paid envelope tends to increase the response rate, although using first class over third class postage gave no significant advantage in increasing the response (Emory, 1985).

The questionnaire is divided into five sections, each of which is discussed in the following order:

Section 1	Industry characteristics (including performance)
Section 2	Strategic Use of IT characteristics
Section 3	Managerial characteristics
Section 4	Organisational characteristics (including IT maturity)
Section 5	Factors Affecting Use of IT

5.6.1 Industry characteristics questions

The purpose of the questions in this section is to measure environmental characteristics and to explore the influence of environmental factors on the degree of the strategic use of IT in organisations. Environmental characteristics comprised of industry dynamism, which reflected the unpredictability of a competitor's actions and the rate of change of customer demands, and industry hostility which indicated the degree of threat posed by the intensity of competition and fluctuations in the company's principal business.

To measure environmental dynamism and hostility, the questions were adopted from previous studies by Khandwalla (1977); by Miller and Friesen (1982,1983), and by King and Sabherwal (1992). Their studies produce a high reliability score of 0.72, which is an acceptable level of reliability and therefore can be safely employed in this study. According to Nunnally (1967), a set of instruments can be considered to have an acceptable level of reliability if its reliability score, often represented by Cronbach Alpha coefficient, is around 0.60. A score greater than 0.70 is considered to have a high reliability standard.

The environmental dynamism questions are:

DYN1 The rate at which product technology becomes obsolete in your industry.
DYN2 The rate at which old markets are expanding and the new markets emerge.
DYN3 The predictability of the actions of your few main competitors.
DYN4 The predictability of demands and customer tastes.
DYN5 The frequency with which marketing practices need to be changed to keep pace with the market and competitors.

Similarly, a set of questions on environmental hostility was adopted from the same studies. These questions have a reliability score of 0.68 and can be safely adopted. The environmental hostility questions are:

HST1 perception of threats posed by price competition
HST2 competition in product quality or service novelty
HST3 dwindling market for products and services
HST4 scarce supply of labour and material
HST5 government interference

5.6.2 Performance measure questions

An important variable in exploring relationships of organisational issues relates to performance variable. In this questionnaire, performance measurement is developed to measure the perceived success of the organisation as viewed by respondents. In measuring performance, the questions are adopted from Khandwalla (1977) who measured the index of subjective performance based on the level of profitability, growth of sales, employee morale, financial strength and public image relative to industry average. In his study, the subjective measure was correlated with an objective financial measure, in which it was shown that the aggregate score of the subjective variables correlated fairly strongly (reliability score of 0.59, which according to Nunnally is quite adequate in the early stages of research) with an index of objective performance. This suggests that the index of subjective performance can be used safely as surrogate to an objective performance measure. Using similar questions, the managers were asked to rate their organisation relative to the industry average in terms of long term profitability, growth rate of sales, financial strength and public image which they think have accrued from the use of the IT application. The four items used to measure perceived performance are:

PERF1	Long run level of profitability
PERF2	Growth rate of sales or revenue
PERF3	Financial strength (liquidity and ability to raise capital resources)
PERF4	Public image and goodwill

In addition to the above subjective measures, objective measures are also used. (The rationale for using multiple measures of performance has been discussed in Chapter Three). Objective data are obtainable from secondary sources in Private+ database and include:

- return on investment, and
- average 3-year sales growth.

5.6.3 Strategic Use of IT questions

The strategic use of IT questions are based on elements which comprise dimensions of the SUIT construct generated in Chapter Two. Table 5.1 is a reproduction of the SUIT inventory and its operationalisation variables as argued for in that chapter.

Table 5.1 - SUIT Inventory and its operationalisation

Dimension	Code	Measurement variable
Strategic vision	STRAT1	Supports the overall corporate strategy
	STRAT2	Influences future direction of corporate strategy
	STRAT3	Creates new strategies for the organisation
	STRAT4	Modifies the existing corporate strategy
	STRAT5	Shapes the organisation's strategic plans
	STRAT6	Contributes to achieving strategy
	STRAT7	Severity of consequences if system fails
Strategic targets	TARGET1	Influences customers buying decisions
	TARGET2	Establishes linkages with suppliers
	TARGET3	Causes threats to existing competitors
	TARGET4	Builds an entry barrier for potential competitors
Strategic impact	IMPACT1	Market share
	IMPACT2	Profitability
	IMPACT3	Efficiency of operation
	IMPACT4	Effectiveness of decision making
	IMPACT5	Radical change to the way business is conducted
Strategic sustainability	COPY	Difficult for competitors to copy system
	ADVAN	Duration system has an advantage over competitors
Strategic cohesion	USE1	Co-ordinates functions within the organisation
	USE2	Integrates activities within each function
	USE3	Enables consultation with different expertise
	USE4	Supports critical areas of business
	USE5	Helps managers identify new opportunities
	USE6	Allows staff to experiment with new ideas
	USE7	Gathers information about competitors
	USE8	Anticipates competitors moves
	USE9	Makes accessible diversified sources of information
	USE10	Increasing access to resources

A number of the questions used to measure the degree of strategic use of IT are adopted from King and Sabherwal's (1992) study while some others are derived from the review of the IT literature. The purpose of these questions is to measure the degree of strategic use of IT in the organisation, which, as defined earlier, is the utilisation of information and technology resources in key areas of the business which results in a profound effect on a company's success. The respondents are asked to identify one IT system or application which they think their company has used for strategic purposes and to answer the questions in this section relating to the system or application which they have identified.

The questions focus on the elements that satisfies characteristics identified from our review of the literature. They are segmented according to the dimensions representing strategic use of IT and into constructs comprising elements of strategic use of IT, for example, strategy, impact, target, sustainability and integration. Each is discussed in the following sections.

1) Strategy - the set of questions on strategy attempts to measure the extent to which the IT application identified has been used to support the organisation's overall strategy, or the extent to which it influences the future direction of the strategy. Whether it shapes, modifies and becomes the key factor in the achievement of the organisation's objectives, and the extent to which the organisation depended on the IT application will determine how well IT is applied to support the organisation's strategic objectives.

STRAT1	Supports the overall corporate strategy
STRAT2	Influences future direction of corporate strategy
STRAT3	Creates new strategies for the organisation
STRAT4	Modifies the existing corporate strategy
STRAT5	Shapes the organisation's strategic plans
STRAT6	Contributes to achieving strategy
STRAT7	Severity of consequences if system fails

2) Impact - the set of five questions on impact below focuses on the extent to which the IT application identified has been able to derive benefits to the organisation in terms of increasing the organisation's market share, improving its long-term profitability, enhancing efficiency of operation and effectiveness of decision making and ability to bring about radical changes in the way business is conducted. Questions on market share and profitability are adopted from King and Sabherwal (1992) while the questions on efficiency, effectiveness and radical changes are derived from the review of the literature and comments obtained during the pilot testing.

IMPACT1	Market share
IMPACT2	Profitability
IMPACT3	Efficiency of operation
IMPACT4	Effectiveness of decision making
IMPACT5	Brings radical changes to business conduct

3) Target - questions on strategic target attempt to measure the extent to which the IT application identified has had influence over customer buying decisions, or its ability to establish linkages with suppliers, or the extent to which it causes a threat to existing competitors such that it reduces their

competitive advantage, or its ability to build entry barriers against potential players wishing to enter the market.

TARGET1	Influences customers buying decisions
TARGET2	Establishes linkages with suppliers
TARGET3	Causes threats to existing competitors
TARGET4	Builds an entry barrier for potential competitors

4) Sustainability - questions on strategic strength or sustainability focus around the extent to which the IT application has been able to provide sufficient protection against being imitated by competitors and the length of time such protection can bring sustained advantage to the organisation. They measure the difficulty rivals encounter in trying to copy such an application either in the form of specific uniqueness upon which the application is built, or the high investment cost of setting up the application and so forth. These questions are adopted from the King and Sabherwal (1992) study.

COPY	Difficult for competitors to copy system
ADVAN	Duration system has an advantage over competitors

5) Integration and other characteristics - this group of questions deals with the extent to which the IT application has been used to co-ordinate and integrate activities within the organisation to provide access to the organisation's resources and to support other operational functions. Questions focus on aspects about the extent to which the IT application has been used to capture information about competitors and then use the information to strategically plan its moves ahead of the competitors.

USE1	Co-ordinates functions within the organisation
USE2	Integrates activities within each function
USE3	Enables consultation with different expertise
USE4	Supports critical areas of business
USE5	Helps managers identify new opportunities
USE6	Allows staff to experiment with new ideas
USE7	Gathers information about competitors
USE8	Anticipates competitors moves
USE9	Makes accessible diversified sources of information
USE10	Increasing access to resources

In total, there are 28 questions on strategic use of IT. All of these questions are later subjected to rigorous tests of reliability statistical techniques to ensure a homogenous group of items which measure the degree of strategic use of IT. These tests on reliability of the questions and their validity are discussed in greater detail in Chapter Six.

5.6.4 Managerial characteristics questions

The purpose of the questions in this section is to measure managerial characteristics such as management style, decision making and involvement in organisations. In measuring managerial characteristics, the questions are adapted from a previous study by Khandwalla (1977) whose measure was based on managerial flexibility in the decision making structure and the level of authority in decision making. Their questions were shown to have a fairly high reliability score of 0.52 and a validity score of 0.68 and these questions were assumed to be appropriate for transfer to this study because a similar construct is being measured. A high score for this group of questions would indicate a very rigid authority structure. On the other hand, a low score would indicate that top management tends to adopt a more organic, flexible style as opposed to a mechanistic style. Management flexibility (rigidity) questions are:

RIGID1	My organisation has a structured channel of communication.
RIGID2	My organisation holds fast to established management principles even in changing business conditions.
RIGID3	My organisation gives a significant say in decision making to formal line managers.
RIGID4	My organisation has restricted access to important financial and operating information.

Management decision making style and involvement in project decisions are measured using questions adapted from the same study. These questions have been shown to have a high reliability score of 0.57, and a validity score of 0.85 and focused on management orientation and philosophy towards group decisions and reward systems. The level of involvement is also measured. A high score would indicate that the management style of decision making is more autocratic as opposed to a democratic, consensus-making style when the score is low. Similarly, a high score for involvement would indicate that management is highly involved in deciding, authorising and monitoring a particular project rather than otherwise if the score is low. The questions are:

PART1	My organisation's management is characterised by strongly individualistic decisions.
PART2	Long-term strategic decisions are reached through participative, group decision-making at junior and senior management level.
INNOV1	My organisation encourages staff to experiment with new ideas.

INNOV2	My organisation has specific reward policies for those who contribute to innovations.
INVOL1	The senior management of my organisation is involved in identifying new IT projects.
INVOL2	The senior management of my organisation is involved in authorising new IT projects.
INVOL3	The senior management of my organisation is involved in monitoring the progress of IT projects.
ANAL1	How much effort is put to review organisation's strengths and weaknesses
ANAL2	How much effort is put to obtain information about the industry
ANAL3	How much effort is put to obtain information about trends and development in technology.

Related to management attributes is IT maturity. The questions relating to IT maturity measure the degree to which an organisation recognises the importance of information and technology to the organisation. The level of recognition is reflected in the extent to which the organisation provides computer facilities and has used these facilities to support various departments within the organisation. It can also be assessed in terms of the level of communication between management and IT staff, IT staff knowledge about the organisation's business, top management involvement in IT planning and the integration of IT planning with corporate strategic plans. In operationalising the IT maturity measure, all the questions used in this questionnaire were adopted from King and Sabherwal's study in 1992. These questions were shown to have a high standardised alpha reliability measure of 0.84. The questions were:

ITMAT1	My organisation has microcomputers, software facilities installed throughout the premise.
ITMAT2	All departments in my organisation are supported by IT.
ITMAT3	Activities within each department in my organisation are well co-ordinated using IT.
ITMAT4	Activities between departments in my organisation are well co-ordinated using IT.
ITMAT5	My organisation's production, sales and distribution functions are highly dependent on IT.
ITMAT6	Extent to which IT planning is formalised.
ITMAT7	Extent to which IT planning takes business plans into consideration.
ITMAT8	Top management's knowledge about IT.
ITMAT9	IT staff knowledge about organisation's business.

A high score to these questions would indicate a high level of maturity of IT within the organisation; knowledge about IT tends to be high, communications between IT staff and management tends to be good, infrastructural support in terms of physical hardware, and its prevalence tends to be widespread, and activities are well co-ordinated. On the other hand, a low score would indicate a low level of understanding about IT, low level of communications among staff and a tendency for co-ordination between functions to be lacking.

5.6.5 Organisational questions

Questions relating to organisational characteristics comprised of structural issues such as centralisation of decision making, formalisation of procedures and the level of IT knowledge and maturity. A large number of these questions were adapted from past studies in organisational behaviour and assumed appropriate for transfer to this study due to similar construct being measured. Organisational constructs such as centralisation, formalisation and IT orientation measures are discussed below.

1) Centralisation - all of the questions relating to centralisation were adopted from Hage and Aiken (1969) and King and Sabherwal (1992). They have been shown to have a high reliability score of 0.78 and hence, have been adopted without modification. The questions measure the extent to which decision making authority is concentrated in the hands of the very top people. A high score would indicate that the decision making authority of the organisation is more in the hands of the very top management. On the other hand, a lower score would indicate that the organisation tends to have a more de-centralised decision making structure, that is, more authority is given to middle or line managers to determine and act on their decisions. The questions were:

CENT1	Decisions about development of new products is centralised at the most senior level of management.
CENT2	Raising long term capital to finance new investments.
CENT3	Selection of large new investments.
CENT4	Acquisition of controlling interest in other organisations.
CENT5	Hiring and firing of senior personnel.

2) Formalisation - the questions on formalisation measures the extent to which rules and procedures in the organisation are formalised and to be followed by employees. The questions were adopted from Hage and Aiken (1969) and have been shown to have a high reliability score of 0.85. The questions were:

FORM1	Whatever situation arises we have procedures to follow in dealing with it.
FORM2	When rules and procedures exist, they are usually written.
FORM3	The employees here are constantly checked for rule violation.
FORM4	There are strong penalties for violating procedures.
FORM5	The rules are ignored and informal procedures reached to handle some situations.

A high score would indicate that the organisation tends to have tight formal control of operations and the management is more coercive. On the other hand, a low score would indicate a loose control structure.

5.6.6 Factors affecting Strategic Use of IT

Factors affecting the use of IT in organisation are explored in this study. Questions are divided into those which facilitate and which inhibit strategic IT use. Respondents are asked whether they agree or disagree with statements regarding the extent to which the factors facilitated or inhibited strategic use of IT. The purpose is to rank the importance of each of these factors according to the degree they are perceived as being contributory to facilitating or inhibiting strategic IT use in organisations. The questions regarding facilitators to strategic IT use are:

FACIL1	strong technical support
FACIL2	extensive computer facilities.
FACIL3	pressure from competition.
FACIL4	strong financial position of my organisation.
FACIL5	strong market position of my organisation.

FACIL6	strong top management support.
FACIL7	strong planning capability.
FACIL8	need for innovation.
FACIL9	upward pressure from middle management.
FACIL10	others

The questions regarding barriers to strategic IT use were:

BARR1	lack of appropriate planning.
BARR2	lack of awareness of IT potentials.
BARR3	lack of management support.
BARR4	lack of communications between IT and management.
BARR5	lack of understanding of user needs.
BARR6	power and politics in the organisation.
BARR7	ill-defined management objectives.
BARR8	difficulty in assessing contribution of IT.
BARR9	budget constraints.
BARR10	other priorities are more important than IT.
BARR11	others

5.7 Pilot testing and data collection

The questions were subjected to a series of interviews, rigorous testing and vetting by professors and lecturers at Strathclyde Graduate Business School (SGBS) and the Human Resource Department at the University of Strathclyde for three months. The principal aim was to ensure quality, unbiased, unambiguous questions with high reliability of this fundamental data gathering instrument. Many valuable suggestions have been incorporated in the pilot and final questionnaires including the layout and the order of the questions to enhance the design and quality of the questionnaire.

The questionnaires were then pre-tested with SGBS students. The aim was to verify the relevance of the content and the wordings used in the questionnaires to achieve a sufficient standard of construct validity. In this pre-testing phase, the respondents were asked to comment on the questionnaires for clarity of questions and the length and the ease of completing the questionnaires. The general opinion was that the questionnaires were easy to understand and were of suitable length.

After incorporating modifications to some of the questions to improve flow of information and to reduce ambiguity, the questionnaires were sent to senior executives of 84 randomly selected organisations from the list of companies in Private+ database. Out of these randomly selected companies, 25 companies responded, representing 29.76 percent (or 30 percent) response. This rate of response was used as a basis for sample size determination in section 5.5.1 above. Minor amendments were made before the final questionnaire was sent out.

Data collection procedures involve sending out the final questionnaires to various senior executives of companies. A total of 553 questionnaires were sent to the company directors or the chief executive officers or their immediate assistants. These target respondents were considered appropriate because they were more likely to have valid perceptions of the nature of the competitive environment and company strategy (Chan and Huff, 1992) and therefore would be able to respond effectively.

Data collection administration took approximately six weeks to complete. The first wave of questionnaires was mailed out during the first two weeks of May 1994, followed by a reminder three weeks later.

5.7.1 Response rate

Of the 553 questionnaires distributed, 168 were collected after a follow-up. This represents a 30.4 percent response rate. An analysis of the 168 returned questionnaires showed that 149 respondents indicated that their organisations had an IT system which they believed to be strategic. The other 19 who responded believed their organisation did not have a strategic system. Our interpretation of the latter was that these respondents either did not have a system which they considered to be strategic, or were unsure whether the system in place in their organisation was strategic. Another possibility was that they were not willing to disclose their system for secrecy reasons. Despite that, the percentage of usable questionnaires ready for analysis worked out to be 27 percent.

A summary of the responses is as follows:

Questionnaires distributed	553 (100%)
Questionnaires collected	168 (30.37%)
Questionnaires usable	149 (26.94%)

Reminders were sent out three weeks after the first mailing. Reminding busy respondents is important and has been almost universally successful in increasing the response rate (Emory, 1985).

5.7.2 Non-response bias

Non response bias, or non response error, in mail survey arises when the required statistical information is not secured from all contacted. It occurs when a researcher fails to obtain information from a sufficiently large portion of the population for various reasons (e.g., lack of ability or knowledge to respond, or inaccessibility to the researcher), and that the missing responses affect conclusions about the variables of interest. While it is difficult to eliminate completely the non response bias, there are ways to minimise the bias. One of the ways is to maximise questionnaire returns by preliminary notification and financial incentives. Another way is by following up with either subsequent mailings, or telephone interviews, to find out the reasons for the non response. Still another way is to estimate the effects of non response on the overall conclusions about the variables of interest. This approach is used when the researcher is faced with time and financial constraints as the effort to increase the rate of return becomes more costly and time consuming.

In estimating the effects of non response bias, Amstrong and Overton (1982) use a time trend extrapolation method. This method assumes that sample members who respond less readily (either by answering later or that they require more prodding to answer) are more like non respondents. In this method, known characteristics of groups which respond readily and less readily are compared and extrapolated. If the groups do not differ in their characteristics, it is assumed that there is no systematic differences in their responses, suggesting that the non response bias is not a significant factor.

The time trend extrapolation method is used by several researchers (Hart, 1986 and King and Sabherwal, 1992). Similarly, it is used in this study to analyse non response bias based on the timing the responses are received. The respondents were divided into two groups comprising the first 30 and the last 30 responses received. The intermediate respondents were excluded to clearly demarcate early and late respondents. The groups were compared on five known demographic characteristics of the respondents; the number of full-time employees, ROI, sales growth, age of IT department and the number of IT employees, as well as on their responses for other variables (in this case, responses relating to barriers and facilitators of the strategic use of IT).

The results of 2-tailed t-tests in Figure 5.3 showed that, apart from the responses for the lack of understanding of user needs, pressure from competition and strong financial position, none of the other variables tested produced significant t-test differences (at 10 percent significant level) between early and late respondents. This suggests that, although biases in the responses exist in the sample of questions tested, they are not a significant factor which could affect the conclusions about the variables being studied. (Detail of the non-response analysis is in Appendix D).

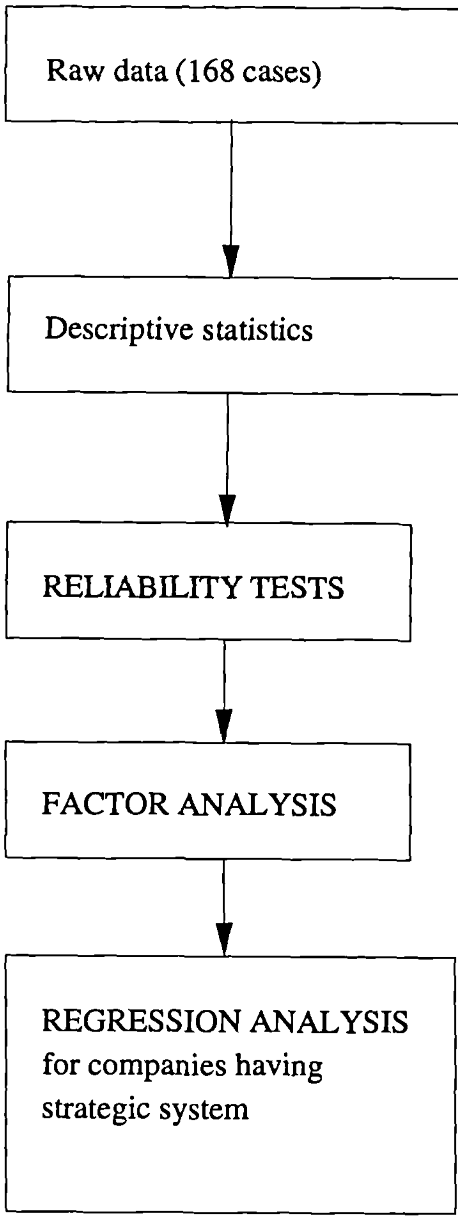
Figure 5.3 - Result of non-response bias between early and late respondents

Variables	degree of freedom	2-tailed significance	Are they significant at 90% level?
Lack of planning	58	.754	Not significant
Lack of awareness of IT potential	58	.716	Not significant
Lack of top management support	58	.356	Not significant
Communication barriers	58	.466	Not significant
Lack of understanding of needs	58	.056	Significant
Strong technical support	58	.437	Not significant
Extensive computer facilities	57	.197	Not significant
Pressure from competition	57	.063	Significant
Strong financial position	57	.076	Significant
Strong market position	57	.249	Not significant
Number of full time employees	58	.191	Not significant
Return on investment	57	.805	Not significant
3-year sales growth	51	.266	Not significant
Age of IT department	56	.871	Not significant
Number of IT employees	58	.117	Not significant

5.8 Framework for data analysis

Having satisfied with the non response issue, the next stage of the research design is the data analysis stage. The process of data analysis began with data coding and data entry involving 168 cases with 108 variables for each case. The overall sequence of data analysis is shown in the flowchart below (Figure 5.4)

Figure 5.4 - Steps in data analysis



Raw data is analysed using SPSS For Windows 6.0 software. Descriptive statistics such as frequency and means are carried out to understand basic characteristics of respondents and their profiles. In the process, anomalies due to data entry errors are corrected.

The next step in data analysis begins with a reliability measure using RELIABILITY procedures for the multi-item scales. This step helps to ensure that only items with high reliability would be retained and used in subsequent analysis. Items that have a low reliability score are eliminated, while those items that are retained would be those which have a sufficiently high reliability for FACTOR analysis.

In factor analysis, variables are grouped into a manageable number of factors which are then analysed and aggregated to determine a 'factor score'. Factor score is the aggregate of values obtained by multiplying the values assigned by individual respondent by the corresponding factor score coefficient. Factor score for each of the constructs used in this thesis is computed and stored as a separate variable.

Once the scores are obtained, REGRESSION analysis is carried out to test the relationship between variables or constructs as proposed in the research hypotheses. Conclusions are subsequently drawn from the results of the regression analysis.

With regard to strategic use of IT measure and the testing of hypotheses involving SUIT, a more specific approach is taken. Data collected from respondents is subjected to reliability and factor analyses in a similar manner following the steps discussed above. Once the items making up SUIT have been determined to possess high reliability, factor analysis is carried out on those items. Apart from being able to reduce the items into a more manageable number of factors, the other objective of using factor analysis is to compute a factor score for SUIT for each company. This score is electronically calculated using SPSS factor score command and is assigned to each company. The result of this calculation produces standardised scores (or index) for companies, ranging from negative values to positive values, with zero being the mean. Companies with a positive score are deemed to exhibit a higher degree of strategic IT use than those with negative SUIT score. As a new variable, the score is used in F-test regression analysis to test specific research hypotheses. The overall framework for data collection and analysis is represented in Figure 5.5. A more detailed discussion of how this was done is explained in the next chapter.

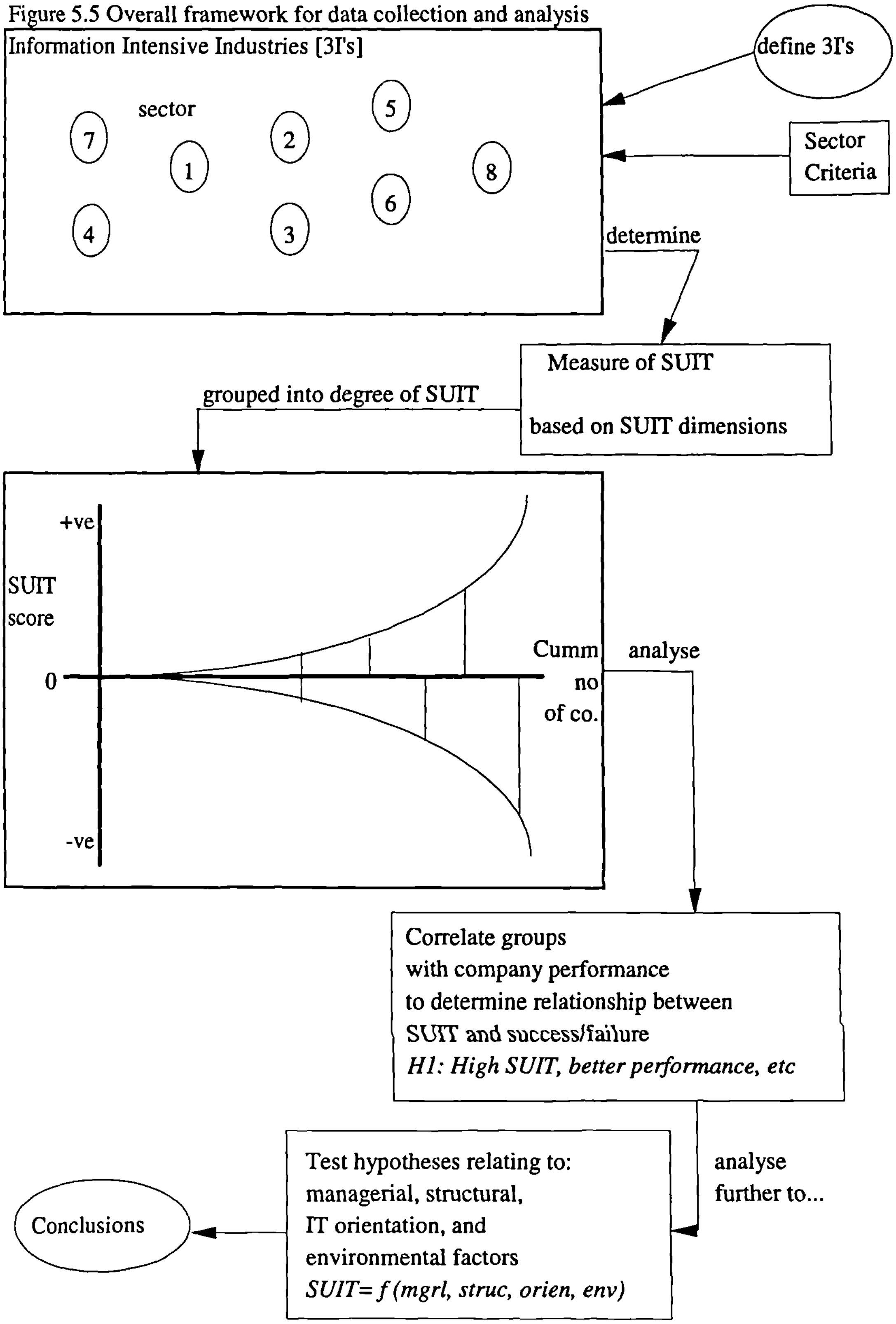
5.9 Summary

This chapter describes the overall approach of the study to test hypotheses of interest between variables and to develop a measurement instrument for SUIT and other constructs. The nature of the study is broadly categorised as non-experimental with exploratory and descriptive bias. Because of the extensive nature of information required in this large scale empirical work, data was collected via sample survey research method. A mail questionnaire was sent to senior executives of companies to gather information about the use of IT in the organisation, its industry, its management decision-making, demographics as well as structure of the organisation before strategic use of IT construct can be studied and its measurement formulated.

A total of 553 companies were randomly selected as samples. 168 responded to the questionnaire, representing 30.4 percent response rate. Data was processed and transformed from its raw form into meaningful groups of factors before it was analysed using SPSS for Windows.

The data gathered would be used to formulate an instrument for SUIT. Using factor analysis, a SUIT factor score would be calculated and assigned to each company participated in the study. Two groups of companies, one having a high SUIT score and another having a low SUIT score would be formed. F-test will be used to determine whether to accept or reject hypotheses of interest.

Figure 5.5 Overall framework for data collection and analysis



CHAPTER SIX

DEVELOPMENT OF MEASURES

6.1 Introduction

This chapter describes development of measures of various constructs used in this thesis. Since one of the objectives of the study is to develop an instrument to measure the degree of strategic use of IT in an organisation, this chapter is devoted to discussion leading to the development of such an instrument. The discussion focuses on measurement issues, the sequence of analysis and the purification process taken to ensure that the resultant instrument possesses a sufficient degree of validity, reliability and robustness. Reliability and factor analysis techniques are widely used, a method suggested by Churchill (1979) and Hair et al. (1992). Measures of other constructs are also discussed. The chapter concludes with a summary of the computation of strategic use of IT score, industry characteristics score, managerial characteristics score and organisational characteristics score which are used for further statistical tests in hypotheses testing.

6.2 Measurement

Measurement is central to research and a foundation of empirical testing (Treacy, 1986). Measurement is defined as a way of assigning numerical values to judgement on attributes of products, ideas, or institutions (Oppenheim, 1992), a process through which the kind and intensity of something is determined (Adams, 1964), and an assignment of points for responses, or the summing of numerals assigned to responses of two or more items (Wiersma, 1991) to provide meaning to the attribute in question. Numerical values are assigned from observation of objects on the assumption that the numbers are analogous to the properties or attributes of the object to be measured (Luck and Rubin, 1987).

Measurement is used to represent theoretical concepts. It is not a surrogate for the concept itself. In social science research, measurement can be used to represent only part of the actual theoretical concept. It may be incomplete because, as Dane (1988) pointed out, concepts in behavioural sciences are inherently multi-dimensional. A good example of the multi-dimensionality of a concept is the performance measure of a company. Some of the dimensions of a performance measure may include returns on capital, sales growth, financial strength, public image, employee commitment, export performance and so on. Because of its multi-dimensional nature, any attempt to capture all these dimensions in one measure is almost impossible. Similarly, in measuring SUIT, issues of multi-dimensionality exist. While efforts are made to uncover attributes of SUIT, admittedly potentially there exists a host of other dimensions which inevitably have been left out. Notwithstanding that, the task of the researcher is to develop a measurement which attempts to capture key elements to reflect the attributes of the object that best represent the concept and to use a scale to assign a numerical value to reflect the observation or perception of respondents about the concept.

There are four types of measurement scales. They are nominal scale, ordinal scale, interval scale and ratio scale (Kerlinger, 1986; Nachimas and Nachimas, 1991). Each of these is reviewed very briefly below as a basis for which measurement scales for SUIT are constructed.

a) Nominal Scale

The nominal scale is the weakest scale of measurement. Numbers are used as 'labels' and carry no mathematical meaning other than classifying attributes into categories to designate differences in characteristics. For example, numbers are used merely to designate gender (male = 1, female = 2), or status (married = 1, single = 2) and have no other mathematical connotations. Statistical tools that can be used for this scale are restricted to lower level statistics such as percentages, mode and chi-square test.

b) Ordinal Scale

In addition to indicating difference, the ordinal scale provides information about whether an object has more of a certain attribute than another, such as low score to high score, or least to most. The scale orders the scores and indicates a relative difference. For example, one's attitude towards advertising is more positive than another's, or, one is more superior than the other. The ordinal scales do not, however, indicate the difference between the intervals in absolute terms. Hence, if two items have ranks 5 and 7 and the other two have 1 and 3, it is wrong to say the difference between the two are equal. With ordinal scales, the statistical tool is restricted to percentiles, median test and rank order correlation plus other statistical tests applicable for nominal scale.

c) Interval scale

Unlike the previous two scales, the interval scale is able to rank-order a set of observations and to measure the exact equal distance between each of the observation. In this measurement scale, the perceived distance between rank position 1 and 2 is the same as the distance between 3 and 4. Hence, the difference between the two intervals can be said to be equal. An interval scale provides a measure of intensity and the researcher will not only be able to say that the object is greater than another, but will also be able to specify by how many units the former is greater that the latter. But, because this scale does not have absolute zero value, no conclusion can be drawn about the relative magnitude of the rank positions. One cannot say that 30 degree Celsius is twice as warm as 15 degree Celsius, because 0 degree is not an *indication of a total lack of heat.* It can determine how much of an attribute exists. A higher and more rigorous statistical tool can be used with interval data, such as range, means, standard deviation, t-test and z-test and regression analysis.

d) Ratio Scale

Ratio scale is the highest level of measurement. It possesses characteristics of nominal, ordinal and interval scales, and has a meaningful absolute or zero value. A zero value represents an object that has none of the properties being measured. Properties that have zero value can be age, costs, sales and experience. Hence, if a company has sales of £200,000 this means that it has generated twice as much sales as another company with £100,000 sales. In addition to the statistical tools applicable for the other scales, ratio scale enables use of other higher level statistical tools such as geometric means and coefficient of variation.

In this study, attitudes towards the use of IT are explored. Since questions are asked about the manager's perception of SUIT and about characteristics of IT in the organisation, an attitudinal scale is considered appropriate. The objective is to come up with an index which measures how strategic IT is being employed in organisations and to design a scale for the instrument that can employ a high level of statistics which is robust enough to produce information or data eligible to be statistically interpreted. Once this is achieved, it will be easier to draw maximum meaning from them.

In determining the type of scales to use in this study, the level of measurement and desired statistical tools are considered. Measurement scales are constructed to measure the level of agreement or disagreement to certain items making up SUIT as well as other constructs, and are based on the extent of statistical tools desired. Likert scale is considered appropriate and hence employed extensively. Each item in the questionnaire is scored arbitrarily on 1 (strongly disagree) to 7 (strongly agree) so that the greater the score, the more positive the attitude or agreement. For example, a survey on senior manager's perception of environmental uncertainty which has 10 items is scored on 1 (strongly disagree) to 7 (strongly agree). When the item scores are summed (by adding the numerals assigned to responses) the sum represents a meaning that can be ascribed to a perceived attitude toward environmental characteristics. The higher the summated score, the more positive or negative (depending on how the questions are structured) is their perception about uncertainty in the environment. Once the level of measurement has been established, appropriate statistical tools can then be applied to produce data useful for drawing meaningful conclusions.

Two essential characteristics of a measurement that must be considered to establish whether an instrument is appropriate or useful are reliability and validity.

a) Reliability

Reliability means consistency of the instrument in measuring whatever it intends to measure. A reliable measure is one which, when replicated in other contexts, produces consistent results when applied at different times and on different individuals. To have a reliable measure of SUIT, the instrument developed should be able to withstand replication when used in other contexts and be able to produce consistently similar results.

There are statistical tools to estimate the reliability of a measure, such as test-retest, split-half and Kuder-Richardson procedures, but one of the most common procedures is the Cronbach's Alpha, a formula developed by Cronbach in 1951 which assesses the degree to which the item used is internally consistent with other items comprising a construct. Not only it is simple to administer, it is also widely accepted as a technique to test reliability of a measure in social science research. Using statistical packages, Cronbach Alpha coefficients can be easily computed to generate indicators of internal consistency based on item-total correlation. In this study, Cronbach's Alpha statistical technique is used to test the reliability of the SUIT measure and to ensure a high reliability, only those items with high item-total correlation scores are retained in the construct. Procedures for retaining and omitting items in reliability testing are discussed in greater detail in Chapter Six.

b) Validity

For a measure to be valid it must be able to accurately measure what it is supposed to measure. It must measure the characteristics, traits and attributes for which it is intended. In this thesis, the instrument should measure the degree of strategic use of IT, its attributes, characteristics and other traits.

There are a number of ways to test the validity of the measure. The main ones are content and construct validity. Content validity refers to whether a measure completely and exhaustively contains all the elements of a particular theme or construct. Price and Mueller (1986) suggest that an instrument should be tested for content validity to ensure that all the elements which represent a particular theme or construct are present and complete. However, because there is no statistical test to verify content validity, researchers normally seek the opinion of an expert in the area or use their own subjective judgement to determine whether all the elements are present to form a construct. Construct validity, on the other hand, assesses the extent to which the information gathered is measuring what it is supposed to measure, and not something else. It refers to the extent to which an empirical measure is consistent with the theory about the concept. This test poses quite a problem especially when dealing with attitudinal measures commonly found in social science research. This is because attitude, which is itself a construct, is difficult to observe. What is observable is the behaviour related to the attitude. Hence a measuring instrument on attitude should be able to capture perceptions or attributes representing the attitude in question. According to Churchill (1988), attitudinal measure has to have a working definition and a set of questions relevant to the construct to test whether the measure confirms or denies the hypothesis or theory upon which the construct is built.

In this study, the validity of the SUIT instrument can be supported from three perspectives. The first is by way of an extensive review of the literature to ensure that key elements of the SUIT construct are present and consistent with the concept developed earlier in the thesis. In the absence of a proper measure of SUIT in the past, subjective judgement is used to gauge the adequacy of elements forming a construct, hence supporting content validity. The second is based on the fact that many of the variables used in the instrument are adapted from the Sabherwal and King (1991) study in which the authors had sought the opinions of experts in the area of IT to indicate if attributes of an IT system satisfied those which they (the experts) believed to be strategic. Such an opinion is very valuable to lend support to content validity. The third evidence of validity - construct validity - is statistically supported using factor analysis, an approach suggested by Mason and Bramble (1989). According to them, factor analysis can be used to support construct validity because it allows sets of highly correlated variables to be grouped into 'factors' that determine the structure of a concept and into groups which the instrument is designed to measure. A factor consists of sets of variables that correlate highly among themselves but not with other variables, and by virtue of that, factor analysis is able to isolate those variables which are irrelevant to the group. As explained in the later chapters, factor analysis is widely used in formulating the SUIT measure and in the process allows construct validity to be verified.

The closest attempt to develop SUIT as a construct was made by Sabherwal and King (1991). Sabherwal and King examined examples of strategic applications of information systems and analysed commonalities in their characteristics to develop testable theoretical propositions using an inductive approach. In the process of building a theory of strategic IT, they selected eleven concepts which were mapped against the various applications identified by managers who participated in their survey. These concepts are:

1. Process initiation - which indicates how the process leading to the strategic application was initiated,
2. Process driving force - which indicates whether the decision leading to the strategic application was driven by business or technical issues,
3. Information resources used - whether the information or technology element is the main basis used to initiate the strategic application,
4. Information systems skill utilised - indicating which of the IT capabilities is mainly employed in initiating strategic IT applications,
5. Value chain - which implies the impact IT has on the value chain of the organisation,
6. Level of corporate strategy affected - which indicates whether the strategic application has significantly influenced either of the corporate strategy levels; internal strategy, competitive strategy or portfolio strategy.

7. The effect on key competitive forces - namely threat of new entrants, existing competitors, suppliers, customers and threat of substitutes.
8. Forms of competitive advantage - namely differentiation advantage, cost advantage, innovation advantage, growth advantage or alliance advantage,
9. Degree of innovation - whether the company is more receptive to new ideas relative to its competitors,
10. The size of competitive advantage - measured by the company's ability to achieved a 'better than normal' return on investments or the extent to which the application reduces the competitor's advantage, and
11. Information intensity - whether the industry level characteristic such as information intensity influences the strategic application.

Against these concepts, several experts in the area of IT were asked to evaluate whether an application had 'high' or 'low' competitive advantage. The experts were requested to rank the IT applications with a 'low', 'medium'. or 'high' competitive advantage by assigning a score if it met their attributes of a strategic system. An application which was scored high by the judges was considered to have a high competitive advantage and one which was scored low was deemed to have a low strategic competitive advantage. These applications were later compared against company performance. Chi-square tests showed that the use of IT is positively associated with high competitive advantage.

There is evidence of a verification of content and construct validity in their research in that they have reviewed cases of successful applications rather extensively and have sought the opinion of experts in the area to map these concepts onto IT application to determine if the application yielded 'high competitive advantage' or 'low competitive advantage'. Credit should be given to the authors for attempting to develop constructs which potentially could be the basis for a theory in strategic use of IT. As recognised by the authors, the study, however, suffers adversely from the lack of generalisability due to the small sample size of 34 applications. It also suffers from a lack of objectivity of measures for competitive advantage.

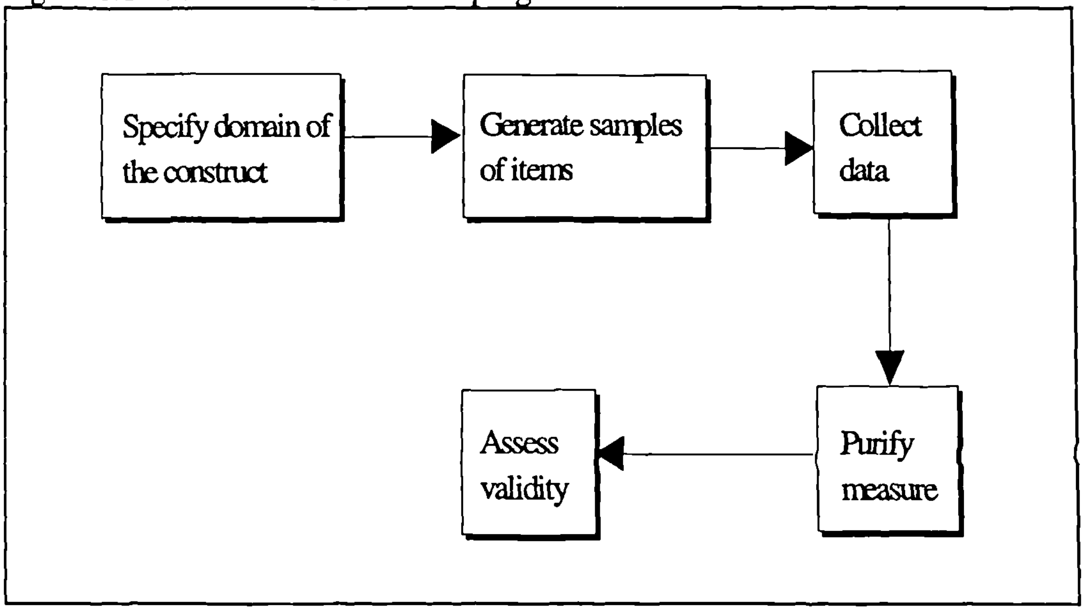
Another criticism is that there was no attempt by the authors to employ high level statistical techniques despite the quality of information gathered. For example, factor analysis could have been employed on strategic information systems data to reduce the number of variables into key components to validate construct validity and to enable more sophisticated tests of relationships to be carried out.

Yet another criticism is its complexity. It seems that the instrument is difficult for busy managers to implement due to its complexity in assessing the degree of their strategic application of IT. For example, in assessing whether an application has low or high competitive advantage, the application in question has to be mapped against the eleven concepts mentioned above. Without clear understanding of the eleven concepts, it is very difficult to carry out an independent assessment. The complexity potentially arises because the managers may not have fully understood how the concept can be mapped against their IT application and how to rate the organisation in the same way as the judges did.

6.3 Measurements employed in this study

In developing a measure of SUIT in this thesis, an approach suggested by Churchill (1979) is adopted, involving five stages as shown in Figure 6.1.

Figure 6.1 - Procedures for developing measures



Adapted from Churchill (1979)

To ensure a high reliability of SUIT measure, all the 28 variables identified are subjected to a purification process and reliability assessment. The purification process involves retaining items of high item-total correlation and omitting items of low item-total correlation scores through an iterative reliability procedure available in the statistical package. This ensures that the SUIT construct contains only items of high reliability which in turn supports a sound SUIT measure.

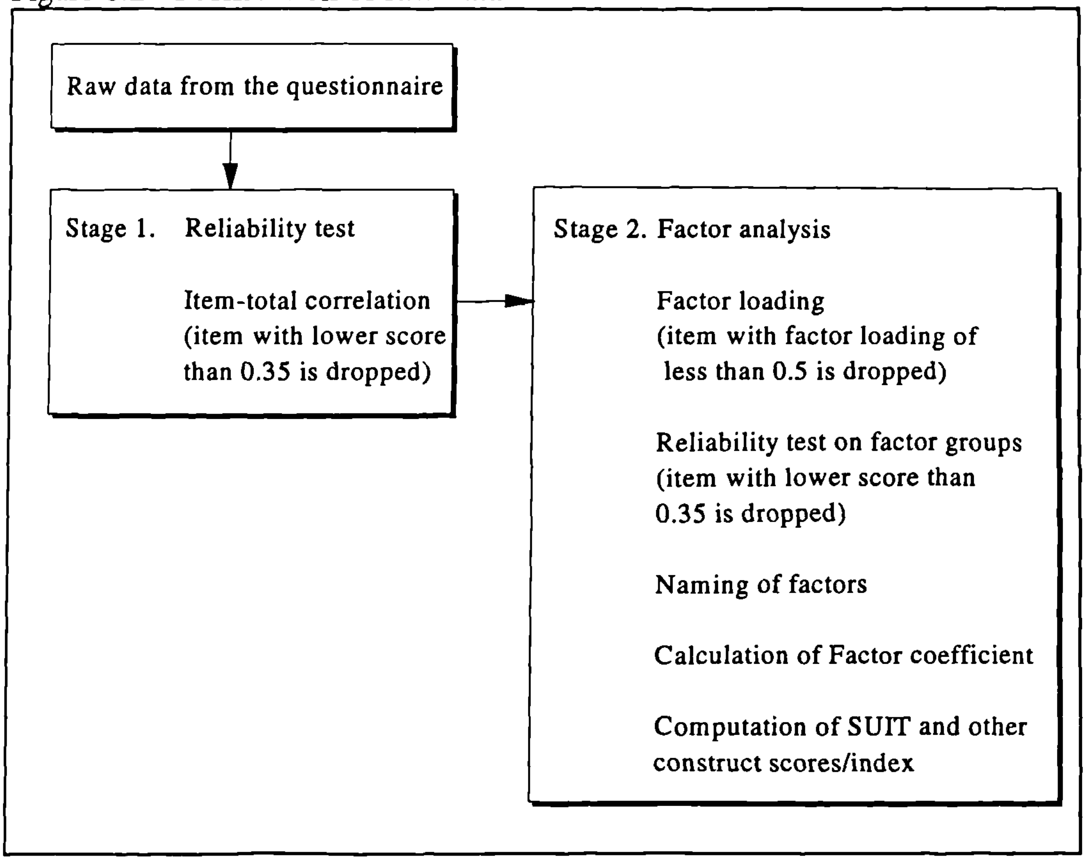
It is felt that the instrument used in this thesis to measure SUIT meets the criteria required for a valid measure. Content validity is satisfied since review of the literature is extensive. Also, many of the questions used to formulate the SUIT measure are adapted from the Sabherwal and King study, all of which had undergone testing by experts in the area of IT. Presumably the SUIT measure developed in this study possesses a sufficient or a similar degree of validity to that of Sabherwal and King's. Content validity is enhanced by virtue of the empirical approach adopted in this study. While Sabherwal and King admitted that their study suffered representativeness, this study employs an industry-wide survey whose 168 final respondents were selected randomly based on a carefully designed selection procedure to ensure representative population. Because the items under testing are employed on samples which are representative of the population domain, content validity is strengthened. Construct validity, which concerns the degree to which an instrument measures the construct it was designed to measure, is also evident. This is because the instrument is robust enough to cater for higher level statistics in order to derive conclusions which are meaningful. Scales of the instrument are designed such that data can be summed up and interpreted using higher level statistics. As a result, factor analysis can be used, from which a parsimonious group of factors are derived. According to Mason and Bramble (1989) construct validity can be supported using factor analysis because the factor analysis allows formation of groups of factors which correlates highly among themselves as one construct, but not with other constructs. Factor score, an ultimate determinant of the degree of SUIT measure, and available as an element in the factor analysis, can be calculated and ultimately determines the degree of SUIT. Detail of how the factor score and the degree of SUIT is derived statistically is discussed in Chapter Six.

6.4 Purification process

An overview of the sequence of the purification process leading to the formulation of the measurement instrument for SUIT is outlined in Figure 6.2. Raw data from the questionnaire was first subjected to a reliability test available in the SPSS for Windows package. From the reliability analysis, 'corrected item-to-total correlation' scores were obtained. Item-to-total score indicates how consistent a variable is within a set of indicators which 'share' the degree to which they measure a construct. The higher the score, the greater is the confidence that the individual indicators are consistent in their measurement of a construct (Hair et al., 1992). In determining the threshold score, we have adopted Edgett's (1991) suggestion that items having a score of 0.35 and higher shall be retained for further computation. Items which score below 0.35 will be removed. Such removal helps in making a construct more reliable and ensures a high reliability of the instrument to be developed.

The next stage in the purification process is the factor analysis. In this stage, only those items which possessed a high factor loading were retained. A factor loading is a correlation between an item and a given factor (Norusis, 1992) and is commonly used by factor analysts as a preliminary examination of significance of an item in interpreting the factor matrix. The higher the factor loading value of an item, the better it is in enhancing reliability, significance and robustness of the measuring instrument. A factor loading value of 0.50 or higher is considered very significant in interpreting the factor matrix (Hair, et al., 1992), and in this study, following Nunnally's (1967) suggestion, those items (whose factor loading is 0.50 or higher) would be retained for further analysis.

Figure 6.2 - Purification of raw data



(adapted from Hair, et al., 1992)

The above sequence in the purification process was also employed in measuring other constructs that were used in this thesis. Results of the process for measures such as industry, managerial and organisational characteristics will be discussed briefly in the last part of the chapter.

6.5 Development of Strategic Use of IT measure

Table 6.1 reproduces dimensions of SUIT and the corresponding twenty-eight questions formulated in the earlier chapter to measure the degree of SUIT. Like all the other constructs used in this study, the questions underwent the two stages of data purification process described above to ensure a high degree of reliability and robustness.

Table 6.1 - Proposed dimensions of SUIT and their operationalisation

Dimension	Code	Measurement variable
Strategic vision	STRAT1	Supports the overall corporate strategy
	STRAT2	Influences future direction of corporate strategy
	STRAT3	Creates new strategies for the organisation
	STRAT4	Modifies the existing corporate strategy
	STRAT5	Shapes the organisation's strategic plans
	STRAT6	Contributes to achieving strategy
	STRAT7	Severity of consequences if system fails
Strategic targets	TARGET1	Influences customers buying decisions
	TARGET2	Establishes linkages with suppliers
	TARGET3	Causes threats to existing competitors
	TARGET4	Builds an entry barrier for potential competitors
Strategic impact	IMPACT1	Market share
	IMPACT2	Profitability
	IMPACT3	Efficiency of operation
	IMPACT4	Effectiveness of decision making
	IMPACT5	Radical change to the way business is conducted
Strategic sustainability	COPY	Difficult for competitors to copy system
	ADVAN	Duration system has an advantage over competitors
Strategic integration	USE1	Co-ordinates functions within the organisation
	USE2	Integrates activities within each function
	USE3	Enables consultation with different expertise
	USE4	Supports critical areas of business
	USE5	Helps managers identify new opportunities
	USE6	Allows staff to experiment with new ideas
	USE7	Gathers information about competitors
	USE8	Anticipates competitors moves
	USE9	Accessible to diversified sources of information
	USE10	Increasing access to resources

6.5.1 Reliability analysis

Reliability technique is one of the most widely used techniques by researchers to ensure high reliability of their multi-scale item questionnaire (Churchill, 1979). This technique is found suitable to the SUIT measure as the latter comprises multi-scale item questions. For the SUIT construct, all the 28 questions were subjected to reliability analysis based on five dimensions; strategic vision, strategic targets, strategic impact, strategic integration and strategic sustainability. Items with a 'corrected item-total correlation' score of 0.35 and higher were retained while items with a lower score than 0.35 were removed to increase the consistency and reliability of the measure (Edgett, 1991).

Details of the reliability analysis is presented in Appendix E, a summary of which is reproduced in Table 6.2.

Table 6.2 - Reliability analysis

		Corrected Item-total Correlation
STRAT1	supports strategy	.2055*
STRAT2	influences direction of strategy	.5908
STRAT3	creates new strategy	.6457
STRAT4	helps modify existing strategy	.6292
STRAT5	helps shape strategic plans	.5847
STRAT6	contributes in achieving strategy	.1464*
STRAT7	how serious if system were to go wrong	.1779*
TARGET1	influences customer buying decision	.4920
TARGET2	establishes supplier linkages	.2993*
TARGET3	causes threat to competitors	.6470
TARGET4	builds entry barriers	.6024
IMPACT1	impact on market share	.4181
IMPACT2	impact on profitability	.5210
IMPACT3	impact on efficiency of operation	.2785*
IMPACT4	impact on effectiveness of decision-making	.2996*
IMPACT5	brings radical change to the way business is conducted	.3485*
ADVAN	length of advantage	.5387
COPY	difficulty in copying this system	.5387
USE1	coordinates functions	.6344
USE2	integrates activities across function	.6402
USE3	integrates expertise	.5715
USE4	supports critical areas of business	.2968*
USE5	identifies new opportunities	.4824
USE6	allows staff to experiment with new ideas	.5071
USE7	gathers information about competitors	.4768
USE8	anticipates competitors moves	.3942
USE9	increases access to sources of information	.3850
USE10	increases access to resources	.4375
Total items=28	Items marked * have scores lower than 0.35 and are omitted in subsequent analysis	

Eight items produced a poor correlation score (of less than 0.35 - marked with an asterisk) and were dropped. The remaining 20 items were found to have item-to-total correlation scores higher than 0.35 and were retained for subsequent analysis.

The determination of high item-to-total score items completes the first stage of data purification. Next, is the factor analysis on the twenty items that were retained. It is worthwhile noting that reliability analysis will be conducted again to determine the overall reliability score for all constructs after factor analysis is conducted.

6.5.2 Factor analysis

The main objective of factor analysis is to reduce the wide ranging number of variables into more manageable groups of factors (Lehmann, 1989). It assumes that there are only a few basic dimensions that underlie attributes of a certain construct to be measured and it then correlates the attributes to identify these basic dimensions (Churchill, 1988). Factor loadings produced from factor analysis is used to indicate the correlation between each attribute and each score. The higher the factor loading, the more significant that attribute is in interpreting the factor matrix (Hair, et al., 1992). Factor analysis also produces factor score coefficient which is used in the computation of the scores for the respective constructs.

To use factor analysis, a number of requirements need to be met. For factor analysis to be appropriately applied, variables under study have to be at least of interval scale (Sproull, 1988). In this study, however, almost all of the variables used are of ordinal scale. However, this does not preclude use of factor analysis because an ordinal scale can be treated as an interval scale if one assumes that the distortion introduced by assigning numeric values to ordinal categories are not very substantial (Kim, 1975). Kim and Mueller (1987) indicate that many ordinal variables may be given numeric values without distorting the underlying properties. In this study, it is assumed that the distortion effect as a result of assigning numeric values to ordinal data is not significant and that they pass the test described above.

The second requirement is that the ratio of respondent to the number of variables should be four-to-one (Edgett,1991). Depending on the nature of the study, Hair, et al., (1987) argues that a two-to-one ratio is acceptable if the research is exploratory in nature. If this ratio is adopted, the minimum sample size should be 100. In this study, the usable sample size was 149 and based on the number of variables used in the SUIT construct, which is 20, the ratio of respondent to variable is 6.4:1, far exceeding the recommended ratio. The sample size requirement is therefore satisfied.

In testing whether factor analysis is appropriate in this study, the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy test is employed. The KMO test would indicate whether it is apt to proceed with factor analysis. A small value on the KMO test indicates that the factor analysis may not be a good option, but the higher the value, the better. Kinnear and Gray (1994) suggest that the KMO value should be greater than 0.50 for factor analysis to proceed. Norusis (1992) quoted Kaiser (1974) as suggesting that The KMO measures in the 0.90's is considered as 'marvellous' sample adequacy for factor analysis purposes, in the 0.80's as 'meritorious', in the 0.70's as 'middling', in the 0.60's as 'mediocre', in the 0.50's as miserable, and below 0.50's as 'unacceptable'.

In addition to the KMO test, the Bartlett test of sphericity is also used. The Bartlett test of sphericity and its significance level indicate a relationship among variables in an identity matrix and it determines whether factor analysis is an appropriate technique to use. If the Bartlett test value is not significant (that is, its associated probability is greater than 0.05), then there is a danger that the correlation matrix is an identity matrix (where the diagonal elements are 1 and the off diagonal elements are 0) and is therefore unsuitable for further analysis (Kinnear and Gray, 1994). What is required is that the value for sphericity is large and the associated significance is small, that is, less than 0.05. When these criteria are present, further use of factor analysis is suitable.

In testing whether factor analysis was appropriate for the SUIT instrument, KMO and Barlett tests were conducted. The result is reproduced in Table 6.3, details of which is presented in Appendix F.

Table 6.3 - KMO and Bartlett Tests results

------- F A C T O R   A N A L Y S I S ------

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .80166
Bartlett Test of Sphericity = 1384.5008, Significance = .00000

Kaiser-Meyer-Olkin measure for SUIT variables showed a value of 0.80166. This indicates a 'meritorious' adequacy according to the Kaiser (1974) scale and hence is very appropriate for use in further factor analysis. The observed value of Bartlett sphericity is also very large (1384.5008) and its associated significance level is very low (0.0000). Combining the results of the KMO measure and the Bartlett test of sphericity, the variables used in the SUIT measure clearly met the conditions for subsequent tests of factor analysis. Overall, the result shows that factor analysis is suitable and can be appropriately applied for the SUIT variables.

Factor analysis technique also produces final statistics which shows communality figures, Eigenvalue and percentage of variance. The result for SUIT analysis is shown in Table 6.4.

Table 6.4 - Final Statistics

Variable	Communality		Factor	Eigenvalue	Percentage of Variance	Cum Pct
ADVAN	.78893	*	1	6.19359	31.0	31.0
COPY	.74677	*	2	2.76420	13.8	44.8
IMPACT1	.74949	*	3	1.61056	8.1	52.8
IMPACT2	.51688	*	4	1.56508	6.8	60.7
STRAT2	.83491	*	5	1.15795	5.8	66.5
STRAT3	.80807	*	6	1.06792	5.3	71.8
STRAT4	.77085	*				
STRAT5	.80580	*				
TARGET1	.69509	*				
TARGET3	.72720	*				
TARGET4	.65097	*				
USE1	.80235	*				
USE10	*.40434*	*				
USE2	.85212	*				
USE3	.54908	*				
USE5	.65982	*				
USE6	.64520	*				
USE7	.85777	*				
USE8	.86873					
USE9	.62492					

Communality is the amount of variance an original variable shares with all other variables included in the analysis (Hair, et al., 1987). It shows how much of the variance in the variables has been accounted for by the factors. For example, STRAT2 accounted for 83.5 percent of the variance whereas IMPACT2 accounted for 51.7 percent of the variance. The higher the observed communality value also means that there is a higher degree of 'commonness' among factors to explain the variance. In other words, the variables making up a common factor explains the variance more than the ones with a lower communality value. In this result, all the variables, except item USE10, have values greater than 0.5. This indicates that there is a high degree of confidence in the factor solution for the variables used in the SUIT measure.

In determining the minimum number of factors, principal component analysis (PCA) is used and has been suggested in research that are concerned with determining the minimum number of variables to account for the maximum number of variance in the data (Hair, et al, 1987). PCA with an Eigenvalue of greater than 1.0 is considered significant (Everitt and Dunn, 1983) and can be used to determine the factors to extract. From the result of this analysis, it was observed that the number of factors extracted is 6, and they explained 71.8 percent of the variance.

After the number of factors was determined, the factors were rotated using Varimax rotation in order to transform the variables into groups of factors for easier interpretation. The result of the Varimax rotation is shown in Table 6.5.

Table 6.5 - Rotated Factor Matrix (first run)

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
STRAT2	.87256	.09923	.17361	.06055	.11672	.12754
STRAT5	.86366	.15557	.14891	.08746	.03896	.06593
STRAT4	.78462	.16657	.16985	.28092	.09118	.10674
STRAT3	.78338	.16497	.20008	.27697	.20914	.08181
TARGET3	.00796	.82257	.07882	.12691	.09070	.14130
TARGET1	.15494	.81289	.07510	-.00029	.06817	.00118
IMPACT1	.29460	.80067	-.09087	-.05267	.08232	-.06174
TARGET4	.01283	.64825	-.05931	.24173	.15530	.38015
IMPACT2	.36546	.51752	-.13511	.00409	-.14311	.27701
USE2	.09413	.01036	.91097	.11320	.01038	.01902
USE1	.17919	.00223	.86525	.13881	.02984	.03770
USE10	.15761	-.04253	.57977	.01150	.19452	.05992
USE3	.13394	.02998	.57749	.38484	.20663	.07713
USE9	.09702	-.08727	.15774	.75934	-.01453	.07870
USE6	.27075	.24136	.14996	.68040	.16430	.03495
USE5	.48435	.19636	.13270	.58861	.12303	-.08638
USE8	.16272	.21266	.10820	.05003	.88473	-.00874
USE7	.12820	.02055	.20888	.13440	.88233	.02671
ADVAN	.16331	.04110	.13736	.10246	.03105	.85454
COPY	.07548	.21533	.03018	-.03626	-.01605	.83200

As observed in Table 6.5, the Varimax rotation produced six groups of factors, all of which seemed to have large factor loadings. A factor loading is a correlation between an item and a given factor (Norusis, 1992) - the higher the loading, the more significant an item is in explaining the meaning of each factor. As a rule of thumb, Hair, et al., (1992) suggest that if the factor loadings are +0.50 or greater, they are considered very significant, loadings of +0.40 are considered more important and loadings greater than +0.30 are considered significant. In this case, the results showed that all the items have a factor loading of more than 0.50, implying that the items making up each of the factors very significantly correlated to the factor itself.

Subsequently, reliability tests were conducted for each of the factors to determine good (or poor) indicators of internal consistency based on item-total correlation. Details of this stage of the reliability test is produced in Appendix F, a summary of which is reproduced in Table 6.6.

Table 6.6 - Reliability Analysis Results for SUIT

	Item-total Correlation	Cronbach Alpha
Factor1		.9183
STRAT2	.7922	
STRAT5	.7957	
STRAT4	.8215	
STRAT3	.8391	
Factor2		.8215
TARGET3	.6838	
TARGET1	.6631	
IMPACT1	.6847	
TARGET4	.5798	
IMPACT2	.4834	
Factor3		.7990
USE2	.7696	
USE1	.7302	
USE3	.5251	
USE10	.4458	
Factor4		.6785
USE9	.3276*	
USE6	.5845	
USE5	.5759	
Factor5		.8619
USE8	.7574	
USE7	.7574	
Factor6		.7002
ADVAN	.5387	
COPY	.5387	

* item is dropped due to poor item-total correlation

It is observed that all the items have item-total correlation scores of greater than 0.35 (Edgett, 1991) with an exception of one variable (USE9), whose score is 0.3276. Item USE9 was subsequently dropped. After dropping this variable, all the other variables that were retained have a very significant factor loading. Because of the omission of item USE9, the factor analysis cycle has to be run again until no more low factor loading items are present (Parasuraman, et al., 1988). Having carried out the factor analysis again, the item USE6 was dropped due to low factor loading as indicated in Table 6.7 (Details of this is in Appendix F).

Table 6.7 - Rotated Factor Matrix

VARIMAX converged in 6 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT2	.86053	.06774	.11830	.09828	.15795
STRAT5	.85448	.12632	.11294	.01597	.09607
STRAT4	.82705	.16047	.19340	.08316	.11944
STRAT3	.82651	.15742	.21863	.20209	.09542
USE5	.62117	.22645	.27809	.13643	-.10945
USE6	.44459*	.28994	.32925	.19315	-.00673
TARGET3	.04758	.83148	.11068	.08514	.12690
TARGET1	.16577	.79923	.04846	.05458	-.00077
IMPACT1	.28936	.77229	-.15280	.07431	-.05431
TARGET4	.06630	.67999	.00931	.16697	.36009
IMPACT2	.35404	.50699	-.16822	-.14386	.28891
USE2	.10997	-.00831	.90147	-.01344	.02752
USE1	.19640	-.01422	.86095	.00638	.04655
USE3	.22512	.04634	.66809	.20825	.06070
USE10	.14258	-.05773	.54086	.18421	.07745
USE7	.16244	.02948	.20849	.88744	.02369
USE8	.17805	.21073	.11187	.87202	-.00770
ADVAN	.17293	.05495	.11718	.05964	.84522
COPY	.04566	.21569	.06867	-.04508	.82209

* Item dropped due to low factor loading (loading < 0.50)

Again the factor analysis was performed but no more items were omitted. The final results showing the final statistics and rotated factor matrix are reproduced in Table 6.8.

Table 6.8 - Final statistics and Rotated Factor Matrix for SUIT (final run)

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	.77194	*	1	5.68515	31.6	31.6
COPY	.74017	*	2	2.70349	15.0	46.6
IMPACT1	.72546	*	3	1.60469	8.9	55.5
IMPACT2	.51682	*	4	1.55764	8.7	64.2
STRAT2	.80277	*	5	1.15363	6.4	70.6
STRAT3	.80833	*				
STRAT4	.76977	*				
STRAT5	.78765	*				
TARGET1	.67924	*				
TARGET3	.72736	*				
TARGET4	.62702	*				
USE1	.79974	*				
USE10	.37356	*				
USE2	.83861	*				
USE3	.52879	*				
USE5	.49267	*				
USE7	.86370	*				
USE8	.85101	*				

- - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 6 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT2	.86488	.08287	.13171	.10131	.14239
STRAT5	.86201	.14553	.13134	.02083	.07569
STRAT4	.82589	.16587	.19715	.08772	.11658
STRAT3	.82503	.16380	.22357	.20628	.09106
USE5	.60306	.20059	.25120	.14284	-.07239
TARGET3	.04101	.83064	.10959	.08734	.12680
TARGET1	.16296	.80393	.05392	.05846	-.00724
IMPACT1	.28925	.78157	-.14265	.07808	-.06699
TARGET4	.06541	.68317	.01134	.16928	.35670
IMPACT2	.35627	.51739	-.15985	-.14369	.27568
USE2	.10943	-.00149	.90886	-.01131	.02177
USE1	.19875	-.00507	.87095	.01055	.03921
USE3	.21645	.03221	.65400	.21484	.08385
USE10	.14739	-.03676	.56165	.18019	.05075
USE7	.16089	.03163	.21151	.88970	.02271
USE8	.17407	.21283	.11462	.87302	-.01027
ADVAN	.17220	.05258	.10927	.05722	.85106
COPY	.04460	.21191	.05985	-.04689	.82915

As can be seen, the initial six groups of factors have now been reduced to five groups of factors. Since all the items now possess high factor loadings, no more items is deleted and the factor determination is completed. As observed, there are 5 factors making up the SUIT construct comprising 18 elements (out of the original 28 elements). Following the factor determination, another reliability test was conducted (Table 6.9) to determine the overall reliability of the factors, or the Cronbach Alpha value.

Table 6.9 - Reliability Analysis Results for SUIT (final run)

	Item-total Correlation	Cronbach Alpha
Factor1		.8995
STRAT2	.7795	
STRAT5	.7769	
STRAT4	.8129	
STRAT3	.8356	
USE5	.5552	
Factor2		.8215
TARGET3	.6838	
TARGET1	.6631	
IMPACT1	.6847	
TARGET4	.5798	
IMPACT2	.4834	
Factor3		.7990
USE2	.7696	
USE1	.7302	
USE3	.5251	
USE10	.4458	
Factor4		.8619
USE7	.7574	
USE8	.7574	
Factor5		.7002
ADVAN	.5387	
COPY	.5387	

According to Nunnally (1967), an instrument can be considered to possess an acceptable reliability standard if the reliability scores are around 0.60. For basic or exploratory research, a reliability score of 0.50 is also acceptable. Scores greater than 0.70 indicates a high reliability standard. Hair et al. (1992), meanwhile, suggest a threshold value of 0.70, although values below 0.70 have been deemed acceptable if the research is exploratory in nature, which this study is. The result above showed that despite its exploratory nature, the observed Alpha values of the factors in this SUIT measure range from 0.6898 to 0.8984, suggesting a respectable reliability. It also suggests that the SUIT instrument possesses a high internal reliability.

Naming of the factors is carried out next when a satisfactory factor solution is derived. Naming is based on a subjective opinion of the researcher to represent the underlying nature of the factors (Hair et al., 1992). For example, Factor 1 comprising of STRAT2 (influence direction of strategy), STRAT3 (creates new strategy), STRAT4 (modifies existing strategy and STRAT5 (shapes new strategy) can be represented as what King and Sabherwal (1992) called 'shaping and influencing strategy' and hence appropriately used to represent Factor 1. Another example, Factor 5, comprised of items ADVAN (length of competitive advantage over competitors) and COPY (difficulty for competitors to copy the company's system) have been mentioned in the literature to have contributed to the 'sustainability of competitive advantage'. Hence, the naming of Factor 5 with such surrogate is appropriate. The naming of the factors and their description are summarised in Table 6.10. The naming of the above factors enables us to derive the following equation for SUIT

SUIT = STRAT + IMPACT + INTEG + INTEL + SUSTAIN

Clearly the equation has captured principal dimensions of the strategic use of IT construct and represents fundamental aspects of what has been ubiquitously mentioned in the literature on IT. If IT is to be used strategically, it must shape and influence the strategy of the company; its impact must be significantly observed in the way it influences competitive market forces such as the customers, suppliers, existing and new competitors; it must support internal smooth running of the organisation by integrating and co-ordinating various functions; it must serve to collect important competitor information through intelligence gathering; and above all, it must provide sustainable length of advantage.

Table 6.10 - Naming of factors

Factor1	Named: Influences Strategy (**STRAT**)
STRAT2	Influences future direction of strategy
STRAT5	Shapes the organisation's strategic plans
STRAT4	Modifies the existing corporate strategy
STRAT3	Creates new strategies for organisation
USE5	Helps managers identify new opportunities
Factor2	Named: Impact on market forces & profit (**IMPAC**)
TARGET3	Causes threats to existing competitors
TARGET1	Influences customers' buying decisions
IMPACT1	Impact on market share
TARGET4	Builds an entry barrier for competitors
IMPACT2	Impact on profitability
Factor3	Named: Integration and co-ordination (**INTEG**)
USE2	Integrates activities within functions
USE1	Co-ordinates functions within the organisation
USE3	Enables staff to consult other expertise
USE10	Increases access to resources
Factor4	Named: Intelligence gathering (**INTEL**)
USE8	Anticipates competitors' moves
USE7	Gathers information about competitors
Factor5	Named: Sustainability (**SUSTAIN**)
ADVAN	Duration of advantage over competitors
COPY	Difficult for competitors to copy system

Factor analysis also produced a factor score coefficient matrix, which is important in the development of the SUIT measure. The result of factor analysis shows a factor score coefficient for each of the variables in Table 6.11, details of which are in Appendix F.

Table 6.11 - Factor Score Coefficient Matrix:

	STRAT Factor1	*IMPACT Factor2*	*INTEG Factor3*	*INTEL Factor4*	*SUSTAIN Factor5*
ADVAN	-.01145	-.11693	-.02630	.04712	.55440
COPY	-.06719	-.01888	-.00344	-.02110	.52259
IMPACT1	.02585	.30402	-.05610	-.02502	-.16131
IMPACT2	.08837	.14557	-.08538	-.13608	.09393
STRAT2	.29611	-.10081	-.07910	-.01973	.02907
STRAT3	.25030	-.05367	-.03370	.03162	-.01490
STRAT4	.26221	-.04792	-.03190	-.04326	-.00228
STRAT5	.29691	-.05551	-.05912	-.08230	-.02871
TARGET1	-.05839	.34038	.05813	-.05360	-.12887
TARGET3	-.12923	.35212	.09321	-.02773	-.03634
TARGET4	-.10536	.23457	.00601	.06305	.14846
USE1	-.05154	.03262	.38659	-.12402	-.03565
USE10	-.03646	-.01587	.21893	.03893	.00638
USE2	-.09029	.05399	.42225	-.13779	-.04581
USE3	-.03690	.00523	.25213	.03960	.01108
USE5	.16802	.02457	.03334	-.00816	-.12193
USE7	-.04435	-.07417	-.04055	.55303	.03258
USE8	-.04653	.00429	-.07069	.53600	-.01130

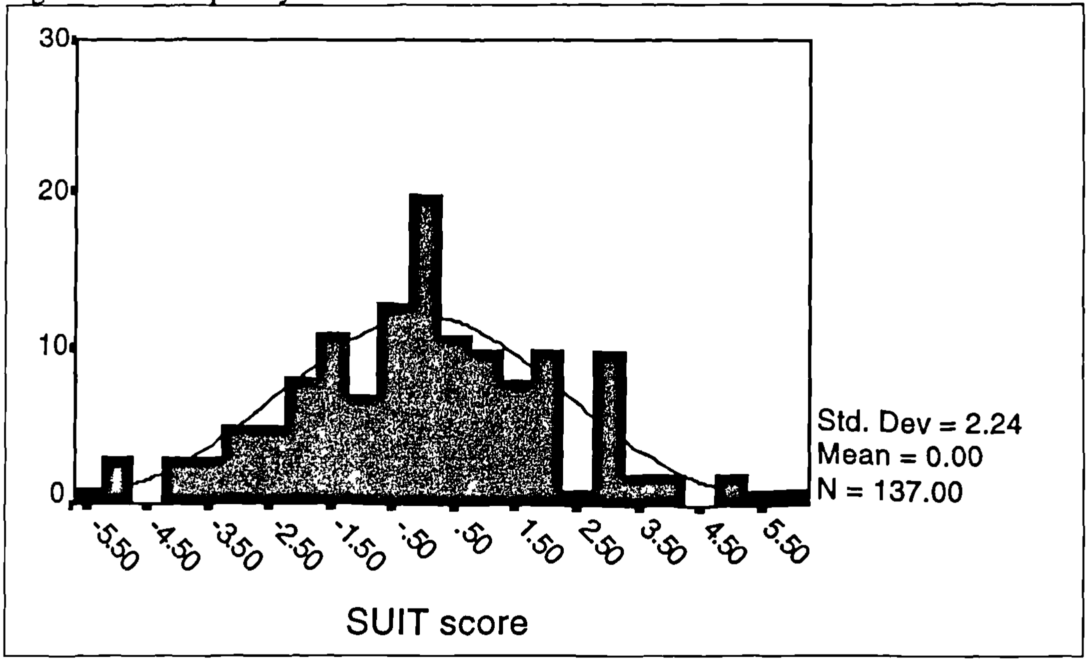
6.5.3 SUIT score

Having calculated the factor score coefficient, the next step in developing the SUIT measure is the calculation of a factor score for SUIT. The computation is based on the sum of multiplication of factor score coefficient for each factor and its component variables, a method suggested by Norusis (1992). This is done by multiplying the factor score coefficient for each variable making up the factor group by the value assigned by each respondent for each variable. The sum of all the factor group scores will be equal to the composite score for SUIT. Using the above matrix table, the SUIT score or index is calculated as follows:

SUIT Score = (-0.01145*ADVAN) + (-0.06719*COPY) + (0.02585*IMPACT1)+ ..
... + (-0.01130*USE8)

For each respondent, the SUIT score or SUIT index is calculated electronically by substituting the value assigned for each variable by the respondent. The sum of the products measures the SUIT index in numerical terms and represents the degree of strategic use of IT in the organisation. The higher the index, the higher is the level of strategic aspects of IT usage, and vice versa. The result of the computation is represented in the distribution diagram in Figure 6.4.

Figure 6.4 - Frequency distribution of SUIT score



Mean	Median	Mode	Minimum	Maximum	Count
0.000438	0.04	0.74	-5.6	5.93	137

As observed, the highest SUIT score is 5.93 and the lowest score is -5.6. The mean score of the samples under study is 0.0004. This means that, within the companies under study, the highest level of SUIT achieved by a company has an index of 5.93. The lowest has an index of -5.6 compared to the rest of the companies. The distribution above also shows that there could be two groups of companies having distinctly opposite scores; those with a positive SUIT score and those with a negative SUIT score, epitomising companies with a high degree of strategic use of IT and those with a low degree of strategic use of IT.

The above result completes the factor score calculation for SUIT. Similar sequence of analysis is carried out for other constructs, such as for performance, centralisation, IT orientation. These and other measures of constructs are summarised below, details of which are in their relevant Appendices.

6.6 Development of perceived performance measure

The original items used for perceived performance measure consist of 4 variables such as PERF1 (long term profitability), PERF2 (sales growth), PERF3 (financial strength) and PERF4 (public image). A reliability test was first carried out to ascertain the items' reliability. The result in Table 6.12 shows that PERF1, PERF2, PERF3 have item-to-total correlation scores of more than 0.35 and were therefore retained for further analysis. PERF4 was dropped due to poor item-total correlation.

Before conducting factor analysis for the remaining variables, Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Significance were examined to determine if factor analysis could be appropriately applied for these variables. The result in Appendix G shows both KMO and Bartlett significance values of 0.6235 and 0.00000 respectively, indicating that factor analysis is suitable. (As mentioned in the earlier section, for factor analysis to proceed, KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05)

Factor analysis was then conducted on the remaining variables. It produced a one-factor solution, named FACPERF, as shown in Table 6.12 including their respective factor loadings. Since all the loadings are high (greater than 0.5), the variables making up the factor are considered very significant to the performance measure (Hair, et al., 1992) and are suitable for use to represent perceived performance measure for companies.

Subsequently. the reliability test was repeated to ascertain internal reliability for FACPERF. The result showed that an Alpha (α) reliability value for FACPERF is 0.5335 - an acceptable reliability by Nunnally's (1967) standard.

To calculate performance measure score or index, factor analysis procedure electronically generates a factor score coefficient for each variable that can be used to calculate the score. The factor score coefficient values are reproduced as follows:

Factor Score Coefficient Matrix:

	Factor 1
PERF1	0.47674
PERF2	0.43810
PERF3	0.43107

The score for the perceived performance measure was then computed by adding electronically the product of each variable and its corresponding factor score coefficient for PERF1, PERF2 and PERF3, and stored as a new variable FACPERF for future analysis in hypothesis testing. A detailed output of this analysis can be found in Appendix G.

Mathematically, the performance measurement score formula is given by:

$$\text{FACPERF} = (\text{factor coefficient}_1 * \text{PERF1}) + (\text{factor coefficient}_2 * \text{PERF2} + (\text{factor coefficient}_3 * \text{PERF3})$$

where,

factor $coefficient_n$ = factor coefficient matrix value for *n*th item

$PERF_n$ = response given by each respondent for each variable

In this case, FACPERF = (0.47674*PERF1)+ (0.43810*PERF2) + (0.43107*PERF3)

Table 6.12 - Reliability and Factor analyses for Performance

	Description	Item-total correlation	Factor loading	Reliability (α)
Factor1	**FACPERF**			**0.5335**
PERF1	LT profitability	0.3941	0.78796	
PERF2	sales growth	0.4075	0.72409	
PERF3	financial strength	0.3632	0.71248	
PERF4	public image	0.1546*		

* item dropped (corr<0.35)

6.7 Environmental characteristics measure

The original items used for the environmental characteristics measure consist of two dimensions (environmental dynamism and hostility) taken from King and Sabherwal who adopted them from earlier studies by Miller and Friesen (1982; 1983). Each dimension has 5 variables, one coded as DYN1, DYN2, DYN3, DYN4, DYN5, and the other as HST1, HST2, HST3, HST4 and HST5. Reliability test was carried out to ascertain the questions' reliability. The result in Table 6.13 shows that all of the dynamism variables had item-to-total correlation scores of more than 0.35. On the other hand, all of the hostility variables had to be dropped due to their poor item-to-total correlation except for HST4 variable. This is rather surprising because the same variables have been used to measure environmental hostility by several other researchers in the past (Miller and Friesen, 1983; Khandwalla, 1977) and have been shown to have a fair degree of reliability alpha of 0.68 (King and Sabherwal, 1992). A possible explanation for this is that these questions, which have been used in the US, may not stand well in the UK context. When similar questions were used by King and Sabherwal in 1992, two of the five-item questions were dropped due to poor item-to-total correlation. Reliability value of 0.68 achieved in King and Sabherwal study for the remaining three items is considered fair and as a result could be sensitive to the variations in the way respondents answer the questions and hence their poor item-total correlation produced in this study. Because it is felt that one item is not appropriate to represent a concept, the environmental hostility measure is omitted completely.

Before conducting factor analysis for the dynamism variables, Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Significance were examined to determine if factor analysis could be appropriately applied for these variables. The result in Appendix G shows both the KMO and the Bartlett significance values of 0.67694 and 0.00000 respectively, indicating that factor analysis is suitable. (For factor analysis to proceed, KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05)

Factor analysis was then conducted on the remaining variables. It produced a one-factor solution, named FACDYN, as shown in Table 6.13 including their respective factor loadings. Since all the loadings are high (greater than 0.5), the variables making up the factor are considered very significant to the dynamism construct (Hair et al., 1992) and are suitable for use to represent perceived environmental dynamism measure for companies.

Subsequently. the reliability test was repeated to ascertain internal reliability for FACDYN. The result showed that an Alpha (α) reliability value for FACDYN is 0.7071 - an acceptable reliability by Nunnally's (1967) standard.

To calculate the dynamism measure, factor analysis procedure electronically generates factor score coefficient for each variable that can be used to calculate the score. The factor score coefficient values are reproduced as follows:

Factor Score Coefficient Matrix:

	Factor 1
DYN1	0.29331
DYN2	0.27929
DYN3	0.32197
DYN4	0.29208
DYN5	0.28378

The score for the dynamism measure was then computed by adding electronically the product of each variable and its corresponding factor score coefficient for DYN1 to DYN5, and stored as a new variable FACDYN for future analysis in hypothesis testing. A detailed output of this analysis can be found in Appendix G.

Mathematically, the dynamism measurement score formula is given by:

$$FACDYN = (\text{factor coefficient}_1 * DYN1) + (\text{factor coefficient}_2 * DYN2 + \dots + (\text{factor coefficient}_5 * DYN5)$$

where,

factor coefficient$_n$ = factor coefficient matrix value for *n*th item

DYN$_n$ = response given by each respondent for each variable

Table 6.13 - Reliability and Factor analyses for Industry Dynamism and Hostility

	Description	Item-total correlation	Factor loading	Reliability (α)
Factor1	**FACDYN**			**0.7071**
DYN1	rate product becomes obsolete	0.4670	0.67654	
DYN2	rate new markets emerge	0.4374	0.64420	
DYN3	predictability of competitors actions	0.5260	0.74265	
DYN4	predictability of demands	0.4452	0.67371	
DYN5	frequency of change to keep pace with environment	0.4394	0.65456	
HST1	threat of price competition	-0.0764*		
HST2	threat of quality competition	0.2196*		
HST3	threat of dwindling markets	0.2952*		
HST4	threat of scarce resources	0.4330		
HST5	threat of govt interference	0.1475*		
*	item dropped (corr<0.35)			

6.8 Managerial characteristics measure

The managerial characteristics measure consists of a few dimensions. These dimensions are:

- depth of analysis,
- participative and flexible management style,
- support for innovation, and

- management involvement.

The questions in these dimensions were grouped and coded separately according to the dimensions they represented. A reliability test was carried out for each dimension.

a) Depth of analysis

The result in Table 6.14 shows that all the variables ANAL1, ANAL2, and ANAL3 had item-to-total correlation value of higher than 0.35. They were all retained for subsequent factor analysis.

The Kaiser-Meyer-Olkin (KMO) and the Bartlett Test of Significance examined shows that both KMO and Bartlett significance have values of 0.66507 and 0.00000 respectively, indicating that factor analysis is suitable. (KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05 for factor analysis to proceed)

Factor analysis was then conducted on the variables. It produced a one-factor solution, named FACANAL, as shown in Table 6.14 including their respective factor loadings. Since all the loadings are high (greater than 0.5), the variables making up the factor are considered very significant to the construct measure (Hair et al., 1992) and are suitable for use to represent the extent of analysis measure for companies.

Subsequently, a reliability test was conducted to ascertain internal reliability for FACANAL. The result showed that an Alpha (α) reliability value for FACANAL is 0.7013 - an acceptable reliability by Nunnally's (1967) standard.

FACANAL score is calculated (and stored for subsequent analysis) using the electronically generated factor score coefficient for each variable below.

Factor Score Coefficient Matrix:

	Factor 1
ANAL1	0.42410
ANAL2	0.43607
ANAL3	0.40257

Mathematically, the depth of analysis measurement score formula is given by:

$$\text{FACANAL} = (\text{factor coefficient}_1 * \text{ANAL1}) + (\text{factor coefficient}_2 * \text{ANAL2} + (\text{factor coefficient}_3 * \text{ANAL3})$$

where,

factor coefficient$_n$ = factor coefficient matrix value for *n*th item

ANAL$_n$ = response given by each respondent for *n*th variable

b) Participative and flexible management style

Participative aspect and rigidity (or flexibility) in management styles were tested for reliability. Unfortunately, all of the items for participative style had to be dropped due to their low item-to-total correlation. The rigidity dimension had to be dropped as well for a similar reason. It is intriguing to note that despite questions being tested, a majority of the variables of these dimensions had to be dropped due to poor item-total correlation. A similar argument may be put forward to explain the reason for dropping these dimensions as for the hostility dimension above.

c) Support for innovation

The result in Table 6.14 shows that the variables INNOV1 and INNOV2 had item-to-total correlation value of higher than 0.35. They were retained for subsequent factor analysis.

KMO and Bartlett Significance measures indicate that factor analysis is suitable. The analysis performed for this dimension produced a one-factor solution as shown in Table 6.14 including their respective factor loadings. The factor score coefficient to be used in the computation of scores for each variable was computed and is reproduced below:

Factor Score Coefficient Matrix

	Factor1
INNOV1	0.60488
INNOV2	0.60488

Subsequently, a reliability test was conducted and the result showed that an Alpha (α) reliability value for FACINNO is 0.5365 - an acceptable reliability by Nunnally's (1967) standard.

The factor score was computed and stored as a new variable called FACINNO for future analysis in hypothesis testing. Mathematically, the innovation measurement score formula is given by:

FACINNO = (factor coefficient$_1$ * INNOV1) + (factor coefficient$_2$ * INNOV2)

where,

factor coefficient$_n$ = factor coefficient matrix value for *n*th item

INNOV$_n$ = response given by each respondent for *n*th variable

d) Management involvement

The result in Table 6.14 shows that all the variables representing management involvement dimension such as INVOL1, INVOL2 and INVOL3 had item-to-total correlation value of higher than 0.35. They were retained for subsequent factor analysis.

Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Significance examined shows that both the KMO and the Bartlett test of significance have values of 0.69858 and 0.00000 respectively, indicating that factor analysis is suitable. (KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05 for factor analysis to proceed).

Factor analysis was then conducted on the variables. It produced a one-factor solution, named FACINVO, as shown in Table 6.14 including their respective factor loadings. Since all the loadings are high (greater than 0.5), the variables making up the factor are considered very significant to the construct measure (Hair, et al., 1992) and are suitable for use to represent the extent of management involvement measure for companies.

Subsequently, reliability test was conducted to ascertain internal reliability for FACINVO. The result showed that an Alpha (α) reliability value for FACINVO is 0.8490 - an acceptable reliability by Nunnally's (1967) standard.

FACINVO score was calculated (and stored for subsequent analysis) using the electronically generated factor score coefficient for each variable below.

Factor Score Coefficient Matrix:

	Factor 1
INVOL1	0.37618
INVOL2	0.36685
INVOL3	0.39689

Mathematically, the involvement construct measurement score formula is given by:

$$FACINVO = (\text{factor coefficient}_1 * INVOL1) + (\text{factor coefficient}_2 * INVOL2 + (\text{factor coefficient}_3 * INVOL3)$$

where,

factor coefficient_n = factor coefficient matrix value for *n*th item

$INVOL_n$ = response given by each respondent for *n*th variable

Table 6.14 - Reliability and Factor analyses for Analysis, Flexibility, Innovation and Involvement

	Description	Item-total correlation	Factor loading	Reliability (α)
Factor1	**FACANAL**			**0.7013**
ANAL1	effort put in to review SWOT	0.5215	0.79706	
ANAL2	effort to obtain industry information	0.5533	0.81956	
ANAL3	effort to obtain information about technology trends	0.4762	0.75660	
RIGID1	very structured channel of communication	0.2505*		
RIGID2	holding fast to established practice	0.3739		
RIGID3	allows line managers to make own decision	0.0847*		
RIGID4	restrict access to important information	-0.0828*		
Factor1	**FACINNO**			**0.5365**
INNOV1	management supports innovation	0.3666	0.82661	
INNOV2	management rewards innovations	0.3666	0.82661	
Factor1	**FACINVO**			**0.8490**
INVOL1	involved in identifying IT projects	0.7078	0.86754	
INVOL2	involved in authorising IT project	0.6672	0.84603	
INVOL3	involved in monitoring IT project	0.7908	0.91531	

6.9 IT orientation measure

There are nine items measuring IT orientation. These items were first tested for reliability and the result in Table 6.15 shows that all except two had to be dropped due to poor item-to-total correlation. The two items dropped are ITMAT6 (formalised IT planning) and ITMAT7 (the extent of business plans are taken into consideration during IT planning). The other seven variables were retained for subsequent analysis.

Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Significance examined shows that both KMO and Bartlett significance have values of 0.79481 and 0.00000 respectively, indicating that factor analysis is suitable. (KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05 for factor analysis to proceed)

Factor analysis conducted produced 2 groups of factors as shown in Table 6.15 together with their respective high factor loadings. The first group of variables had factor loadings of between 0.68 to 0.83 which seems to connote the prevalence of IT and its integrative capability to link functional activities across departments. This group of factors is named IT prevalence for the purpose of this thesis. The second homogenous group of variables had factor loadings of between 0.48 to 0.84, with two dominant ones related to knowledge of IT business managers have and knowledge of business IT managers have. This group of factors is named management IT knowledge. Since all the loadings are high (greater than 0.5), the variables making up the factor are considered very significant to the construct measure (Hair et al., 1992) and are suitable for use to represent the extent of physical IT prevalence and management IT knowledge measures respectively for companies.

Subsequently. reliability tests were conducted to ascertain internal reliability for both constructs. The result shows that Alpha (α) reliability values for FACMAT1 and FACMAT2 are 0.8055 and 0.6993 respectively - an acceptable reliability by Nunnally's (1967) standard.

Both scores were calculated (and stored for subsequent analysis) using electronically generated factor score coefficients for each of the variables below.

For FACMAT1, Factor Score Coefficient Matrix is:

	Factor 1
ITMAT1	0.45941
ITMAT2	0.36293
ITMAT3	0.19404
ITMAT5	0.30617

Mathematically, the IT prevalence measurement formula is given by:

$$FACMAT1 = (\text{factor coefficient}_1 * ITMAT1) + (\text{factor coefficient}_2 * ITMAT2) + (\text{factor coefficient}_3 * ITMAT3) + (\text{factor coefficient}_5 * ITMAT5)$$

And, for FACMAT2, Factor Score Coefficient Matrix is:

	Factor 1
ITMAT4	0.21488
ITMAT8	0.49594
ITMAT9	0.55278

Mathematically, the management IT knowledge score formula is given by:

$$FACMAT2 = (\text{factor coefficient}_4 * ITMAT4) + (\text{factor coefficient}_8 * ITMAT8) + (\text{factor coefficient}_9 * ITMAT9)$$

where,

factor coefficient$_n$ = factor coefficient matrix value for *n*th item

ITMAT$_n$ = response given by each respondent for *n*th variable

Table 6.15 - Reliability and Factor analyses for IT orientation / maturity

	Description	Item-total correlation	Factor loading	Reliability (α)
Factor	FACMATU			
Factor1	**FACMAT1**			**0.8055**
ITMAT1	Prevalence of IT in organisation	0.6082	0.83444	
ITMAT2	All depts are supported by IT	0.7594	0.82584	
ITMAT3	Activities within dept are well co-ordinated	0.5705	0.64016	
ITMAT5	Dept highly dependent on IT	0.5490	0.68864	
Factor2	**FACMAT2**			**0.6993**
ITMAT8	Mgmt knowledgeable about IT	0.5622	0.81198	
ITMAT9	IT knowledgeable about business	0.5749	0.84966	
ITMAT4	Activities between dept are well co-ordinated	0.4126	0.48157	
ITMAT6	IT planning is formalised	0.1057*		
ITMAT7	Extent IT plan considers overall plan	0.1914*		
*	item dropped (corr<0.35)			

A detailed output of this analysis can be found in Appendix G.

6.10 Structural characteristics measure

The original items used for organisational or structural characteristics measure consist of a few dimensions. They are:

- centralisation of decision, and
- formalisation of procedures.

The questions in these dimensions were grouped and coded separately according to the dimensions they represent. A reliability test was carried out dimension by dimension to ascertain the questions' reliability.

a) Centralisation

The result in Table 6.16 shows that all the variables except CENT1, had item-to-total correlation value of higher than 0.35. CENT1 was dropped but the rest of the variables were retained for subsequent factor analysis.

The Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Significance show that both have values of 0.76396 and 0.00000 respectively, indicating that factor analysis is suitable. (KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05 for factor analysis to proceed).

Factor analysis was then conducted on the variables. It produced a one-factor solution, named FACCENT, as shown in Table 6.16 including their respective factor loadings. Since all the loadings are high (greater than

0.5), the variables making up the factor are considered very significant to the construct measure (Hair et al., 1992) and are suitable for use to represent the centralisation of the decision making measure for the companies.

Subsequently. a reliability test was conducted to ascertain internal reliability for FACCENT. The result showed that an Alpha (α) reliability value for FACCENT is 0.7720 - an acceptable reliability by Nunnally's (1967) standard.

FACCENT score was calculated (and stored for subsequent analysis) using the electronically generated factor score coefficient for each of the variables below.

Factor Score Coefficient Matrix:

	Factor 1
CENT2	0.34602
CENT3	0.34486
CENT4	0.32615
CENT5	0.21762

Mathematically, the centralisation construct score formula is given by:

$$\text{FACCENT} = (\text{factor coefficient}_2 * \text{CENT2}) + (\text{factor coefficient}_3 * \text{CENT3}) + (\text{factor coefficient}_4 * \text{CENT4}) + (\text{factor coefficient}_5 * \text{CENT5})$$

where,

factor coefficient$_n$ = factor coefficient matrix value for *n*th item

CENT$_n$ = response given by each respondent for *n*th variable

A detailed output of this analysis can be found in Appendix G.

b) Formalisation of procedures

The result in Table 6.16 shows that all the variables, FORM1, FORM2, FORM3, FORM4 and FORM5 had item-to-total correlation value of higher than 0.35. They were all retained for subsequent factor analysis.

The Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Significance shows that both have values of 0.69671 and 0.00000 respectively, indicating that factor analysis is suitable. (KMO measure should be at least 0.50 and Bartlett Test of Significance should be less than 0.05 for factor analysis to proceed).

Factor analysis was then conducted on the variables. It produced a one-factor solution, named FACFORM, as shown in Table 6.16 including their respective factor loadings. Since all the loadings are high (greater than 0.5), the variables making up the factor are considered very significant to the construct measure and is suitable for use to represent the centralisation of decision making measure for companies.

Subsequently, reliability test was conducted to ascertain internal reliability for FACFORM. The result showed that an Alpha (α) reliability value for FACFORM is 0.7532 - an acceptable reliability by Nunnally's (1967) standard.

FACFORM score was calculated (and stored for subsequent analysis) using the electronically generated factor score coefficient for each of the variables below.

Factor Score Coefficient Matrix:

	Factor 1
FORM1	0.28309
FORM2	0.28970
FORM3	0.31308
FORM4	0.27422
FORM5	0.24120

Mathematically, the formalisation construct score formula is given by:

$$FACFORM = (\text{factor coefficient}_1 * FORM1) + (\text{factor coefficient}_2 * FORM2) + (\text{factor coefficient}_3 * FORM3) + (\text{factor coefficient}_4 * FORM4) + (\text{factor coefficient}_5 * FORM5)$$

where,

factor coefficient$_n$ = factor coefficient matrix value for *n*th item

FORM$_n$ = response given by each respondent for *n*th variable

A detailed output of this analysis can be found in Appendix G.

Table 6.16 - Reliability and Factor Analysis for Structural Characteristics

	Description	Item-total correlation	Factor loading	Reliability (α)
Factor1	**FACCENT**			**0.7720**
CENT1	decision about dev of new products	0.3325*		
CENT2	decision to raise LT capital	0.6720	0.88183	
CENT3	decision to select new investment	0.6876	0.87887	
CENT4	decision to acquire controlling interest	0.5449	0.83120	
CENT5	decision to hire & fire personnel	0.4124	0.55459	
Factor1	**FACFORM**			**0.7532**
FORM1	strict procedures in any situation	0.5216	0.71585	
FORM2	procedures are written	0.5407	0.73258	
FORM3	rule violation are checked regularly	0.6169	0.79168	
FORM4	strong penalties for rule violation	0.4991	0.69341	
FORM5	rules bent to handle some situation	0.4219	0.60993	

6.11 Summary

In developing SUIT instrument and measures of other constructs, data collected from the survey were subjected to purification process to ensure the resultant instrument and other measures possess sound reliability and robustness. It was found that the instrument herewith developed possesses a high degree of internal reliability and robustness, as do other measures of construct. The SUIT instrument developed can be said to comprise of an aggregate measure of five dimensions, such as strategic direction and influence, impact on competitive forces, integration of functions, intelligence gathering and sustainability dimensions. The derivatives of this analysis is a model equation such that:

$$\mathbf{SUIT = STRAT + IMPAC + INTEG + INTEL + SUSTAIN}$$

The equation model of SUIT has enabled the SUIT score or index for each company in the sample to be calculated. Using this score, the next step is to analyse its relationship with other variables or constructs whose reliability tests were subjected to the same rigour as SUIT. The discussion on SUIT relationship with other variables, testing of hypotheses and comparison of group characteristics are the subject of the next chapter.

CHAPTER SEVEN

DATA ANALYSIS AND FINDINGS

7.1 Introduction

This chapter is divided into two sections. Section One describes the results of descriptive statistics as a basis for understanding the characteristics of companies which participated in the study. General profile of respondents is explained, including a section about the strategic information systems by companies within the information intensive industry and the nature of its development which is thought to be of interest to readers. Section Two focuses on a discussion of the results from testing the research model, supported by statistical evidence to show the direction of relationships between the variables. The chapter concludes with a discussion on the overall findings which have important implications for theory and practice.

Section One

7.2 Profile of respondents

The respondents who participated in the mail survey were mainly senior executives of 168 companies from diverse sectors in information intensive industry. Their profile is examined in the following sections.

7.2.1 Respondent's job status

A profile of respondent's job status in Table 7.1 shows that a large majority of the respondents hold a senior managerial level or above. Approximately 94 percent are IT directors, senior managers, general managers, chief executive officers and other company directors.

Table 7.1 - Respondent's job status

	Frequency	Percent	Cumulative *Percentage*
Chairman/CEO	17	10.1	10.1
Managing Director	8	4.8	14.9
IT director	64	38.1	53.0
Other director	18	10.7	63.7
General Manager	10	6.0	69.6
Other Senior Manager	40	23.8	93.5
Middle manager	11	6.5	100.0
Total	168	100.0	

IT directors accounted for 38 percent of the respondents who participated in the survey. It is important to note that the participation of other directors and senior executives accounted for 93 percent of the participants while middle managers made up only 6.5 percent of the sample. The bias towards the IT directors and senior management is important because the survey intended to seek information from respondents who hold a sufficiently high level of authority in the management hierarchy to effectively respond to questions of a strategic nature such as SUIT. Further, the authority level is important to achieve a high degree of reliability in responses and hence to strengthen the validity of the analysis.

7.2.2 Industry sector

Table 7.2 shows that 48 percent of the 168 companies which responded are from the financial services sector, compared to 19 and 33 percent respectively from the tourism-related or retail trade sectors.

Table 7.2 - Industry sector

Sector	Frequency	Percentage	Cumulative percentage
Banking/finance/insurance	80	47.6	47.6
Hotel/tourism/airline	32	19.0	66.7
Wholesale/retail/trade	56	33.3	100.0
Total	168	100.0	

The better response from the financial services sector could be due to an increased interest in IT within the financial services over the past few years. An increased awareness of the trends in customer demands for IT-based financial services could also have prompted senior managers to be more participative in the survey. Hotel/tourism/airline sector produced a relatively low response of 19 percent. Past surveys in the hotel/tourism/airline sector have generally experienced a poor mail survey response rate. The airline sector, particularly, is known to have a low response to mail surveys. The sector, often faced with intense competition, feels that ideas of a strategic nature should remain within the organisation to safeguard its distinctive advantage over others. Such secrecy has perhaps influenced managers within this sector to shy away from providing information to surveys which are strategic in nature such as the one conducted for this research. The wholesale/retail trade sector responded satisfactorily to the questionnaire. Of the 168 companies, 56 companies or 33 percent are from this sector, representing proportionately one-third of the total number of respondents.

7.2.3 Size and experience

The composition of the 168 companies included in the study is further broken down by sales volume, the number of IT employees and the age of the IT department. Table 7.3 shows that a relatively higher proportion of the participating companies are large. Approximately 45 percent register more than £100 million in sales, 21 percent have sales between £46 to £90 million, 26 percent have sales between £15 to £45 million and only 7.7 percent have sales of £15 million and below. Of the 168 companies which participated, only a small number have a large IT department. Fifty-two percent of the companies have an IT department with 10 or fewer employees while seventeen percent have more than 100 employees. IT experience, based on the number of years the IT department has been established, indicated that 40 percent of the companies studied have seven or fewer years of IT experience, 24 percent have between eight to fourteen years while 39 percent have fifteen or more years of experience.

Table 7.3 - Size and experience

Sales	Frequency	Percentage	Cumulative Percentage
More than £105 million	71	42.3	42.3
£91-105 million	5	3.0	45.2
£76-90 million	5	3.0	48.2
£61-75 million	8	4.8	53.0
£46-60 million	22	13.1	66.1
£31-45 million	16	9.5	75.6
£15-30 million	28	16.7	92.3
About £15 million	13	7.7	100.0
Total	168	100.0	

Number of IT employees	Frequency	Percentage	Cumulative Percentage
0-10	86	52.1	52.1
11-20	18	10.9	63.0
21-50	23	13.9	77.0
51-100	10	6.1	83.0
101-200	8	4.8	87.9
201-400	7	4.2	92.1
400 and above	13	7.9	100.0
Missing	3	1.8	
Total	168	100.0	

Age of IT department	Frequency	Valid Percentage	Cumulative Percentage
0 - 7 years	65	40.4	40.4
8-14 years	38	23.6	64.0
15 or more years	58	36.0	100.0
Missing	7	4.2	
Total	168	100.0	

7.2.4 Planning horizon

Table 7.4 demonstrates the business planning perspectives viewed by the companies operating in the information intensive industry. Reflecting the short term nature of planning, 53 percent planned up to three years, and 41 percent of the companies planned between four to five years ahead. In total, ninety-three percent mentioned that their planning was five years or less and very few (6 percent) took the longer term perspective by planning 10 years or more into the future. It appears that companies operating in the information intensive industry generally adopt a short term planning perspective.

Table 7.4 - Business planning horizon

	Frequency	Percentage
1-3 years	88	52.7
4-9 years	69	41.3
10 years or more	10	6.0

7.2.5 Status of IT function

The level of status or authority given to IT personnel has often been associated with the degree of influence they have in top management decisions, especially those related to IT decisions. In this survey, the respondents were asked whether or not an IT executive in their organisations was established as part of the top executive team or board. Table 7.5 shows that 63 percent indicated their organisation's IT executive was part of the top executive function, while 37 percent mentioned it was not.

Table 7.5 - IT as an executive function?

Yes	104	62.7 percent
No	62	37.3 percent
Missing value	2	
Total	168	

Given the larger number of organisations where IT staff form part of the top level executive committee, the finding tends to suggest that the role IT executives can play in their respective organisations can be quite significant. Organisations whose IT staff holds a high position may be expected to facilitate their involvement in the corporate decision making process. This link between management and IT staff is important as it makes it easier for IT matters to obtain top management support. It also implies that top management is likely to actively take part in IT related decisions.

7.2.6 Generic strategies

In order to explore the types of strategies adopted by companies operating in the information intensive industry, the respondents were asked to indicate the primary business strategy their company adopts. Table 7.6 gives the distribution of generic strategies. The result shows that focus or niche market strategy seems to be the most popular type of business strategy adopted by companies operating in the information intensive industry.

Twenty-eight percent of the companies used this type of strategy as the primary philosophy upon which their business is developed. Twenty-six percent adopted a low-cost philosophy while differentiation and growth strategies were each popular among 17 percent of the responding companies.

On closer examination, it was found that the more popular types of IT applications employed by companies following focus/niche strategy were general MIS (19.5 percent), customer information systems and internally developed proprietary systems (17.1 percent each). Customer information systems and proprietary systems also seem to be popular among companies following low-cost strategy and differentiation-based companies.

Table 7.6 - Generic strategy adopted

Type of strategy	Mention	Percentage
Focus	41	27.9
Cost leadership	39	26.5
Differentiation	25	17.0
Growth	25	17.0
Innovation	11	7.5
Alliance	5	3.4
Don't know	1	.7

7.2.7 Strategic IT application

Respondents were asked to identify one IT system or application installed by their organisation which they believed had a significant impact on their organisation. Among the 168 companies which responded, 89 percent (149 companies) believed they had a strategic system in place in their organisations. The other 11 percent (19 companies) said they did not have a strategic system.

The types of strategic applications most often employed by organisations in the information intensive industry are summarised in Table 7.7. The few popular ones are customer information systems (17.5 percent), general management information systems (14.1 percent) and other proprietary systems (14.8 percent).

A closer analysis shows that customer information systems were most prevalent in the financial services sector (61.5 percent) and among the wholesale/retail trade (34.6 percent) but less prevalent within the hotel, airline and tourism sectors (3.8 percent).

Within the financial services, more than one-fifth of banks, finance and insurance companies employed customer information systems. Other popular systems, in ranked order are:

- proprietary financial systems such as deal entry reporting for insurance, global invoicing, and claims systems (15 percent),
- general management information systems (12.5 percent),
- point-of-sale systems (7.5 percent), and
- other systems such as accounting information systems, and marketing database.

Within the hotel, airline and tourism sectors, the more popular IT applications are flight information systems (25.0 percent), room-booking systems (18.8 percent), and marketing database systems (12.5 percent) respectively. Proprietary systems tailor made to meet the need of individual companies were also prevalent.

In the wholesale/retail trade sector, apart from customer information systems, general management information systems are also common (17.9 percent), followed by customer information systems (16.1 percent) and point-of-sale and accounting information systems (12.5 percent each).

The above findings seem to suggest that the systems in place within a particular sector of the industry is tailored towards meeting specific needs of the sectors depending on market demand and the types of customers served. The range of services demanded by banking and retail customers has forced these sectors to invest in systems that captures massive data on customers profiles in order to analyse needs, patterns of customer behaviours and to match products and services required by them. Point of sales systems installed by retailers like Safeway or Asda is a good example of an investment in a customer based information system where a massive amount of information is captured at check-out point and then used to analyse customer buying patterns for the purpose of improving services through floor designs and systematic check-out procedures. Similarly in the financial services sector, customer information captured at opening and operating of accounts is used to analyse demographic changes and customer financial positions to develop financial packages suitable for individual and corporate clients. In the airline and tourism sectors, flight information systems are prevalent understandably to facilitate choice of airline, hotel and tour packages for eager tourists and frequent flyers.

Table 7.7 - Type of strategic system deemed strategic by respondents

	Frequency	Percent
Customer information system	26	17.5
Others e.g. proprietary system	22	14.8
General MIS	21	14.1
Point of sale system	14	9.3
Accounting information system	10	6.7
Electronic Data Interchange	9	6.0
Marketing database	9	6.0
Flight information system	8	5.4
Telecommunication network	7	4.7
Roombooking system	6	4.0
Expert system	6	4.0
Executive information system	4	2.7
Office systems e.g. e-mail	4	2.7
Cash management system	3	2.1
Total	149	100.0

7.2.8 How the system was developed

In this study, the nature of system development was examined (as a matter of interest) to explore whether the different ways in which IT application is developed produce different degrees of contribution to the level of strategic use of IT. Respondents were asked to indicate how the IT application which they had identified was developed to find out the prevalence of a particular method over other methods of system development, as well as to examine if the different modes of development have any significance on the degree of competitiveness of an organisation.

Table 7.8 shows the breakdown of the nature of IT development. A large proportion of the companies appears to have developed their IT applications internally by employing the skills of in-house staff (41 percent). This is followed by those which acquired packages from software vendors and subsequently modified them to suit the company's individual needs (28 percent). Nineteen percent indicated that they had used external consultants, while 7 percent said they simply purchased the application from software vendors. Only 5 percent of the companies collaborated with third parties or outsourced the development of the IT to software specialists.

Table 7.8 - How system was developed

	Frequency	Percent
Internally by in-house staff	61	41.2
Purchase but modified	42	28.4
Engage external consultant	28	18.9
Purchase off-the-shelf package	10	6.8
Others e.g. collaboration	7	4.7
Missing	20	-
Total	168	100.0

It is interesting to note the widespread use of internal staff and external consultants in developing the IT system in companies in this industry (60.1 percent). It is equally interesting to note that a large number of companies in this study had resorted to purchasing and modifying the application (35.2 percent). This seems to suggest the popularity of different modes of application development within the information intensive industry. To examine if the different modes of development has any significant bearing on the degree of SUIT in an organisation, an ANOVA test was carried out. The results in Table 7.9 show that there is a significant difference in the relationship between the nature of the system development and the degree of SUIT (F-prob. = 0.0000) to suggest that the different ways in which IT systems are developed can significantly determine the level of SUIT in an organisation. In other words, the degree of SUIT is dependent on whether an application is developed internally, or by a consultant or acquired from external sources. Hence it becomes apparent that different types of application offer different degrees of advantage to organisations.

Table 7.9 - One-way ANOVA (SUIT vs. Nature of systems development)

----- ONEWAY -----

Variable FACSUIT SUIT 5-item score (facstrat+...facsus)
By Variable NATURE how system was developed

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	4	117.3689	29.3422	6.8840	.0000
Within Groups	132	562.6311	4.2624		
Total	136	680.0000			

Group	Count	Mean	Standard Deviation	Standard Error
internal in-house	56	.5887	2.0507	.2740
consultant	27	.0371	2.1098	.4060
purchase outright	10	-2.4253	1.8293	.5785
purchase but modified	37	-.6194	2.0712	.3405
others eg collaboration	7	1.8862	2.2749	.8598
Total	137	.0000	2.2361	.1910

(For detail, please refer to Appendix H)

A closer analysis of the mean score in Table 7.9 and Table 7.10 shows that the standard means differ depending on the way they are developed. For example, the means for applications which were acquired outright from off-the-shelf vendors as well as for those which were subsequently modified are negative while the mean values for the rest of the applications are positive. The negative mean value of -2.4253 for off-the-shelf software implies that the off-the-shelf software packages not only do not seem to contribute to enhancing the strategic value of IT for the organisation but are counter-productive to the strategic aspects of the IT application. Likewise, those companies which purchased their IT applications from vendors but subsequently modified them to suit their needs also do not seem to be able to increase the strategic value from the use of the application (mean = -0.6194).

These findings provide empirical support for the commonly held belief that applications which are sourced from computer software shelves, even though modified subsequently, do not provide sufficient competitive advantage to the purchasing organisations. Apparently these types of applications provide little or no advantage apart from merely automating routine tasks and providing back-office support. They do not contribute to the creation of strategic value to the IT application because, not only are they readily available, but they do not have unique attributes to provide the purchasing organisation with sufficient duration of advantage over others.

On the other hand, applications which are sourced through collaboration with specialised parties (mean = 1.8862) and those developed using internal resources (mean = 0.5887) play an important part in enhancing competitive advantage for the organisation. The use of external consultants also seems to have a positive effect on providing considerable strategic significance of the IT application (mean = 0.371).

Table 7.10 - Comparisons between nature of IT development

Mean	NATURE	purchased off-the-shelf	purchase but modified	external consultant	in-house	other
-2.4253	purchased off-the-shelf					
-.6194	purchased but modified					
.0371	external consultant	*				
.5887	in-house	*				
1.8862	others e.g. collaborate; outsource	*	*			

(*) Indicates significant differences at 0.05 level on Tukey-HSD test

The mean scores and the signs preceding the scores indicate the strength and the direction of the relationship. To determine which of the types of IT development methods differs from the others in terms of their contribution to SUIT, a Tukey test of significance is used. Multiple comparisons in Table 7.10 shows that IT applications which are acquired from off-the-shelf differ significantly in the degree to which they contribute to enhancing the strategic value of IT to the acquiring companies from those which were developed either by consultants, by in-house staff or by collaboration with other parties. No significant difference is observed between applications which were purchased outright from off-the-shelf and those which were subsequently modified. No significant difference is also observed between groups of applications which were developed internally, by a consultant or by collaboration with a third party.

This finding strongly implies that the way an IT application is developed determines the degree to which it contributes to the strategic nature of the application. Undoubtedly, those applications acquired without much effort, such as those purchased directly from the shelves, do not add to the strategic value of IT to the organisation (as shown by the negative mean value) whereas those applications which were developed by in-house staff, or by consultants, or by outsourcing and collaboration with other specialised parties tend to add positively to the strategic value for the organisation.

The above findings provide evidence that the type of development which involves collaboration of internal staff with other parties, either with the supplier who specialised in specific systems development areas or outsourcing it, can significantly enhance the degree of strategic use of IT. It also lends support to the suggestion that internally developed applications positively contribute towards more strategic IT for the organisation.

Section Two

7.3 Results of hypothesis testing

This section discusses the results of tests of hypotheses based on the model derived in Chapter Four. In testing these hypotheses, the F-test in the regression analysis was used to determine whether to reject or to accept the null hypothesis. A 95 percent confidence interval is used throughout. In other words, a null hypothesis is rejected if the 'Significant F' score has a value of 0.05 or lower. The null hypothesis is accepted if the 'Significant F' is more that 0.05. An 'R-square' value, also called the coefficient of determination, produced during the regression process indicates the extent to which the variation in the dependent variable is explained by the independent variable as well as determining the predictive power of the independent variable. For example, the R-square of .288 means that 28.8 percent of the variation in the dependent variable is explained by the independent variable. The other 71.2 percent of the variation in the dependent variable is explained by other intervening factors.

Correlation analysis was also carried out to determine the strength and the direction of the relationship between the variables. In determining the strength of the relationship, Levin and Fox (1988) suggest the following scale:

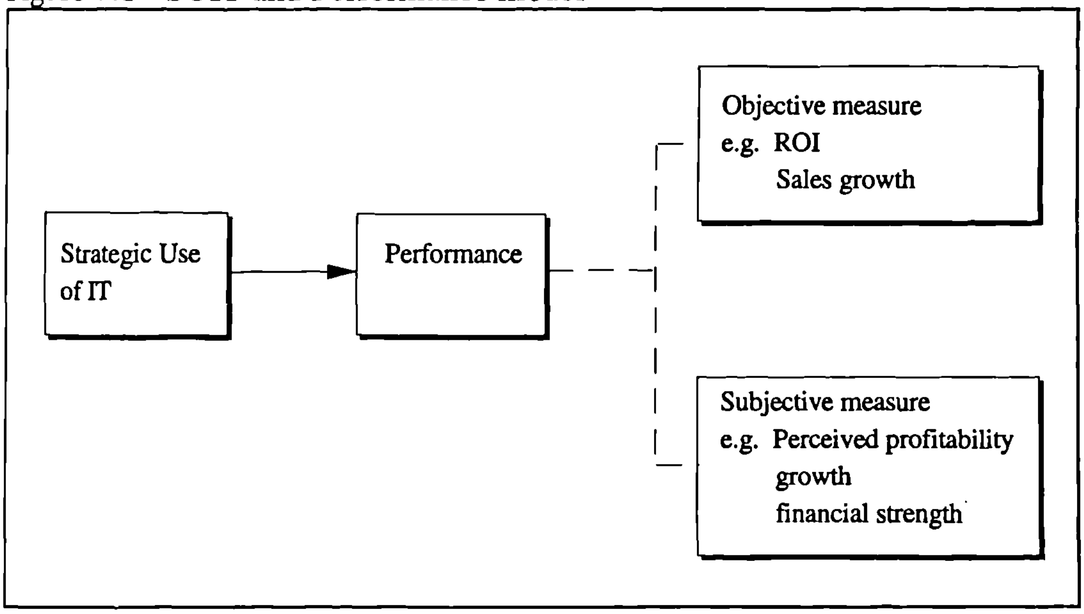
1.00	perfect correlation
0.60	strong correlation
0.30	moderate correlation
0.10	weak correlation
0.00	no correlation

The direction of the relationship is depicted by the positive or negative sign preceding the correlation coefficient. A positive coefficient means a positive relationship between the variables while a negative coefficient means a negative relationship.

7.3.1 Tests of hypothesis on performance

This section discusses findings relating to the first tier of analysis regarding the relationship between SUIT and performance. As mentioned in the earlier chapter, SUIT would be tested for its association with objective and subjective measures of performance based on the model represented in the Figure 7.1.

Figure 7.1 - SUIT and Performance model



The individual hypothesis tests are discussed in greater detail, supported by the results of the regression and correlation analyses. Details of the regression and correlation analyses are in Appendix I. Where the results are found to be statistically insignificant, a cross tabulation analysis is performed in order to further explore the underlying relationships between the variables.

7.3.1.1 SUIT and Return on Investment (ROI)

H1: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's profitability as measured by return on investment.

It is hypothesised that the higher the level of SUIT, the higher will be the level of profitability of an organisation. To test this hypothesis, regression analysis was done. The result in Table 7.11 yields a significant F-value of 0.5604 which is not significant at .05 level. This indicates that the relationship between SUIT and profitability is not statistically significant at 95 percent confidence level, suggesting that the null hypothesis is to be accepted. The result, therefore, does not support the hypothesis that the level of SUIT can explain the variations in the profitability of an organisation. In other words, based on the sample studied, there is not enough evidence to show that SUIT is strongly associated with the organisation's ROI at 95 percent confidence level. To explore this relationship further, correlation analysis was performed to determine the strength and the direction of the association. The result shows that the association between SUIT and ROI is positive but weak (0.505). A cross tabulation analysis shows that companies with a high level of SUIT register a higher level of profit (39.1 percent) than companies with a low level of SUIT (32.6 percent). On the other hand, a higher percentage of companies with a lower level of SUIT register a negative profit (42.4 percent) than companies with a higher level of SUIT (24.2 percent). It can be concluded from the above that while the statistical results does not provide a basis for confirming a strong association between SUIT and ROI, there is evidence to show that a positive relationship exists between SUIT and ROI.

Table 7.11 - Regression, correlation and cross-tab analyses between SUIT and ROI

**** MULTIPLE REGRESSION ****

Dependent Variable: ROI return on investment
Independent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat +...+ facsustain)

Multiple R	.05054
R Square	.00255
Adjusted R Square	-.00494
Standard Error	69.56767

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	1648.63569	1648.63569
Residual	133	643674.79512	4839.66011

F = .34065 Signif F = .5604 ← *not significant*

-- Correlation Coefficients --

	FACSUIT	ROI
FACSUIT	1.0000 (137) P= .	.0505 ← *positive correlation* (135) P= .560

Cross tabulation

	SUIT		
ROI	High	Medium	Low
High	39.1%	28.3%	32.6%
Marginal	31.0%	36.2%	32.8%
Low	24.2%	33.3%	42.4%

Chi-square = 2.53 Not significant at .05
df = 4, significance = .63

7.3.1.2 SUIT and sales growth

In addition to the ROI, sales growth was similarly tested against SUIT. The hypothesis is:

H2: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's growth as measured by 3-year average sales growth (SALGROW).

The result of the regression analysis in Table 7.12 indicates that the significant F-value of 0.2663 is more than the cut-off point of 0.05 (at 5 percent significant level) suggesting that the relationship between SUIT and growth is not statistically significant. The null hypothesis is therefore accepted, suggesting that there is no support for the above hypothesis at 95 percent confidence level. The correlation coefficient is nevertheless positive. A cross tabulation analysis shows that the companies with a higher level of SUIT tend to generate a higher sales growth (31.0 percent) compared to those with a lower level of SUIT (27.6 percent) while a higher proportion of companies with a lower level of SUIT (38.0 percent) experience a slower sales growth than companies with a higher level of SUIT (32.4 percent). The above results indicate that while the degree of SUIT does not explain much of the variation in the average sales growth of an organisation, there is evidence of a positive relationship between the degree of SUIT and 3-year average sales growth. Based on the sample studied, there is not enough evidence to show that there is a strong association between SUIT and sales growth of an organisation, but the two variables do relate to each other in a positive way.

Table 7.12 - Regression and correlation analyses between SUIT and sales growth

**** MULTIPLE REGRESSION ****

Dependent Variable.. SALGROW Average 3-yr sales growth
Independent Variable(s): FACSUIT SUIT 5-Factor score (facstrat+...+facsustain)

Multiple R	.09782
R Square	.00957
Adjusted R Square	.00189
Standard Error	136.09560

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	23084.38385	23084.38385
Residual	129	2389339.75356	18522.01359

F = 1.24632 Signif F = .2663 ← *not significant*

-- Correlation Coefficients --

	FACSUIT	SALGROW
FACSUIT	1.0000	.0978 ← *positive correlation*
	(137)	(131)
	P= .	P= .266

Cross tabulation

	SUIT		
Sales growth	High	Medium	Low
High	31.0%	41.4%	27.6%
Medium	38.7%	32.3%	29.0%
Low	32.4%	29.6%	38.0%

Chi-square = 2.12 Not significant at .05
df = 4, significance = .71

The above findings provide some evidence of a positive relationship between SUIT and ROI or sales growth. However, the relationship is not statistically significant at 95 percent confidence level. In other words, while these findings do not provide the basis for confirming a strong association between SUIT and ROI or sales growth, they appear to suggest that positive relationships do exist between SUIT and ROI or sales growth of organisations. The weak relationship could be explained by the fact that profitability and sales of a company are said to have been influenced by a multitude of factors such as the level of customer service, marketing orientation, management and control, human resource management, market structure, product life cycle and a number of other elements. The use of *IT is* but one of these factors which influence the organisation's ROI or sales growth.

7.3.1.3 SUIT and competitiveness

A third measure of performance used in this study is based on the subjective opinion of executives in companies. It is a qualitative evaluation of performance which captures managers perception of the organisation's performance attributable to a particular set of elements. As have been discussed in Chapter Three, the rationale for using this measure is to overcome the shortcomings of objective measures especially when dealing with performance measurement on specific attributes (in this case, the use of IT) for which objective measures attributable to IT alone are not readily available. In this study, the subjective measure is used to test if relationship exists between SUIT and the perceptual performance indicator. Senior executives were asked how IT has influenced their company's performance relative to the industry in term of the following:

- long term profitability,
- growth of sales,
- the company's financial strength, and
- public image

The measure is tested against SUIT based on the following hypothesis:

H3: The higher the degree of SUIT in an organisation, the more competitive the organisation is relative to its competitors.

The result of the regression analysis in Table 7.14 shows that the relationship between SUIT and competitiveness is statistically significant. The significant F shows a value of 0.0079, below the cut-off point of 0.01 (at 1 percent significant level). The null hypothesis is therefore rejected and it can be said that the higher the degree of SUIT in an organisation, the more competitive the organisation is relative to its competitors. The correlation coefficient of 0.23 indicates a moderate positive relationship between SUIT and competitiveness.

The above finding supports the hypothesis that the higher the degree of SUIT, the more competitive the organisation becomes. In other words, at 99 percent confidence level, there is sufficient statistical evidence to show that the degree of SUIT strongly influences the competitiveness of an organisation. This finding supports much of the literature on IT and competitive advantage which points towards a link between strategic use of IT and competitive advantage for an organisation. It supports the suggestions made in the IT and strategy literature and the numerous qualitative case studies found in popular journals on the contribution of IT to organisational competitive advantage (Fortune, 1980, 1982, 1983, 1985). and perhaps one of the first findings to date that establishes empirically the relationship between IT and competitiveness based on a large-scale fieldwork across sectors of an industry. It provides evidence of a linkage between strategic use of IT and competitive advantage, and the generalisation that the extent to which organisations use IT for strategic objectives determines the degree of competitiveness of an organisation. The results clearly demonstrates that companies which use IT in a strategic manner can be expected to achieve long term profit performance, and improved financial strength, although its impact may not be reflected in financial terms over the short term.

Table 7.14 - Regression and correlation analyses between SUIT and Perceived Performance

**** MULTIPLE REGRESSION ****

Dependent Variable: FACPERF
FACPERF: Composite 3-factor perceptual performance score
Independent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)

Multiple R	.22705
R Square	.05155
Adjusted R Square	.04447
Standard Error	.98191

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	7.02197	7.02197
Residual	134	129.19614	.96415

F = 7.28307 Signif F = .0079 ←*significant at 1% level*

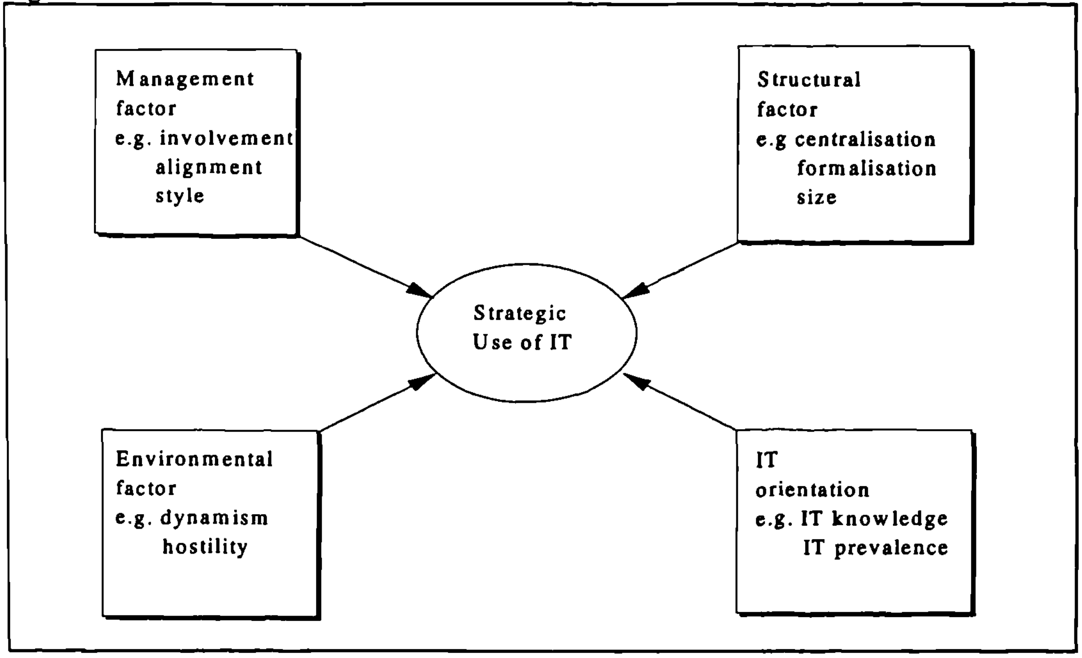
-- Correlation Coefficients --

	FACSUIT	FACPERF
FACSUIT	1.0000	.2270 ← *moderate positive correlation*
	(137)	(136)
	P= .	P= .008

7.3.2 Tests of hypothesis on contextual factors

This section discusses findings relating to the second tier of analysis regarding the influence of contextual factors over the strategic use of IT in organisations. The analysis of relationship between these variables is based on a model in Figure 7.3 which is reproduced from the earlier chapter. Testing of individual hypothesis is discussed in greater detail, supported by results of the regression and correlation analyses, details of which are in Appendix I.

Figure 7.3 - Contextual factor influence model



7.3.2.1 SUIT and industry environment

H1: The more an organisation perceives the industry as being dynamic, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.15 indicates that the relationship between perceived environmental uncertainty and SUIT is not statistically significant. Significant F shows a value of 0.2304 which is more than the cut-off point of 0.05 (at 5 percent significant level). The null hypothesis is therefore accepted and based on the sample studied it can be said that the degree of strategic use of IT is not significantly influenced by industry dynamism and uncertainty.

Table 7.15 - Regression and correlation analyses between SUIT and Industry Dynamism

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACDYN
FACDYN Composite score for Industry dynamism

Multiple R	.10431
R Square	.01088
Adjusted R Square	.00339
Standard Error	2.23863

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	7.27665	7.27665
Residual	132	661.51257	5.01146

F = 1.45200 Signif F = .2304 ← *not significant*

-- Correlation Coefficients --

	FACSUIT	FACDYN
FACSUIT	1.0000 (137) P= .	.1043 ← *positive correlation* (134) P= .230

This result, on one hand, contradicts the findings by *Johnston and* Carrico (1988) which suggest that industry factors influence the direction and pace of strategic deployment of IT. Deregulation (especially in the airline and financial services sectors), increased foreign competition, successful introduction of IT by competitors and entry of strong competitors from another industry compel a number of companies to turn to strategic use of IT as a means of responding to the competitive pressure. This result also challenges findings by Miller and Friesen (1982) and Myers and Marquis (1969) which suggested that industry uncertainty acts as a catalyst that can set off a serious search for ways to gain competitive advantage from innovation.

On the other hand, this finding supports a study by King and Sabherwal (1992) which showed no evidence of a significant relationship between industry dynamism and strategic use of IT. The notion that an uncertain industry environment makes strategic applications more urgent was not established in their research. Another study by Neo (1988) also concluded that competitive pressure is not a factor for the use of strategic IT. In his content analysis of 14 leading US companies which employ IT, he found that only two of the 14 companies used IT as a direct result of competitive pressure. The other 12 companies were more motivated by the strength of their internal expertise in IT rather than by competitive pressures and hence were less driven by the latter than the former.

In this study, the lack of support for competitive pressure as a factor which has a considerable influence on SUIT perhaps suggests that industry uncertainty makes investment in IT more difficult as it involves costs and longer term planning. Alternatively, managers perceive changes in the environment as being insufficiently turbulent to warrant any major decisions in the strategic use of IT. Or, perhaps that while they indeed perceive the industry as being turbulent, they would rather adopt a wait-and-see attitude in their decision to employ IT, despite changes in the environment.

7.3.2.2 SUIT and management involvement

H2: The more involved top management is in identifying, authorising and monitoring IT projects, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.16 indicates that the relationship between top management involvement and SUIT is not statistically significant. Significant F shows a value of 0.4463 which is more than the cut-off point of 0.05 (at 5 percent significant level). The null hypothesis is therefore accepted and thus it can be said that the degree of strategic use of IT is not influenced by top management involvement in IT projects.

Table 7.16 - Regression and correlation analyses between SUIT and Involvement

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACINVO
FACINVO Composite score for management involvement

Multiple R	.06559
R Square	.00430
Adjusted R Square	-.00307
Standard Error	2.23950

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	2.92581	2.92581
Residual	135	677.07419	5.01536

F = .58337 Signif F = .4463 ←*not significant*

- - Correlation Coefficients - -

	FACSUIT	FACINVO
FACSUIT	1.0000	.0656 ← *weak correlation*
	(137)	(137)
	P= .	P= .230

This finding is rather unexpected as it implies that top management involvement in IT projects may not necessarily result in the strategic use of IT. It repudiates popular belief about top management involvement and the success of a project. Management involvement has been said to be an important prerequisite for success in project development and execution. Similarly in strategic use of IT, management involvement has been frequently associated with success. McCosh et al. (1981) identify the lack of top management support as one of the major inhibitors to strategic applications of IT in organisations, a view supported by King (1989). However, based on the sample studied, this is not observed in this study. A possible explanation for this observation is the possibility that top management involvement requires more than just involvement at the project level. The level that was called for included involvement in strategic decisions rather than identification and monitoring, which are indeed administrative tasks. Another possible explanation points towards the way the questions are structured which could have led to the non-significant result. The questions used to measure management involvement were exploratory in nature and had not been tested in past studies. Hence their reliability and validity can be questionable. Future research should explore this aspect in greater detail and address them accordingly.

7.3.2.3 SUIT and analysis of environment

H3: The more an organisation put its effort into analysing the environment and in reviewing its strengths and weaknesses, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.17 indicates that the above relationship is statistically significant. Significant F shows a value of 0.0101 which is significant at 1 percent significant level. The null hypothesis is therefore rejected and thus it can be said that the depth and rigour of analysis carried out during the business planning process influences the degree of strategic use of IT. The more rigorous the analysis carried out by the organisation prior to a decision, the higher will be the value of the outcome of a strategic use of IT.

Table 7.17 - Regression and correlation analyses between SUIT and Analysis

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACANAL
FACANAL Composite score for analysis

Multiple R	.21998
R Square	.04839
Adjusted R Square	.04129
Standard Error	2.19740

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	32.90194	32.90194
Residual	134	647.03057	4.82859

F = 6.81399 Signif F = .0101 ← *significant at 1% level*

-- Correlation Coefficients --

	FACSUIT	FACANAL
FACSUIT	1.0000	.2200 ← *moderate correlation*
	(137)	(136)
	P= .	P= .010

This finding implies that the depth of analysis carried out by an organisation plays a significant role in influencing the use of IT for strategic purposes. By making sure that information are gathered and analysed before IT decisions are made will result in better decisions on IT and their impact on the organisation.

7.3.2.4 SUIT and alignment

H5: The more an organisation considers IT plans in its strategic plan, the higher tends to be the degree of SUIT in the organisation.

It is hypothesised that the more IT strategy aligns with the overall organsation strategy, the higher is the level of SUIT in the organisation. The result of the regression analysis in Table 7.19 indicates that relationship between the extent of alignment of IT and strategy in the planning process and SUIT is statistically significant. Significant F shows a value of 0.0001 which is more than the cut-off point of 0.01 (at 1 percent significant level). The null hypothesis is therefore rejected and thus it can be said that the extent to which IT plans takes into consideration overall business strategy strongly influences the degree of SUIT. The correlation coefficient shows a positive association between the two variables to indicate that the more IT is aligned to business strategy, the higher is the level of SUIT achieved by the organisation.

Table 7.19 - Regression and correlation analyses between SUIT and Alignment

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACALIGN
FACALIGN Composite score for alignment measure

Multiple R	.33214
R Square	.11031
Adjusted R Square	.10314
Standard Error	2.04659

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	64.39925	64.39925
Residual	124	519.37866	4.18854

F = 15.37512 Signif F = .0001 ← *significant at 1% level*

-- Correlation Coefficients --

	FACSUIT	FACALIGN
FACSUIT	1.0000	.3321 ← *moderate correlation*
	(137)	(126)
	P= .	P= .000

This result clearly supports IT literature regarding the need to align IT and business strategy as a prerequisite to greater use of IT for strategic purposes. The positive correlation adds testimony to the strength of the association between the IT-strategy alignment and the level of SUIT. The need for an alignment or 'fit' has been mentioned to be the central theme of a strategy. Strategic fit is considered as a central concept of strategic management (Venkatraman and Camillus, 1984; Miles and Snow, 1978). In SUIT, the alignment between business strategy and IT strategy is equally important to achieve the desired results. This view is shared by Chan and Huff (1992) who hypothesised that the better the strategic fit, or congruence between business strategy and IT strategy, the better the expected company performance. Companies which are able to integrate IT with business strategy are found to be better prepared to respond to a sudden increase in competition or attack by rivals. For example, Johnston and Carrico (1988) found that financial services, airline, distribution sectors are better able in assessing opportunities available to them than the hotel sector due to the different degree of congruence between IT and strategy within these sectors. The tight integration between IT and strategy is cited as a key success factor for companies in the former sectors. Based on the above, it can be concluded that IT-strategy alignment is critical for the strategic use of IT.

7.3.2.5 SUIT and IT orientation

IT orientation or maturity is characterised by the extent to which IT is prevalent throughout the organisation. It is also characterised by the level of knowledge about IT which top management has. Hence, organisations which have a mature IT are likely to have decision makers knowledgeable about IT. It would be expected therefore that the higher the maturity level is, the higher the degree of SUIT. In the tests of the relationships which follow, the hypotheses are broken down into two: 1) IT prevalence and 2) IT knowledge, as two components of IT maturity.

H6: The more prevalent IT is, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.20 indicates that the relationship between IT prevalence is not significant. Significant F shows a value of 0.7359 which is more than the cut-off point of 0.05 (at 5 percent significant level). The null hypothesis is therefore accepted. Based on the sample studied, there is not enough evidence to show that IT prevalence has a strong association with the level of strategic use of IT in an organisation. In other words, there is no basis to confirm that the physical availability of IT hardware or software in an organisation does not necessarily suggest better use of IT in that organisation. This finding tends to suggest that physical IT presence is not the main factor in the use of IT for strategic purpose and it tends to support critics in the literature (Sutherland, 1991; Clemons, 1986 and Emery, 1990) who suggest that IT alone does not provide long term competitiveness. Whether other aspect of IT maturity (i.e., IT knowledge) is a factor in the use of IT for strategic purpose is examined next.

Table 7.20 - Regression and correlation analyses between SUIT and IT Prevalence

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACMAT1
FACMAT1 Composite score for IT prevalence

Multiple R	.02908
R Square	.00085
Adjusted R Square	-.00656
Standard Error	2.24339

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	.57492	.57492
Residual	135	679.42508	5.03278

F = .11423 Signif F = .7359 ←*Not significant*

- - Correlation Coefficients - -

	FACSUIT	FACMAT1
FACSUIT	1.0000	.0291 ← *weak correlation*
	(137)	(137)
	P= .	P= .736

7.3.2.6 SUIT and management knowledge about IT

H7: The more knowledgeable top management is about IT or IT staff is about the business of an organisation, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.21 indicates that the above relationship is statistically significant. Significant F shows a value of 0.0294 which is less than the cut-off point of 0.05 (at 5 percent significant level). The null hypothesis is therefore rejected and thus it can be said that the degree of strategic use of IT is influenced by the level of knowledge top management has about IT and the level of knowledge IT staff has about business. It confirms the assumption about the relationship between the level of IT knowledge top management has and the use of IT for strategic purposes.

Table 7.21 - Regression and correlation analyses between SUIT and IT Knowledge

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACMAT2
FACMAT2 Composite score for knowledge

Multiple R	.18619
R Square	.03467
Adjusted R Square	.02752
Standard Error	2.20509

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	23.57289	23.57289
Residual	135	656.42711	4.86242

F = 4.84797 Signif F = .0294 ← *significant at 5% level*

-- Correlation Coefficients --

	FACSUIT	FACMAT2
FACSUIT	1.0000	.1862 ← *moderate correlation*
	(137)	(137)
	P= .	P= .029

This result lends support to much of the literature which suggests the importance of top management knowledge and experience to SUIT (Hackett, 1990). Organisations whose managers are knowledgeable about IT would be more aware of the potentials IT can bring to the organisation and accordingly would be in a better position to exploit IT than their counterparts.

The above two findings relating to IT prevalence and management knowledge, taken together, imply that intrinsic qualities of management are more important than sheer physical quantities of computers in determining the degree of strategic use of IT. It is obvious from the findings that IT alone will not enhance strategic value to an organisation (Clemons, 1986). The prevalence of IT across the organisation, while helpful, can only realise its value through systematic development supported by skilled management. It has been shown from the above that management knowledge strongly contributes to enhancing the strategic use of IT. These findings lend empirical support for recent calls by management and strategy writers for the need to leverage IT assets with management skills and knowledge (Financial Times, 1994; Hackett, 1990; Barney, 1992).

7.3.2.7 SUIT and IT investment

H8: The higher the expenditure on IT is (as a percentage of sales) relative to the industry average, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.22 indicates that the relationship between IT spending and SUIT is statistically significant. Significant F shows a value of 0.0146 which is close to the cut-off point of 0.01 (at 1 percent significant level). The null hypothesis therefore is rejected and thus it can be said that the degree of strategic use of IT is influenced by the level of IT expenditure or investment.

Table 7.22 - Regression and correlation analyses between SUIT and IT Investment

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): ITSPEN
ITSPEN IT spending relative to industry average

Multiple R .20902
R Square .04369
Adjusted R Square .03655
Standard Error 2.20205

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	29.68534	29.68534
Residual	134	649.76969	4.84903

F = 6.12192 Signif F = .0146 ← *Significant at close to 1% level*

-- Correlation Coefficients --

	FACSUIT	ITSPEN	
FACSUIT	1.0000	.2090	← *moderate correlation*
	(137)	(136)	
	P= .	P= .015	

This result suggests that the more an organisation spends on IT, the higher is the degree of SUIT. This finding lends empirical support to previous findings which imply a correlation between IT investment and SUIT. Burchett (1988) who relates strategic use of IT to the size of IT investment found that organisations that have gained competitive advantage through strategic use of IT spend seven percent or more of the total revenue on IT, while those that do not appear to gain advantage spend less than two percent. This is supported by Norton (1988) who found that top companies spend three to nine percent more of their turnover on IT than their competitors. Successful ITusers, while having extensive resources at their disposal, also recognise these resources as their assets and deploy them to strengthen their business. The danger of disappointing results from investment in IT is likely to be great if firms rely too heavily on IT without developing employee skills and enhancing the structure of day-to-day operations. In studying what makes large companies successful in their investment in IT, Quinn (1986) found that successful companies treat their IT investment in a similar manner to any other uncertain investment such as research and development (R & D); they recognise that IT payoffs may be delayed substantially and financial implications cannot be accurately assessed. In many of these companies, investment decisions in IT are often made based on intuitive and non-financial judgement just as they do for R & D investment. So while his finding calls for an alternative perspective to view IT investment, it complements the finding of this study in support for increased IT investment.

7.3.2.8 SUIT and planning horizon

H9: The longer the IT planning horizon of an organisation is, the higher tends to be the degree of SUIT in the organisation.

The result of the multiple regression analysis in Table 7.23 indicates that the relationship between the length of business planning horizon and SUIT is not statistically significant. Significant F shows a value of 0.1434 which is more than the cut-off point of 0.05 (at 5 percent significant level).

The null hypothesis is therefore accepted and thus it can be said that the business planning horizon does not have an influence over the degree of strategic use of IT in organisation.

Table 7.23 - Regression and correlation analyses between SUIT and Planning Horizon

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): BUSPLAN
BUSPLAN Business planning horizon in YEARS

Multiple R	.12615
R Square	.01591
Adjusted R Square	.00857
Standard Error	2.23109

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	10.78573	10.78573
Residual	134	667.02039	4.97776

F= 2.16678 Signif F = .1434 ← *Not significant*

-- Correlation Coefficients --

	FACSUIT	BUSPLAN	
FACSUIT	1.0000	.1261	← *weak correlation*
	(137)	(136)	
	P= .	P= .143	

Based on the sample studied, there is no basis to confirm that the business planning horizon has a strong association with the degree of SUIT. Longer business planning, which is often associated with the ability to devise long-term strategy and making forecasts and hence the ability to exploit IT better, is not evidenced in this study. This tends to suggest that perhaps many of the IT applications are concerned with managing the short term rather than the long term future.

7.3.2.9 SUIT and centralisation

H10: The more centralised a decision making structure (the less authority is delegated to the lower level of an organisation), the higher tends to be the degree of SUIT in an organisation.

The result of the regression analysis in Table 7.24 indicates that the relationship between centralisation and SUIT is statistically significant. Significant F shows a value of 0.0126 which is close to the cut-off point of 0.01 (at 1 percent significant level). The null hypothesis therefore is rejected. In addition, the correlation coefficient shows that the direction of the association between the two variables is negative, indicating an inverse relationship. Thus it can be said that the less centralised an organisation is, the higher is the degree of strategic use of IT.

Table 7.24 - Regression and correlation analyses between SUIT and Centralisation

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACCENT
FACCENT Composite score for centralisation measure

Multiple R	.21267
R Square	.04523
Adjusted R Square	.03816
Standard Error	2.19299

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	30.75576	30.75576
Residual	135	649.24424	4.80922

F = 6.39517 Signif F = .0126 ← *significant at close to 1% level*

-- Correlation Coefficients --

	FACSUIT	FACCENT
FACSUIT	1.0000	-.2127 ← *moderate* ***negative*** *correlation*
	(137)	(137)
	P= .	P= .013

The negative correlation observed above indicates a strong association between decentralisation organisation and the level of SUIT, i.e., the less centralised the organisation decision-making structure is, the higher the degree of SUIT. This implies that a higher level of SUIT can be found in an organisation whose decision-making authority is delegated to lower managers. The more line managers are given the authority to make important IT decisions, the more they are able to contribute towards the use of IT for strategic purposes. This supports the notion that managers in a de-centralised organisation are closer to their customers and hence would be able to understand customer needs better, and are better able to provide useful input into building IT applications which have strategic values to the organisation (Earl and Skyrme, 1992).

7.3.2.10 SUIT and formalisation

H11: The less an organisation formalises or adheres to its procedures, the higher tends to be the degree of SUIT in the organisation.

It is hypothesised that the less the organisation formalises its operational procedures, the higher is the level of SUIT in the organisation. In testing this hypothesis, it is expected that the direction of the association between the two variables to be negative. The regression analysis in Table 7.25 shows that the relationship is statistically not significant at 95 percent confidence level. The correlation coefficient is, however, negative (-0.0254), implying an inverse relationship between formalisation of procedures and SUIT. In other words, a higher level of SUIT is derived from organisations which are less formal (or less rigid) in their operational procedures. This tends to suggest that organisations which have a 'loose' structure may be better able at exploiting IT as evidenced by the weak inverse relationship between the two variables.

Table 7.25 - Regression and correlation analyses between SUIT and Formalisation

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FACFORM
FACFORM Composite score for formalisation measure

Multiple R	.02545
R Square	.00065
Adjusted R Square	-.00676
Standard Error	2.24361

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	.44030	.44030
Residual	135	679.55970	5.03378

F = .08747 Signif F = .7679 ← *Not significant*

-- Correlation Coefficients --

	FACSUIT	FACFORM
FACSUIT	1.0000	-.0254 ← *weak negative correlation*
	(137)	(137)
	P= .	P= .768

7.3.2.11 SUIT and organisational size

H12: The bigger the size of an organisation, the higher tends to be the degree of SUIT in the organisation.

The result of the regression analysis in Table 7.26 indicates that above relationship is not statistically significant. Significant F shows a value of 0.3880 which is more than the cut-off point of 0.05 (at 5 percent significant level). The null hypothesis is therefore accepted. Based on the sample studied, there is not enough support to show that size influences the degree of strategic use of IT. The finding seems to suggest that size is not the main determinant of SUIT in an organisation although larger organisations have traditionally been seen as being in the forefront in their use of IT by virtue of their wealth of resources. Smaller organisations, on the other hand, are often seen as being able to adapt easily to changes due to a less bureaucratic structure. To explore this further, a cross tabulation was performed. The result shows that 43.2 percent of those showing high level of SUIT are large companies while only 36.4 percent are small companies. In addition, more than half of the small companies (52.1 percent) produce low level of SUIT as compared to only 27.1 percent for the large companies. This appears to suggest that larger organisation, by virtue of their size, may have been better able to exploit IT relative to smaller organisations although this suggestion cannot be statistically proven based on the sample studied.

Table 7.26 - Regression and correlation analyses between SUIT and Size

**** MULTIPLE REGRESSION ****

Dependent Variable(s): FACSUIT
FACSUIT: Composite 5-Factor SUIT score (facstrat+...+facsustain)
Independent Variable(s): FT EMPLOY
EMPLOY No of full-time employees

Multiple R	.07434
R Square	.00553
Adjusted R Square	-.00184
Standard Error	2.23812

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	3.75782	3.75782
Residual	135	676.24218	5.00920

F = .75018 Signif F = .3880 ← *Not significant*

-- Correlation Coefficients --

	EMPLOY	FACSUIT
EMPLOY	1.0000	.0743 ← *weak correlation*
	(168)	(137)
	P= .	P= .388

Cross tabulation

		SUIT	
Size	High	Medium	Low
Large	43.2%	33.3%	27.1%
Medium	20.4%	26.7%	20.8%
Small	36.4%	40.0%	52.1%

Chi-square = 3.70 Not significant at .05
df = 4, significance = 44

7.3.3 A summary of the results of the hypotheses tests

In summary, the above analyses in this section has shown that there are a few dimensions of factors identified as being more influential than others in contributing towards the strategic use of IT in organisations. These factors are:

- management IT knowledge
- alignment of IT and business strategy
- depth of analysis
- the level of IT investment, and
- de-centralised organisational structure

More importantly this study has shown that there is a strong linkage between SUIT and competitiveness of an organisation, supporting conventional wisdom about the association between the two. Associations between SUIT and ROI or sales growth were less evident based on the sample studied but the overall finding relating to SUIT and organisation performance seems to indicate better long term performance for organisations which employ their IT for strategic purposes than their counterparts which lag in the use of IT.

The overall results of the analyses carried out are summarised in Table 7.28 below.

Table 7.28 - Summary of results of hypotheses tests

HYPOTHESES	SUPPORTED (**)1% sig (*) 5% sig	NOT SUPPORTED (✗)
H1: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's profitability as measured by return on investment (ROI).		(✗)
H2: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's growth as measured by 3-year average sales growth (SALGROW).		(✗)
H3: The higher the degree of SUIT in an organisation, the higher tends to be the organisation's competitiveness as measured by perceived success.	(**)	
H4: The more an organisation perceives the environment as being dynamic or hostile, the higher tends to be the degree of SUIT in the organisation.		(✗)
H5: The more top management of an organisation is involved in identifying, authoring and monitoring IT projects, the higher tends to be the degree of SUIT in the organisation.		(✗)
H6: The more an organisation put its effort into analysing the environment and reviewing its strengths and weaknesses, the higher tends to be the degree of SUIT in the organisation.	(*)	
H7: The more an organisation aligns IT plans with business strategic plan, the higher tends to be the degree of SUIT in the organisation.	(**)	

continued...

H8: The more mature an organisation is in terms of its IT department, IT prevalence, the higher tends to be the degree of SUIT in the organisation.		(✗)
H9: The more knowledgeable top management is about IT and IT staff is about the business of an organisation, the higher tends to be the degree of SUIT in the organisation.	(*)	
H10: The higher the expenditure on IT (as a percentage of sales) is relative to the industry average, the higher tends to be the degree of SUIT in the organisation.	(*)	
H11: The longer the IT planning horizon of an organisation is, the higher tends to be the degree of SUIT in the organisation.		(✗)
H12: The less centralised a decision making structure (the more lower level managers are given the authority to make their decision), the higher tends to be the degree of SUIT in an organisation.	(*)	
H13: The less an organisation formalises or adheres to its procedures, the higher tends to be the degree of SUIT in the organisation.		(✗)
H14: The bigger the organisation, the higher tends to be the degree of SUIT in the organisation.		(✗)

(**) Significant at 1% level; (*) Significant at 5% level

CHAPTER EIGHT

CONCLUSIONS AND RECOMMENDATIONS

8.1 Concluding remarks

The conclusions derived from the findings thus far seem to strengthen common belief among academia and industrial practitioners that the secret of success in an organisation remains a mystery - for the problem is a complex one. What this research has done is identify a set of factors that could be used to explain better means of achieving organisational success through the use of IT in a manner that will produce a significant impact on the organisation. It attempts to answer a basic question about the relationship between strategic use of IT and organisational performance, and in the process identifies a set of attributes that would delineate characteristics of companies which will help explain why some companies are better able than others to exploit IT for competitive advantage. Fundamental questions were asked: Does strategic use of IT (really) lead to organisational success as many have claimed? And in response to a given competitive environment, what makes companies better able to use IT than their counterparts? Why do some companies stand a better chance of building a competitive advantage based on IT while others do not? Are there common factors that influence the success of IT? If so, it would be interesting if these factors, be it organisational, managerial or environmental could be isolated, studied more deeply, and structured into a theory useful for academics and practitioners. These questions, fundamental as they are, pose a significant research challenge, at least from a conceptual standpoint. Feedback from reviewers for two international conference papers submitted from this research (Zain, 1994a; 1994b) suggest that the questions address an extremely crucial topic; but the task could be a particularly difficult one. Indeed it is, because the concept of strategic use of IT has not been very clear, its key dimensions have not been put into a proper perspective, and there is not a theory on strategic IT upon which the construct or model can be based. But this does not deter the researcher from breaking new grounds and exploring new avenues, in an effort to extend the body of knowledge by using available means, techniques and properly designed methodology, as Treacy (1986) said,

> *"...we should not give in to these difficulties, for if we do, we confine ourselves to conjectures. Instead, the practical problems of testing should be allowed to influence the design of our research, the type of models we develop, and ultimately, the topic we choose to study." (p. 15).*

Clearly, the above advice is useful and has in a way influenced the structure of this study.

This study starts with a review of the literature in strategy and management to gain an in-depth understanding of the meaning of the term 'strategic use of IT' or SUIT for short. From the review, it becomes clear that different authors have their own views and research agenda about the strategic aspects of IT. This study brings together different definitions and descriptions about strategic IT in the existing literature into a more coherent working definition in order to build explanatory models and features of SUIT. It gives a vocabulary into constructing a theory which can be measured or subjected to empirical analysis. It establishes a path to test the descriptive and prescriptive ideas through empirical tests as it integrates different thoughts about the strategic use of IT into a construct or a model of SUIT. Five key categories or dimensions of major elements of SUIT were formulated. They comprise strategic vision, strategic impact, strategic targets, strategic sustainability and strategic integration, all of which attempt to capture conceptual elements of SUIT. Categorisation of elements into the above dimensions is an important step towards putting the concept of SUIT into operation.

It also becomes clear from the review of the literature that numerous frameworks are proposed. While they have had an influential impact on the way IT is being managed in organisations, they have important drawbacks, in that they lack an independent empirical test to confirm the conclusions drawn from the case studies upon which they were established. For example, the review of the literature suggests a strong link between IT and the competitive advantage of a company. Successful companies seem to have reaped significant advantage from using IT to meet their objectives. This suggestion was derived from experiences of companies in different industries and was implied from examination of individual companies which had successfully utilised IT for strategic purposes. It is ironic, however, that there has been little large-scale empirical evidence to support such a relationship between IT and success, using large enough samples to enable general conclusions to be made across organisations in different industries. Empirical testing plays an important role in scientific enquiry as a theory inferred from a few examples is only a theory about a few examples until it is submitted to an independent verification (Treacy, 1986). This argument points towards the need for an approach away from the traditional case approaches used in the past, an approach which allows evidence to confirm, or otherwise, previous conclusions derived from the cases. It also allows for generalisation to be made about the characteristics of the population in general rather than about specific companies.

The review of the literature also suggests determinants factors influencing successful development of SUIT and organisational competitiveness. In this thesis, the factors are categorised into:

- environmental,
- managerial,
- IT orientation, and
- structural factors

To determine their relationship with SUIT, several hypotheses are formulated based on the understanding of the possible association that may exist between environmental, managerial and structural factors with SUIT.

Overall, the results present interesting implications for theory and practice. Relationships between strategic use of IT, organisational competitiveness, and the contextual factors based on the experience of 149 companies in information intensive industry have provided insights into specific environmental, structural and managerial factors which are useful to practitioners in understanding the elements impacting strategic IT applications. They offer empirical evidence for some of the commonly held beliefs about the nature of IT development and competitiveness.

Firstly, the study identified common methods of IT development and showed evidence the way IT is developed has contributed to the level of strategic IT usage in the organisations. The five common methods of IT development identified are those IT applications which are either :

- developed by in-house staff,
- developed by consultants,
- acquired outright through purchase of software from off-the-shelf,
- acquired from off-the-shelf but modified subsequently to meet the company's individual needs, or
- developed through other means such as by outsourcing or collaboration with specialised parties

Each of the above methods contributes differently to the degree of strategic IT use. Systems which are developed through collaboration with specialised external parties have been shown to contribute more towards the strategic aspects of IT relative to the rest of the other methods. Systems which are developed internally by in-house staff and those developed by external consultants also contribute positively towards enhancing the use of IT for strategic purposes. On a contrary, software that are acquired simply from off-the-shelf vendors, irrespective of whether they are subsequently modified or not, are shown to contribute negatively to competitiveness. They are counter-productive to providing value added competitiveness to an organisation, providing little or no more strategic value to the purchasing organisation apart from automating routine tasks and back-office support.

This finding sends a strong message to managers and decision makers about the need to prioritise IT system development and to be aware of the potential strategic advantages it gives, depending on the way it is developed. The choice of IT development appears to have played a significant part in competitive advantage. To managers who have not yet developed or are thinking of developing an IT system, this finding presents them with useful insights into the choice of alternative modes to develop their IT for competitive advantage. Clearly, outsourcing of IT development to specialised parties potentially adds to the future strategic application of IT. However, one must not rule out developing an IT system through the use of skills of in-house staff and of consultants who are conversant with the business and therefore are in a position to develop the system most suited to the organisation.

Based on the sample studied, it was found that companies operating in an information intensive industry tend to develop their IT application either internally using their in-house staff or by engaging external consultants. A total of 60 percent of the companies either use internal staff or engage external consultant to work collaboratively with the internal staff. This figure is encouraging as it suggests that a relatively large number of companies have adopted methods of IT development which have been shown to contribute positively to the companies' competitive advantage. A small number (5 percent) of companies resort to outsourcing or collaborating with a third party, perhaps due to the latter not being able to make themselves sufficiently felt within the marketplace. The remaining 35 percent, however, purchase pre-programmed packages which are either installed or modified. Against this background, it can be concluded that generally a large number of companies in this industry has embarked on a program to develop an IT application which has strategic prospects. However, quite a number of companies prefer to limit their effort to the choices of software that is readily available in the marketplace, perhaps due to their lack of resources, skills and experience the necessary for them to develop their IT application through other means. For these companies, the need to assess their resources and internal capabilities to gradually move away from relying too heavily on generic software packages which add little value to strategic activities is more pressing if they are to remain competitive.

The main thrust of this study centres on testing of hypotheses relating to the variables of interest. Hypotheses regarding associations between strategic use of IT and three key measures of performance (return on investment, 3-year average sales growth, and perceived organisational success) were tested. Based on the sample studied, there is a strong evidence to show that the strategic use of IT in an organisation determines the long term competitiveness of the organisation. This is one of the most important and managerially relevant overall empirical evidence to prove an association between strategic use of IT and competitive advantage. The evidence shows that the degree of SUIT correlates very significantly with perceived competitive advantage of a company - a subjective financial performance measure which some believe has an longer term implication than short term objective financial indicators. In fact, one of the strongest relationships in the entire model is the relationship between SUIT and competitiveness, confirming conventional wisdom about strategic IT and competitive advantage. It demonstrates that a high level of strategic use of IT is very likely to produce better competitive advantage to companies relative to their rivals. What this implies is that managers can expect a longer term profitability, growth and financial strength of their company through a higher level of usage of IT for strategic purposes. Organisations which exhibit a higher level of SUIT tends to be more competitive than those which lag in the use of IT. This finding offers managerial insights into the importance of regularly assessing the effectiveness of IT in the day-to-day strategic decisions. There is weak evidence to support a direct association between SUIT and ROI or sales growth. Such evidence seems to suggest that SUIT could be but one of the host of factors which influence the financial performance of an organisation. Human resource management, financial management, marketing orientation and overall management skills could be a combination of factors which have contributed towards financial performance, although each of the factors individually would not be sufficient to generate better financial performance (Yusoff, 1992). There is also reason to believe that IT development in these organisations is still in its infancy stage. Hence, attempts to explore the impact of IT on the financial figures can be hampered because of a gestation period required before any benefits can be realised and studied. Diebold (1990) in his study about innovations indicates that most of radical innovations take over a decade from first discovery to net positive cash flows, and even smaller extensions of technology typically take two to five years from initiation to bear their financial benefits. This is likely to be true for strategic IT use because its impact can be wide ranging and similarly requires a significant time lapse for the effect to be felt. While the link between SUIT and financial performance cannot be sufficiently established from the data available, the finding shows that managers believe that a higher level of usage of IT for strategic purposes would ensure the long term profitability, growth and financial strength of the company.

Hypotheses relating to the influence of contextual factors on the degree of SUIT were investigated. Based on the sample studied, environmental factors, such as changing demands and prices of products, shrinking market of products and the threats of government intervention, seem to have little influence on managers to strategically employ IT.

On managerial factors, hypotheses concerning analysis, alignment of IT and business strategy, management knowledge, and IT expenditure were supported. The extent to which internal and external analysis is carried out prior to a decision was shown to be strongly associated with the level of SUIT. A comprehensive analysis about the company's strengths and weaknesses, and the amount of search carried out concerning industry information such as market demands, competition and technology is imperative before making a corporate decision and it is shown to contribute positively to SUIT. In an organisation where strategic use of IT is high, it is very likely that there would be a parallel degree of analysis, information gathering and deliberation being carried out.

Considerable emphasis has been given in the literature to the need to align IT and business strategy and the need to consider IT plans in the organisation's overall plans (Chan and Huff, 1992; Griffith, 1986; Venkatraman and Camillus, 1984). This study adds further evidence confirming the linkage between the alignment of IT/business strategy and the degree of SUIT. In organisations where there is close inter-dependency between IT strategy and business strategy, there is potentially a considerable level of impact on IT usage for strategic purposes. Conversely, in organisations which have detached IT strategy from their overall business strategy, the impact on the level of strategic use is expected to be low. Cross-functional knowledge between top management and IT staff has also been shown to contribute positively to the strategic use of IT. The level of knowledge about IT and business is considered critical to the identification of strategic IT application (Barrett and Konsynski, 1982; Vijayasarathy and Sabherwal, 1992). Organisations whose managers are technically competent in IT, and whose IT staffs are equally competent in business, tend to exploit IT better than their counterparts.

The level of IT spending also tends to influence the degree of strategic use of IT. This finding complements an earlier finding concerning IT prevalence and infrastructure which was shown to correlate positively to the strategic use of IT in an organisation. Although the level of IT expenditure across industry generally tends to be within the range of 2-5 percent of the total revenue (Daniel, 1991), previous studies (Burchett, 1988; Norton, 1988) have shown that companies that spend 7 percent or more of their total revenue have gained competitive advantage over rivals, strengthening the need for increased investment in IT.

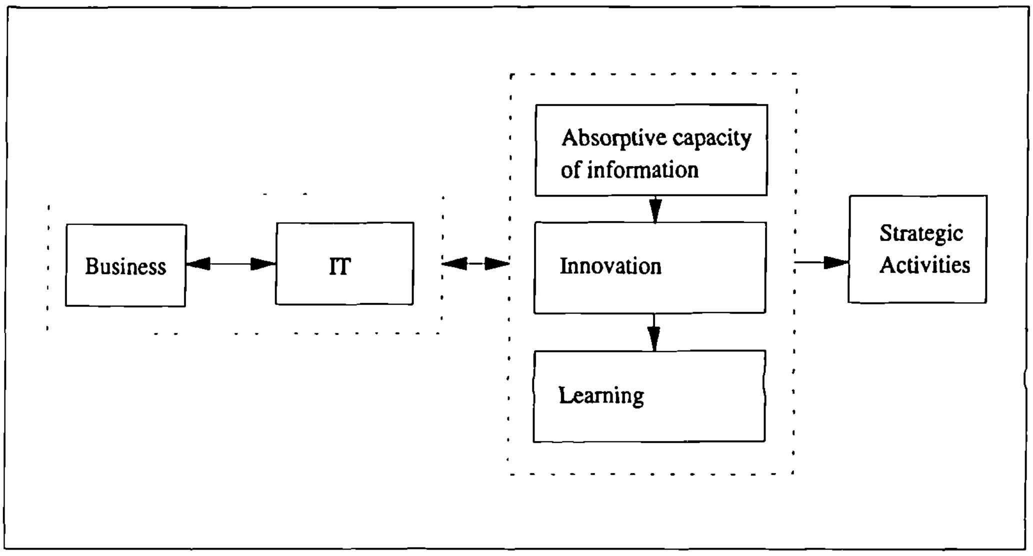
Of the four hypotheses on structural factors, only one was supported, that is, concerning centralisation of decision making and SUIT. Centralisation was found to be negatively correlated with SUIT, suggesting that SUIT is enhanced by a decentralised decision making structure. The other three hypotheses concerning planning horizon, size and formalisation were not supported. While the rejection of these hypotheses suggests that an organisation which plans further into the future, or an organisation which is bigger, or which adheres to stringent established procedures does not necessarily make greater use of IT for strategic purposes, the support for decentralisation indicates that those organisations which decentralise their decision making are likely to exploit IT and to derive greater benefits from the use of IT than centralised organisations can. Since decentralisation empowers line managers closer to customers, decentralisation may thus be considered important in creating an opportunity for using IT to improve performance. Empowerment of line managers through decentralisation of decisions facilitates the use of IT more than centralised organisations can. Decentralised organisations empower line managers with more authority over decisions and with more freedom to determine how tasks can be accomplished. The fact that they are closer to customers suggests that these managers are in a better position to understand subtle changes in the environment and are better able to tap IT opportunities as they arise.

Collectively, it can be concluded that the factors dominating the strategic use of IT are categorically managerial and structural in nature. These factors are:

- management IT knowledge
- level of IT investment
- alignment between IT and business strategy
- extent and rigour of analysis
- decentralisation

Management IT knowledge refers to the level of knowledge in IT and business possessed by and exchanged among IT and business managers (Boynton, et al, 1994). It reflects the overlapping of technological know-how IT managers have and the strategic perspectives business managers have. Figure 8.1 represents the exchange of information and interaction amongst staff to create redundancy of knowledge necessary for steady generation of innovative ideas which can be applied towards operational and strategic activities (Cohen and Levinthal, 1990). Ideally, through the exchange of information and experience, an IT manager would gain strategic business experience to apply to opportunities created by technological advances. Similarly, business managers would gain sufficient knowledge and experience in technological breakthroughs to apply to strategic decisions.

Figure 8.1 - Interaction of knowledge and strategic activities



Further support to management IT knowledge can be found in the Kenney and Florida (1988) study which suggests that Japanese firms are better at exploiting IT than Western firms due to the redundancy of knowledge and the robustness of the exchange of information among managers in Japanese firms. The works of Rockart (1988) and Henderson (1990) support a similar view in that such redundancy enriches organisational knowledge which could lead to IT innovations and promote effective use of IT. As Boynton, et al (1994) reiterated:

> "...an organization, when fabricating its IT infrastructure, might best err in favor of emphasizing the development of an effective state of managerial IT knowledge rather than an effective set of IT management processes. Most organizations, however, have historically tended to move in the opposite direction." (p. 314).

Unleashing management IT knowledge demands sufficient investment in IT, investment in hiring 'literate' IT executives and expenditure in training and re-training of non-professional staff. In the past, as with other new technology, investment in IT suffers unwarranted criticisms and has been subject to justifications unrecognised by many. However, a study (Quinn, 1986) of large and successful IT-using companies reveals that the decision processes leading to IT investment is comparable to those used for other uncertain investment (such as research and development). These managers invest in IT for purposes not reflected in financial measures, and their decisions are often based on unmeasurable benefits which will not necessarily translate into financial terms. Benefits of this sort are maintaining market share, creating flexibility, improving responsiveness to new product lines, improving service quality and enhancing quality of work life, all of which will have long term consequential effects on performance. How much to invest depends a lot on the industry (see Table 8.1) but in general, a company which spends more should be poised to reap its benefits through an increased level of strategic use of IT as this study has shown.

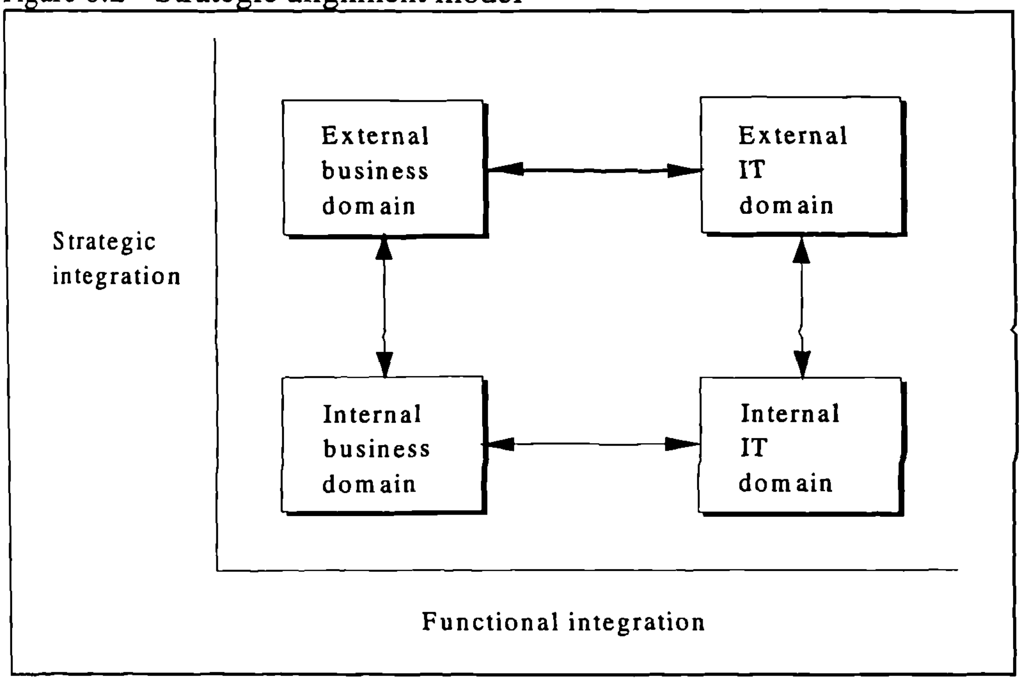
Table 8.1 - Average IT expenditure by industry

	% total annual expenditure
Financial services	12.0
Computers	10.0
Banking	10.0
Utilities	7.0
Aerospace	6.0
Insurance	5.0
Transportation	4.5
Electronics	3.0
Health care	3.0
Recreation	3.0
Chemicals	2.5
Forest products and paper	2.0
Appliances	2.0
Broadcasting and publishing	2.0
Metals	1.5
Beverages	1.0
Food and household products	1.0
Real estate	1.0

Source: Daniel, 1994

Investment which is closely linked to business strategy characterises profitable companies (Kearney, 1984). This appears to blend well with the alignment of IT and business strategy, another factor extensively mentioned in the literature to be a dominant element in organisational success. The concept of alignment or 'strategic fit' pioneered by Alfred D. Chandler in 1962 was based on ability of organisations to change their organisational structure to suit new strategies in order to maximise the benefit of the shift in their strategies. Building on this concept, Rumelt (1974) developed 'strategic fit' role to organisational success. Others like Burns and Stalker (1961) and Lawrence and Lorsch (1967) studied the fit between environment and strategy, Ferris and Butler (1991) studied human resources and strategy fit, while Thomas and Ramaswamy (1994) explored characteristics of top managers and their impact on strategy to see how they fit into one another. In the area of IT, the importance of aligning IT and business strategy has led to a growing number of research projects leading to a comprehensive model creation like 'Strategic Alignment Model' (Venkatraman, 1991; Henderson and Venkatraman, 1993) whose purpose is to create a culture in which IT strategy is compatible with business strategy (see Figure 8.2). It is concerned with integrating IT strategy with the organisation's fundamental strategies and core competencies, wherein an organisation directs significant resources towards building capabilities of effectively supporting the organisation's strategic thrusts (Chan and Huff, 1993).

Figure 8.2 - Strategic alignment model



Adapted from Venkatraman, 1991

Strategic alignment between IT and business requires synergistic combination of functional IT and business domains. In this regard, Chan and Huff (1993) call on managers to:

- take strategic alignment seriously. Consider alignment implications before moving ahead to implement strategic plans.
- determine dimensions of strategy which matters most; then direct IT resources to support those at a level consistent with their salience.
- do not ignore the need for providing support to those rated low. Establish a baseline, then move to support more important aspects of strategy.
- examine the level of IT knowledge, implement appropriate training. Monitor improvement then move to examining opportunities for connecting customers, suppliers. Where technically and economically feasible, implement them.

One of the interesting aspects of the managerial practices which was found to be influential in the strategic use of IT is the level of analysis when making strategic decisions. A rational decision making process, which analyses internal strengths and weaknesses to match with the demands of external requirements, not only allows in-depth scrutiny of issues facing the organisation and its business but also allows the use of information to address decision problems. Tools for decision support, for example, decision support systems, forecasting techniques and scenario planning, can be very useful for this purpose.

Finally, empowerment is found to be a powerful tool for achieving a desired level of strategic use of IT. It is generally believed that if the delegation of decision prerogatives, once exclusively held by top management, are given to line managers the bottom line result will be boosted. This is evidenced by a growing number of companies in the US that have begun implementing focused, self-directed programs which allows line managers and employees to take part in the decision making process (Kirwan, 1995). The result is improved balance sheets and increased employee morale. In the UK, the Rover Group's culture changed dramatically from a very hierarchical, formal structure of decision making to one which allows employees to participate in decisions regarding recruitment, training and record keeping as a result of an empowerment process that took place in the 1990's. The result was increased work autonomy with greater responsibility and accountability given to lower level managers leading to a motivated workforce and profitability. Similarly, the findings in this study point toward the same direction - the more de-centralised the decision making structure is, the more likelihood that the level of strategic use of IT in the organisation can be achieved.

As a summary, this study thus far unveils results which have interesting implications for theory and practice. The findings support conventional wisdom about the link between strategic IT and the competitiveness of an organisation. While this suggests significant advantages accrued to organisations which use IT strategically, such advantage may not necessarily be reflected in financial terms over the short term due to the gestation period before the full impact of IT can be felt. Continuous appraisal of the management of IT is important to ensure that investment in IT will produce benefits. This entails the need to put a sufficient *effort into strategically managing the IT* by reviewing, scanning and gathering information about subtle changes in the environment, by ensuring IT plans are properly integrated with business plans, by managing IT investment relative to the level demanded by the changes in technology, and by nurturing cross-functional knowledge between key members of the organisation.

8.2 Theoretical and practical implications

This study has several interesting theoretical and practical implications.

- Theoretical implications

The main theoretical implication of this study is the establishment of an empirical based framework integrating SUIT, contextual variables and organisational success. This is important because the findings of the study can provide meaningful empirical input towards future effort to establish a theory to relate SUIT and organisational competitiveness.

Likewise, this study has empirically established the link between factors, SUIT and performance. In the past no empirical study has been carried out to identify these linkages. This was not done perhaps due to the paucity in theory and the difficulties in conducting empirical studies. Key variables are not adequately defined, valid measures of them have not been developed and operationalisation of the measures is a problem. These were addressed in this study.

- Practical Implications

The findings in this study present interesting implication for academics and practitioners. Direct implication is the establishment of an instrument to measure the degree of SUIT in an organisation. The instrument developed in this study can be used to measure the extent of IT orientation in the organisation and has been proven to be highly reliable. It is important for managers to assess the effectiveness of their IT regularly. This is because the success of the organisation depends on IT as has been proven in this study.

The discussions in this thesis should extend general knowledge about SUIT as a construct as they were addressed more comprehensively than the isolated descriptions given in literature. Better understanding of the factors influencing SUIT and performance should help managers reduce uncertainties about investment in IT and hence they are better able to exploit IT opportunities for success. From a practical standpoint, this study can be invaluable to managers who may be trying to reduce uncertainties in major IT initiatives. All too often in the past, decisions regarding IT have been made without a clear frame of reference and better understanding of its strategic implications. The results of the study should provide managers with an understanding of controllable and uncontrollable elements of the business environment which have considerable influence on the level of strategic use of IT. The results may also prove useful for managers in determining which factors should be considered prior to investing in IT.

The overall findings of the study have led to several recommendations for managers in search of organisational excellence, the first and most important of which is the realisation that strategic use of IT really makes a difference in the competitive advantage of their company. It is therefore important for managers to take IT as seriously as possible by taking stock of the company's position in terms of the degree of strategic use of IT by assessing the extent to which its IT system complies with dimensions of strategic use of IT developed in this study. Direct resources towards achieving the level of conformity to the collective attributes of the strategic IT characteristics. Secondly, treat alignment of IT and business strategy as more than a simple match. It requires organisational resources to best support the organisation's strategic orientation and to be deployed in line with the organisation's strategic profile. These resources may include time spent on analysing, scrutinising environmental changes as input to the strategic decision process. Thirdly, investment in IT is a good thing, but may not initially have a clear financial impact. Do not be discouraged by minuscule gains in measured productivity, or delayed results, for high performance payoffs may be received subsequent to unmeasurable benefits such as greater flexibility and adaptability, motivated knowledgeable workers and an improved quality of working life. And finally, combine work life with greater responsibility and accountability through empowerment of workers. This means direct communication partnership with lower level staff, fostering resolution of inadequacies at task level and authority to make small market related changes attuned to the needs of the market. This is more likely to result in success.

8.3 Limitations and suggestions for future research

In appraising the findings of this study, it is important to interpret the results in the light of the following limitations. Firstly, in the absence of prior instruments used by researchers to measure SUIT, this study and the development of the SUIT instrument is exploratory in nature. Every effort is made to ensure that all the principal elements representing SUIT are present in the SUIT construct. For example, an extensive search of the literature was carried out to identify elements which meet the description of SUIT. Those that met the description were included in the questionnaire. In the process of the search, however, there could potentially be other elements which could have been part of the construct but may have been overlooked and not taken into consideration. If this occurs, the strength of the construct may be affected, although it does not invalidate the construct itself. This is also true in the case of those items which were omitted during the process of purification of the SUIT construct. In order to ensure a high reliability of the SUIT measure, those items which were poorly correlated were dropped, leaving only those which correlated highly with the rest of the items in the construct. From an inventory of 28 items, only 18 items were retained while 10 were dropped. The omission of these 10 items from the construct may have affected the comprehensiveness and the strength of the validity of the SUIT construct. Future research may examine relevant new items which can be included as part of the SUIT construct. It may choose to retain all the items which have been dropped in this study and compromise the reliability of the SUIT measure. In addition, future research in the area of IT and competitive advantage which involves measurement and establishes the impact of IT on organisational performance may be approached by improving the operationalisation of the SUIT measure. This is done by controlling disturbances which affect extraneous variances. For example, rather than studying organisations across too diverse a sector, future research may choose to concentrate on studying IT impact on a specific sector, or the study of a selection of the largest companies with established IT department. In doing so, variances can be reduced or controlled and once these variances are controlled, the study of the impact due to IT can be better appreciated. Bakos (1987) recognises that measurement at the firm or industry level, while has an advantage of high validity, can make the task of establishing an impact due to IT extremely difficult because of confounding factors and extraneous variance. To reduce this problem, future research which analyses firms should attempt to control disturbances affecting variances such as mergers and acquisitions, government policy changes and other contextual 'noise'. This can be done by a screening process during the sample selection stage, including, as mentioned earlier, the screening of companies with established IT departments.

Furthermore, in appraising the findings, it is important to note that this study is cross-sectional in nature. Cross-sectional data captures a situation or an event at a point in time and inherently has its shortcomings. This shortcoming may be embedded in the data gathered from the mail survey. In this study, for example, the effect of IT on financial performance was measured at a point in time by matching the perception of managers about the impact of IT against an average financial performance of a company over three years. There is potentially a mismatch between these two data especially when it was later discovered that the IT implementation in a majority of these organisations was relatively recent. Because of this, the financial effect of IT implementation may not have been fully explained unless the IT has been implemented well before the study is carried out. Although every effort is taken to reduce this shortcoming in the design of the survey, the risk of the mismatch cannot be eliminated entirely. A longitudinal study approach would have alleviated such shortcomings but given the extensive number of companies involved, such an approach may not be practicable. Another approach for future research would be to selectively focus on organisations which have established IT departments, preferably those whose IT department has been in operation for more than 10 years. Studies about characteristics of IT usage in these organisations may reveal a different picture as by that time, IT innovations have been sufficiently left to mature and the aggregated impact may have been reflected in financial terms.

Another limitation of the study concerns the cause and effect relationship between SUIT and financial performance measures. In this empirical-based study, the research model developed provides a way of viewing the world but at the same time makes the research doable by simplifying things somewhat. In the complex real world of business, there are potentially other factors which could influence the use of IT and business performance but for the purposes of this study, these are controlled (or ignored?) by concentrating on the factors shown in the model. The arrows shown in the research model indicate the relationships between contextual factors and strategic use of IT, and strategic use of IT and business performance and the links that were hypothesised to exist. Never in a cross-sectional study such as this can a cause and effect relationship unquestionably be established. Causal effect can only be assumed by virtue of the non-experimental research design adopted throughout this study. Future research may choose to conduct the study based on a time linked longitudinal study across sectors in the information intensive industry. A longitudinal study is a better means of determining the time link between variables and could produce a probable causal effect in the relationships between variables. This approach, however, is expensive and requires an extended time period as it covers a large number of companies which are geographically distributed. Resources can be a major limitation for those who wish to undertake this approach.

Last but not least is time and resources limitations. A PhD exercise such as this is often faced with time and financial constraints. Funding by the Malaysian government is limited to three years and hence the structure of the work carried out had to be designed around the stipulated time period. The field survey covering a three-month period is considered short to capture the massive amount of data required or to allow verification of findings of the study through other means. Despite this limitation, the use of recent software packages has enabled sufficient depth of analysis and has greatly reduced the time that would otherwise be taken.

It is a little disappointing, however, to have completed the study without being able to find a firm conclusion about the impact of IT on the overall financial performance of the company employing the IT. It would have been an exciting overall finding had the result been otherwise - that IT directly affects accounting profits. But such an outcome is not entirely unexpected, although future research can be conducted using larger sample size and a more defined population.

Finally further research is needed to test and extend the findings presented in this thesis. Researchers are invited to test the validity of the measures developed in this study by re-employing the SUIT questionnaire used in this study on companies in different settings, for example, in the manufacturing or high technology sector. In this way the instrument can be enhanced and its external validity improved.

8.4 Summary

In conclusion, this study has provided invaluable input to theory and practice. It provides a stepping stone to more theory building research which is needed for an area of knowledge as 'adolescent' as IT (Kaufmann and Weill, 1989). The study conducted is in response to the numerous calls that have repeatedly emphasised the necessity of conducting empirical research that would enhance a body of knowledge called 'strategic IT'. It also contributes to filling the vacuum to the dearth of empirical study in IT. The results have addressed a useful conceptualisation of strategic use of IT which were formally tested against a wide range of hypotheses. From a practical standpoint, managers and practitioners alike stand to gain from the findings of this study. The results serve managers and practitioners well to champion IT development for business success.

Finally, the results of the study suggest a healthy future for companies using IT for competitive advantage. The introduction of a strategic system does not always result in a healthy balance sheet in the short term but given time, the future looks good for those who strike a careful balance between IT, managerial acumen, environmental opportunities and organisational resources. Wishing all the best of success in IT!

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Appendix A - Sample of a covering letter

THE
UNIVERSITY OF
STRATHCLYDE
IN GLASGOW

12 May 1994

«title» «fullname»
«job»
«company»
«address1»
«address2», «address3»
«address4»

Dear «title» «lastname»

STRATEGIC USE OF INFORMATION TECHNOLOGY

Information technology has become an important part of UK businesses. Its use for achieving strategic objectives is critical for success in organisations today. At the University of Strathclyde, we have embarked on research to identify ways in which companies like yours use IT, and to identify the factors which influence its use. To do this, we kindly ask you (or another member of your organisation directly responsible for IT) to share your insights with us in the enclosed questionnaire and to return it in the prepaid envelope provided, if possible, within the next two weeks.

In return for your support, we will send you summary findings of this research focusing on the industry relevant to your organisation. We believe that this report could help you gauge the profile of your organisation relative to the industry.

This research is part of a doctoral thesis and your response is vital. With your help, this research can make a valuable contribution towards understanding the impact of IT on corporate success and improving the competitiveness of UK businesses.

We look forward to your early response and wish to thank you in advance for your valued support.

Yours sincerely,

Nordin H. Zain

199 Cathedral Street, Glasgow G4 0QU
Telephone: 0141-553 6000
Telex: 77472 UNSLIB G
Fax: 0141-552 8851/0141-552 2501

Director: Professor Chris Greensted

Appendix B - Sample of a reminder letter

THE
UNIVERSITY OF
STRATHCLYDE
IN GLASGOW

26 May, 1994

«title» «fullname»
«jobtitle»
«company»
«address1»
«address2»
«address3»
«address4»

Dear «title» «lastname»

RESEARCH IN THE STRATEGIC USE OF INFORMATION TECHNOLOGY

You may remember that recently we contacted you regarding research into the strategic use of information technology (IT), and provided you with a copy of our research questionnaire. We do appreciate the time pressures imposed upon executives in today's business environment but <u>your response is very important</u> to us as your company has been specially selected to represent the views of large firms in the UK.

If you have already replied, we thank you for your participation. If you have not, we kindly request that you or another member of your organisation directly responsible for IT complete and return the questionnaire (copy enclosed) to us at the earliest possible opportunity. Please be assured that your identity, and that of «company», will be kept in <u>the strictest confidence</u>.

We look forward to receiving your views on this important area of corporate activity, and wish to thank you for your support.

Yours sincerely,

Nordin H. Zain

199 Cathedral Street, Glasgow G4 0QU
Telephone: 0141-553 6000
Telex: 77472 UNSLIB G
Fax: 0141-552 8851/0141-552 2501

Director: Professor Chris Greensted

Appendix C - Sample of a questionnaire

UNIVERSITY OF STRATHCLYDE

SENIOR EXECUTIVE QUESTIONNAIRE

A Survey of Factors and Attitudes Towards the Use of Information Technology

This questionnaire is being administered as part of my doctoral research in the area of strategic use of information technology. *Information technology* (IT) includes hardware (mainframe, microcomputers), software (computer languages, expert systems), networks (telecommunication systems), workstations (computer capabilities with large databases used by professionals for model buildings, graphics) or smart chips ('intelligent' cards used to enhance product functionality or reliability).

The questionnaire is designed to gather information about your organisation, its environment, the nature of its industry, its decision making process, and the factors affecting its use of IT. No questions of a personal nature are asked, nor is any proprietary information requested.

The questionnaire is meant for senior executives who have adequate familiarity with the organisation's operations and its business environment. Throughout the questionnaire, the word 'organisation' is used, and it means the entity of which you are a senior executive, whether it is a division, a subsidiary, or an independent corporation.

The questionnaire is divided into five sections. Each section is structured for ease of answering and will take about a few minutes to complete. Most of the questions are rating scales where you are requested to circle the number in each scale to represent the reality as you perceive it. Other questions may require either a tick or filling in the blank.

I hope you will find it interesting and useful to complete this questionnaire. Other executives who have done so have found it stimulating and that it helps them think in ways which they might not have otherwise considered.

All information you provide will be kept in the strictest confidence. Only aggregate data will be used in the final report so that it is impossible to identify specific organisations. Please answer as openly and as completely as you can, as incomplete questionnaires create severe problems in data analysis.

The main findings of this survey will be made available to you if you so desire, by filling in the information box at the end of the questionnaire.

Thank you for your co-operation.

Section 1. INDUSTRY CHARACTERISTICS

1. **Which of the following best describes your industry?**

Banking/finance/insurance	☐	Publishing/news	☐
Hotel/tourism	☐	Mail order	☐
Airlines	☐	Other (please specify)	☐
Wholesale/retail	☐	____________________	

The following questions relate to the industry within which your organisation operates (An organisation means a division, a subsidiary, or a corporation of which you are a senior executive). *Please circle the number which* represents your understanding of the industry.

2. **At what rate do products/services become obsolete in your industry?**	*Very slowly*	1	2	3	4	5	6	7	*Very rapidly*
3. **At what rate are new markets for industry's products emerging?**	*Very slowly*	1	2	3	4	5	6	7	*Very rapidly*
4. **How predictable are the actions of your competitors?**	*Very predictable*	1	2	3	4	5	6	7	*Very unpredictable*
5. **How predictable are the industry's customer demands and tastes?**	*Very predictable*	1	2	3	4	5	6	7	*Very unpredictable*
6. **How often must your organisation change its marketing practices to keep pace with the market?**	*Very rarely*	1	2	3	4	5	6	7	*Very frequently*

7. **How significantly does each of the following aspects cause a <u>threat</u> to the survival of your organisation?**

	Not at all significant						*Very significant*
a) Price competition in the industry	1	2	3	4	5	6	7
b) Competition in product quality or service novelty	1	2	3	4	5	6	7
c) Dwindling market for your products and services	1	2	3	4	5	6	7
d) Scarce supply of labour and material	1	2	3	4	5	6	7
e) Government interference	1	2	3	4	5	6	7

8. **Compared to your *Industry's average*,** (or, if yours is a diversified organisation, in relation to comparable organisations) **how do you rate your organisation on each of the following?**

	Very low			*Average*			*Very high*
a) Long run level of profitability	1	2	3	4	5	6	7
b) Growth rate of sales or revenues	1	2	3	4	5	6	7
c) Financial strength (liquidity and ability to raise financial resources)	1	2	3	4	5	6	7
d) Public image and goodwill	1	2	3	4	5	6	7
e) IT spending relative to sales	1	2	3	4	5	6	7

Section 2. STRATEGIC USE OF INFORMATION TECHNOLOGY CHARACTERISTICS

In recent times, numerous success stories about companies using IT for strategic purposes have been mentioned in the popular business press. By definition, ***strategic use of IT is "the utilisation of information or technology resources in key areas of the business which results in a profound effect on a company's success."***

There may be such success stories about using IT in your company as well. Please identify **ONE** IT system/application which you think your company has used for strategic purposes, and indicate below the category which best describes the IT application you have just identified. Please bear this application in mind as the rest of the questions in this section relate to the application you identify here.

1. **Type of IT application/system.** (Please tick only one)

Customer Information System	☐	Expert System	☐
Competitor/Supplier Information System	☐	Electronic Data Interchange	☐
Cash Management System	☐	CAD/CAM	☐
Flight Information System	☐	Telecommunication Networking	☐
Roombooking System	☐	Office Systems (e.g. E-mail, etc.)	☐
Point-Of-Sale System	☐	Smart Cards/Robotics	☐
Executive Information System	☐	Marketing Database	☐
Accounting/Inventory System	☐	No strategic application (*go to Section 3*)	☐
General Management Information System	☐	Other (please specify) ______________________	☐

2. **Was this application developed internally or acquired from an external source?**

- ☐ developed internally by in-house staff
- ☐ developed by external consultants
- ☐ purchased off-the shelf packages
- ☐ purchased off-the-shelf packages but modified to suit company needs
- ☐ other (please specify) ______________________

3. **Was this application used for the entire corporation, for a business unit, or for a division?**

The entire corporation ☐ A business unit ☐ A division ☐

In the rest of this section, the term organisation means the corporation, the business unit, or the division for which this application was developed .

4. **How significant do you think this application was in contributing to the performance of your organisation in the following areas relative to competitors?**

	Not at all significant						*Very significant*
Market share	1	2	3	4	5	6	7
Profitability	1	2	3	4	5	6	7
Efficiency of operation	1	2	3	4	5	6	7
Effectiveness of decision making	1	2	3	4	5	6	7

5. **How significant do you think this application was in contributing to the following outcomes?**

	Not at all significant						*Very significant*
Ability to influence customers buying decisions	1	2	3	4	5	6	7
Ability to establish linkages with suppliers	1	2	3	4	5	6	7
Ability to cause threats to existing competitors	1	2	3	4	5	6	7
Ability to build an entry barrier for potential competitors	1	2	3	4	5	6	7

6. **How significant do you think this application was in contributing to the following activities?**

	Not at all significant						*Very significant*
Co-ordinating functions within the organisation	1	2	3	4	5	6	7
Integrating activities within each function	1	2	3	4	5	6	7
Enabling staff to consult other staff with different expertise	1	2	3	4	5	6	7
Supporting critical areas of business operations	1	2	3	4	5	6	7

...continued from previous page

	Not at all significant						Very significant
Helping managers identify new opportunities	1	2	3	4	5	6	7
Allowing staff to experiment with new ideas	1	2	3	4	5	6	7
Gathering information about competitors	1	2	3	4	5	6	7
Anticipating competitor's moves	1	2	3	4	5	6	7
Bringing radical changes in the way business is conducted	1	2	3	4	5	6	7
Making accessible diversified sources of information	1	2	3	4	5	6	7
Increasing access to resources (e.g. manpower, fund, equipment, etc.)	1	2	3	4	5	6	7

7. How significant is this application for the following functions?

	Not at all significant						Very significant
Supporting the overall corporate strategy	1	2	3	4	5	6	7
Influencing future direction of the corporate strategy	1	2	3	4	5	6	7
Creating new strategies for the organisation	1	2	3	4	5	6	7
Modifying the existing corporate strategy	1	2	3	4	5	6	7
Shaping the organisation's strategic plans	1	2	3	4	5	6	7

8.a) If your competitors wanted to copy this application, how much difficulty do you think they would encounter in doing so?

No difficulty at all 1 2 3 4 5 6 7 *Great deal of difficulty*

8.b) Please explain why you answered 8.a) as you did.

____

____

9.a) For how long do you expect this application to have an advantage over your competitors?

For a short time 1 2 3 4 5 6 7 *For a long time*

9.b) Please explain why you answered 9.a) as you did.

____

____

10. **Which of the following strategies does your organisation primarily adopt?** (Please tick only one)

Differentiation - by offering unique products, delivery or services with little regard of costs. ☐	***Innovation*** - by introducing products or processes that result in radical transformation of the industry. ☐
Cost Reduction - by reducing overall organisation costs, supplier's costs, or customer's costs. ☐	***Alliance*** - by co-operating with intermediaries or competitors. ☐
Growth - by expanding geographically or in volume. ☐	***Focus*** - by concentrating on niche segments of market. ☐
	Don't know ☐

11. **What was the contribution of this IT application to achieving the above strategy?**

No contribution 1 2 3 4 5 6 7 *Very significant contribution* *Not applicable* ☐

12. **If things had gone wrong, showing that the decision to install/develop this particular application was a mistake, how serious could the consequence have been for your organisation?**

Not at all serious 1 2 3 4 5 6 7 *Very serious*

Section 3. MANAGERIAL CHARACTERISTICS

1. **What is your job status?**

Chairman/Chief Executive	☐	General Manager	☐
Managing Director	☐	Other Senior Management	☐
IT Director	☐	Middle Management	☐
Other Director	☐	Other	☐

2. **How far ahead does your organisation plan its business?**
(An organisation means a division, a subsidiary, or a corporation of which you are a senior executive)

No. of years: ________

3. During the planning process, how much effort is devoted to:

		No effort at all						*A lot of effort*
a)	reviewing your organisation's strengths and weaknesses?	1	2	3	4	5	6	7
b)	obtaining information about your industry (such as market demands, competitors, etc.)?	1	2	3	4	5	6	7
c)	obtaining information about trends and developments in IT?	1	2	3	4	5	6	7

4. How strongly do you agree or disagree with the following statements about your organisation?

		Strongly disagree						*Strongly agree*
a)	My organisation has a structured channel of communication.	1	2	3	4	5	6	7
b)	My organisation holds fast to established management principles even in changing business conditions.	1	2	3	4	5	6	7
c)	My organisation gives a significant say in decision making to formal line managers.	1	2	3	4	5	6	7
d)	My organisation has restricted access to important financial and operating information.	1	2	3	4	5	6	7
e)	My organisation's management is characterised by strongly individualistic decisions.	1	2	3	4	5	6	7
f)	Long-term strategic decisions are reached through participative, group decision-making at junior and senior management level.	1	2	3	4	5	6	7
g)	My organisation encourages staff to experiment with new ideas.	1	2	3	4	5	6	7
h)	My organisation has specific reward policies for those who contribute to innovations.	1	2	3	4	5	6	7
i)	The senior management of my organisation is well informed about IT.	1	2	3	4	5	6	7
j)	The IT staff is well informed about my organisation's business.	1	2	3	4	5	6	7
k)	The senior management of my organisation is involved in identifying new IT projects.	1	2	3	4	5	6	7
l)	The senior management of my organisation is involved in authorising new IT projects.	1	2	3	4	5	6	7
m)	The senior management of my organisation is involved in monitoring the progress of IT projects.	1	2	3	4	5	6	7

Section 4. ORGANISATIONAL CHARACTERISTICS

1. **What is the total sales (value) of your organisation?**
(An organisation means a division, a subsidiary, or a corporation of which you are a senior executive)

Less than £15 million	☐	£61-75 million	☐
£15-30 million	☐	£76-90 million	☐
£31-45 million	☐	£91-105 million	☐
£46-60 million	☐	£105 million or above	☐

2. **What is your organisation's total number of full-time employees?** ________ employees

3. **To what extent is the responsibility to make the following decisions in your organisation centralised at the most senior levels (chief executive or board) of management?**

	Very de-centralised						*Very centralised*
a) Development of new products .	1	2	3	4	5	6	7
b) Raising long term capital to finance new investments.	1	2	3	4	5	6	7
c) Selection of large new investments.	1	2	3	4	5	6	7
d) Acquisition of controlling interest in other organisations.	1	2	3	4	5	6	7
e) Hiring and firing of senior personnel	1	2	3	4	5	6	7

4. **How strongly do you agree or disagree with these statement about your organisation's operating procedures?**

	Strongly disagree						*Strongly agree*
a) Whatever situation arises my organisation has procedures for dealing with it.	1	2	3	4	5	6	7
b) Where rules and procedures exist, they are usually written.	1	2	3	4	5	6	7
c) Employees are constantly checked for rule violation.	1	2	3	4	5	6	7
d) There are strong penalties for violating procedures.	1	2	3	4	5	6	7
e) The rules are ignored and informal procedures used to handle some situations.	1	2	3	4	5	6	7

5. How strongly do you agree or disagree with these general statements about IT in your organisation?

	Strongly disagree						*Strongly agree*
My organisation has microcomputers, software facilities installed throughout the premise.	1	2	3	4	5	6	7
All departments in my organisation are supported by IT.	1	2	3	4	5	6	7
Activities within each department in my organisation are well co-ordinated using IT.	1	2	3	4	5	6	7
Activities between departments in my organisation are well co-ordinated using IT.	1	2	3	4	5	6	7
My organisation's production, sales and distribution functions are highly dependent on IT.	1	2	3	4	5	6	7
It does not take long before my organisation is able to copy a competitor's new IT system.	1	2	3	4	5	6	7
If a competitor tries to introduce a new system which threatens my organisation's position, my organisation is able to quickly deal with it through new or similar innovations of IT.	1	2	3	4	5	6	7

6. Does your organisation carry out any kind of IT planning? *Yes* ☐ *No* ☐ (If no, please go to Question 8)

a) How formalised is the IT planning done by your organisation?

Very informal 1 2 3 4 5 6 7 *Very formal*

b) To what extent does IT planning take the organisation's overall plans into consideration?

Not at all 1 2 3 4 5 6 7 *To a great extent*

c) About how far ahead does your organisation plan for IT into the future? *No. of years:* ________

7. How strongly do you agree or disagree with these statements about IT planning in your organisation?

	Strongly disagree						*Strongly agree*
My organisation would not change its strategic plans without changing its IT plans.	1	2	3	4	5	6	7
My organisation carries out an extensive review of IT plans before a corporate decision is taken.	1	2	3	4	5	6	7
A change in corporate plans normally triggers a significant change in IT plans.	1	2	3	4	5	6	7

8. How many employees does the IT department of your organisation have? ________ *IT employees*
(including those assigned to other departments)

9. Is an IT executive in your organisation established as part of the executive team or board?

Yes ☐ *No* ☐

10. Approximately how long ago was your IT department established? *Years* ______

Section 5. FACTORS

Finally, listed below is a series of statements about what people think to be the factors which influence the use of IT in their organisation.

A) For each item below, please indicate how strongly you agree or disagree that it facilitates the use of IT in your organisation.

		Strongly disagree						*Strongly agree*
1)	strong technical support within my organisation.	1	2	3	4	5	6	7
2)	extensive computer facilities.	1	2	3	4	5	6	7
3)	pressure from competition.	1	2	3	4	5	6	7
4)	strong financial position of my organisation.	1	2	3	4	5	6	7
5)	strong market position of my organisation.	1	2	3	4	5	6	7
6)	strong top management support.	1	2	3	4	5	6	7
7)	strong planning capability.	1	2	3	4	5	6	7
8)	need for innovation.	1	2	3	4	5	6	7
9)	upward pressure from middle management.	1	2	3	4	5	6	7
10)	others ______________________	1	2	3	4	5	6	7

B) For each item below, please indicate how strongly you agree or disagree that it is a barrier to the use of IT in your organisation.

		Strongly disagree						*Strongly agree*
1)	lack of appropriate planning.	1	2	3	4	5	6	7
2)	lack of knowledge and awareness of IT potentials.	1	2	3	4	5	6	7
3)	lack of management support.	1	2	3	4	5	6	7
4)	lack of communications between IT staff and management.	1	2	3	4	5	6	7
5)	lack of understanding of user needs.	1	2	3	4	5	6	7
6)	power and politics.	1	2	3	4	5	6	7
7)	ill-defined management objectives.	1	2	3	4	5	6	7
8)	difficulty in assessing contribution of IT.	1	2	3	4	5	6	7
9)	budget constraints.	1	2	3	4	5	6	7
10)	other priorities are more important than IT.	1	2	3	4	5	6	7
11)	others ______________________	1	2	3	4	5	6	7

Would you consent to being interviewed at your place of work on this subject? *Yes* ☐ *No* ☐

Thank you very much for your time. Please place the completed questionnaire in the prepaid envelope provided and return it to: Mr. Nordin H. Zain c/o Professor Keith Fletcher Strathclyde Graduate Business School University of Strathclyde 130 Rottenrow Glasgow G4 0BR	**If you would like to have a copy of the survey results when they become available, please write your name and address in the space below. Your name and address will be used only for mailing the results to you or contacting you in the event that you have agreed to being interviewed. All responses to this questionnaire will remain strictly confidential to Strathclyde Graduate Business School.** ________________________ ________________________ ________________________ ________________________ ________________________

Appendix D - Analysis of a non-response bias

NON RESPONSE ANALYSIS BASED ON THE FIRST AND THE LAST 30 RESPONDENTS

```
-> T-TEST
->   GROUPS=bias30('early' 'late')
->   /MISSING=ANALYSIS
->   /VARIABLES=barr1 barr2 barr3 barr4 barr5 barr6 barr7 barr8 barr9 facil1 facil2
facil3 facil4 facil5 facil6 facil7 facil8 facil9 barr10
->   /CRITERIA=CIN(.95) .
```

There are 605,392 bytes of memory available.
The largest contiguous area has 342,088 bytes.

T-TEST requires 1368 bytes of workspace for execution.

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
BARR1 lack of planning				
BIAS30 early	30	3.8667	1.655	.302
BIAS30 late	30	4.0000	1.619	.296

Mean Difference = -.1333

Levene's Test for Equality of Variances: F= .118 P= .732

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-.32	58	.754	.423	(-.980, .713)
Unequal	-.32	57.97	.754	.423	(-.980, .713)

Variable	Number of Cases	Mean	SD	SE of Mean
BARR2 lack of awareness of IT potential				
BIAS30 early	30	4.3667	1.650	.301
BIAS30 late	30	4.5333	1.871	.342

Mean Difference = -.1667

Levene's Test for Equality of Variances: F= .633 P= .430

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-.37	58	.716	.455	(-1.078, .745)
Unequal	-.37	57.11	.716	.455	(-1.079, .745)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
BARR3 lack of top mgmt support				
BIAS30 early	30	3.4667	1.655	.302
BIAS30 late	30	3.8667	1.676	.306

Mean Difference = -.4000

Levene's Test for Equality of Variances: F= .003 P= .956

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.93	58	.356	.430	(-1.261, .461)
Unequal	-.93	57.99	.356	.430	(-1.261, .461)

Variable	Number of Cases	Mean	SD	SE of Mean
BARR4 communication barrier betw IT & mgmt				
BIAS30 early	30	3.8333	1.577	.288
BIAS30 late	30	3.5333	1.592	.291

Mean Difference = .3000

Levene's Test for Equality of Variances: F= .006 P= .940

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.73	58	.466	.409	(-.519, 1.119)
Unequal	.73	58.00	.466	.409	(-.519, 1.119)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
BARR5 lack of understanding of user needs				
BIAS30 early	30	4.3667	1.326	.242
BIAS30 late	30	3.6667	1.446	.264

Mean Difference = .7000

Levene's Test for Equality of Variances: F= .344 P= .560

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.95	58	.056	.358	(-.017, 1.417)
Unequal	1.95	57.57	.056	.358	(-.017, 1.417)

Variable	Number of Cases	Mean	SD	SE of Mean
BARR6 power and politics				
BIAS30 early	30	3.9000	1.561	.285
BIAS30 late	30	3.5000	1.503	.274

Mean Difference = .4000

Levene's Test for Equality of Variances: F= .004 P= .953

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.01	58	.316	.396	(-.392, 1.192)
Unequal	1.01	57.92	.316	.396	(-.392, 1.192)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
BARR7 ill-defined objectives				
BIAS30 early	30	4.0000	1.857	.339
BIAS30 late	30	3.9667	1.790	.327

Mean Difference = .0333

Levene's Test for Equality of Variances: F= .018 P= .895

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.07	58	.944	.471	(-.910, .976)
Unequal	.07	57.92	.944	.471	(-.910, .976)

Variable	Number of Cases	Mean	SD	SE of Mean
BARR8 difficulty in assessing IT contribution				
BIAS30 early	30	4.3000	1.685	.308
BIAS30 late	30	3.9333	1.437	.262

Mean Difference = .3667

Levene's Test for Equality of Variances: F= .336 P= .564

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.91	58	.368	.404	(-.443, 1.176)
Unequal	.91	56.59	.368	.404	(-.443, 1.176)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
BARR9 budget constraints				
BIAS30 early	30	3.9667	1.790	.327
BIAS30 late	30	4.5000	1.503	.274

Mean Difference = -.5333

Levene's Test for Equality of Variances: F= .888 P= .350

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.25	58	.216	.427	(-1.388, .321)
Unequal	-1.25	56.31	.217	.427	(-1.388, .322)

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL1 strong technical support				
BIAS30 early	30	5.1000	1.373	.251
BIAS30 late	30	4.8333	1.262	.230

Mean Difference = .2667

Levene's Test for Equality of Variances: F= .029 P= .864

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	.78	58	.437	.340	(-.415, .948)
Unequal	.78	57.59	.437	.340	(-.415, .948)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL2 extensive computer facilities				
BIAS30 early	29	5.3103	1.228	.228
BIAS30 late	30	4.9000	1.185	.216

Mean Difference = .4103

Levene's Test for Equality of Variances: F= .407 P= .526

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	1.31	57	.197	.314	(-.219, 1.039)
Unequal	1.31	56.72	.197	.314	(-.219, 1.040)

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL3 pressure from competition				
BIAS30 early	29	4.6552	1.370	.254
BIAS30 late	30	3.9000	1.668	.305

Mean Difference = .7552

Levene's Test for Equality of Variances: F= .107 P= .745

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.90	57	.063	.398	(-.042, 1.553)
Unequal	1.90	55.57	.062	.397	(-.040, 1.550)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL4 strong financial position				
BIAS30 early	29	4.7586	1.272	.236
BIAS30 late	30	4.1000	1.517	.277

Mean Difference = .6586

Levene's Test for Equality of Variances: F= .255 P= .615

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.80	57	.076	.365	(-.073, 1.390)
Unequal	1.81	55.90	.076	.364	(-.071, 1.388)

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL5 strong market position				
BIAS30 early	29	4.5172	1.353	.251
BIAS30 late	30	4.1000	1.398	.255

Mean Difference = .4172

Levene's Test for Equality of Variances: F= .500 P= .482

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.16	57	.249	.358	(-.301, 1.135)
Unequal	1.16	57.00	.249	.358	(-.300, 1.135)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL6 strong top mgmt support				
BIAS30 early	29	5.4828	1.353	.251
BIAS30 late	30	5.4333	1.135	.207

Mean Difference = .0494

Levene's Test for Equality of Variances: F= .190 P= .665

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.15	57	.880	.325	(-.601, .700)
Unequal	.15	54.64	.880	.326	(-.603, .702)

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL7 strong planning capability				
BIAS30 early	29	4.7241	1.099	.204
BIAS30 late	30	4.6667	1.295	.237

Mean Difference = .0575

Levene's Test for Equality of Variances: F= 1.022 P= .316

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.18	57	.855	.313	(-.570, .685)
Unequal	.18	56.06	.855	.312	(-.568, .683)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL8 need for innovation				
BIAS30 early	29	4.6897	1.365	.254
BIAS30 late	30	4.9000	1.296	.237

Mean Difference = -.2103

Levene's Test for Equality of Variances: F= .216 P= .644

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-.61	57	.546	.346	(-.904, .484)
Unequal	-.61	56.57	.547	.347	(-.905, .484)

Variable	Number of Cases	Mean	SD	SE of Mean
FACIL9 upward pressure from middle mgmt				
BIAS30 early	29	4.3793	1.321	.245
BIAS30 late	30	4.6667	1.155	.211

Mean Difference = -.2874

Levene's Test for Equality of Variances: F= .858 P= .358

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-.89	57	.377	.323	(-.934, .359)
Unequal	-.89	55.44	.378	.323	(-.936, .361)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
BARR10 other priorities are more important				
BIAS30 early	30	3.5667	1.633	.298
BIAS30 late	29	4.2759	1.486	.276

Mean Difference = -.7092

Levene's Test for Equality of Variances: F= .690 P= .410

t-test for Equality of Means					95%
Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.74	57	.087	.407	(-1.524, .106)
Unequal	-1.75	56.79	.086	.406	(-1.523, .104)

```
-> T-TEST
->   GROUPS=bias30('early' 'late')
->   /MISSING=ANALYSIS
->   /VARIABLES=employ roi salgrow itage itemp
->   /CRITERIA=CIN(.95) .
```

There are 605,448 bytes of memory available.
The largest contiguous area has 342,880 bytes.

T-TEST requires 360 bytes of workspace for execution.

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
EMPLOY No of FT employees				
BIAS30 early	30	5910.2667	12572.937	2295.494
BIAS30 late	30	2557.3667	5863.360	1070.498

Mean Difference = 3352.9000

Levene's Test for Equality of Variances: F= 6.186 P= .016

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.32	58	.191	2532.836	(-1718.27, 8424.074)
Unequal	1.32	41.04	.193	2532.836	(-1763.44, 8469.245)

Variable	Number of Cases	Mean	SD	SE of Mean
ROI return on investment				
BIAS30 early	30	8.9200	24.900	4.546
BIAS30 late	29	7.4897	18.932	3.516

Mean Difference = 1.4303

Levene's Test for Equality of Variances: F= .102 P= .751

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	.25	57	.805	5.773	(-10.133, 12.994)
Unequal	.25	54.04	.804	5.747	(-10.094, 12.955)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
SALGROW 3-yr sales growth				
BIAS30 early	27	23.5185	58.428	11.244
BIAS30 late	26	39.8077	46.085	9.038

Mean Difference = -16.2892

Levene's Test for Equality of Variances: F= .907 P= .346

t-test for Equality of Means 95%

Variances	t-value	df	2-Tail Sig	SE of Diff	CI for Diff
Equal	-1.12	51	.266	14.491	(-45.388, 12.810)
Unequal	-1.13	49.12	.264	14.426	(-45.287, 12.709)

Variable	Number of Cases	Mean	SD	SE of Mean
ITAGE No of years IT dept established				
BIAS30 early	29	13.0345	9.417	1.749
BIAS30 late	29	13.4138	8.279	1.537

Mean Difference = -.3793

Levene's Test for Equality of Variances: F= 1.112 P= .296

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	-.16	56	.871	2.328	(-5.045, 4.286)
Unequal	-.16	55.10	.871	2.328	(-5.046, 4.288)

t-tests for independent samples of BIAS30 30 early & late responses

Variable	Number of Cases	Mean	SD	SE of Mean
ITEMP No of IT employees				
BIAS30 early	30	200.0000	400.873	73.189
BIAS30 late	30	74.1667	163.583	29.866

Mean Difference = 125.8333

Levene's Test for Equality of Variances: F= 8.906 P= .004

t-test for Equality of Means

Variances	t-value	df	2-Tail Sig	SE of Diff	95% CI for Diff
Equal	1.59	58	.117	79.048	(-32.435, 284.101)
Unequal	1.59	38.40	.120	79.048	(-34.228, 285.895)

Preceding task required 6.32 seconds elapsed.

Appendix E - Reliability analysis on SUIT

Reliability Analysis for SUIT variables

SPSS For WINDOWS Release 6.0

(Legend: An asterisk (*) denotes item with corrected item-total correlation of less than 0.35 and is dropped in subsequent analysis)

```
-> RELIABILITY
->   /VARIABLES=advan copy
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 128 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1. ADVAN length of advantage
2. COPY difficulty in copying this system

Correlation Matrix

	ADVAN	COPY
ADVAN	1.0000	
COPY	.5387	1.0000

N of Cases = 144.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ADVAN	4.0486	3.7249	.5387	.2902	.
COPY	3.6597	2.4219	.5387	.2902	.

Reliability Coefficients 2 items

Alpha = .6898 Standardized item alpha = .7002

```
-> RELIABILITY
->   /VARIABLES=impact1 impact2 impact3 impact4 impact5
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	IMPACT1	impact on market share
2.	IMPACT2	impact on profitability
3.	IMPACT3	impact on efficiency of operation
4.	IMPACT4	impact on effectiveness of D-mkg
5.	IMPACT5	able to bring radical change to bus cond

Correlation Matrix

	IMPACT1	IMPACT2	IMPACT3	IMPACT4	IMPACT5
IMPACT1	1.0000				
IMPACT2	.4971	1.0000			
IMPACT3	.0488	.2263	1.0000		
IMPACT4	.2451	.3388	.1596	1.0000	
IMPACT5	.2847	.2377	.3178	.0959	1.0000

N of Cases =   145.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
IMPACT1	19.4345	14.4557	.4181	.2984	.5269
IMPACT2	18.9172	15.7431	.5210	.3279	.4883
IMPACT3	18.2207	18.3260	.2785*	.1511	.5962
IMPACT4	18.7241	16.9928	.2996*	.1320	.5888
IMPACT5	19.2414	14.6983	.3485*	.1762	.5726

Reliability Coefficients   5 items

Alpha =   .6108   Standardized item alpha =   .6189

```
-> RELIABILITY
->   /VARIABLES=strat1 strat2 strat3 strat4 strat5 strat6 strat7
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 848 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	STRAT1	supports strategy
2.	STRAT2	influence direction of strategy
3.	STRAT3	create new strategy
4.	STRAT4	helps modify existing strategy
5.	STRAT5	helps shape strategic plans
6.	STRAT6	contribution in achieving generic strat
7.	STRAT7	how serious if system go wrong

Correlation Matrix

	STRAT1	STRAT2	STRAT3	STRAT4	STRAT5
STRAT1	1.0000				
STRAT2	.1825	1.0000			
STRAT3	.1976	.7466	1.0000		
STRAT4	.1914	.7160	.8268	1.0000	
STRAT5	.1465	.7295	.7260	.7095	1.0000
STRAT6	.0827	.1400	.1303	.0975	.2038
STRAT7	.0650	.1326	.2335	.2468	.1824

	STRAT6	STRAT7
STRAT6	1.0000	
STRAT7	-.0173	1.0000

N of Cases =   134.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
STRAT1	26.9701	50.0593	.2055*	.0481	.7826
STRAT2	28.1194	74.8879	.5908	.6466	.5019
STRAT3	28.6791	73.3023	.6457	.7471	.4876
STRAT4	28.7239	74.2916	.6292	.7224	.4947
STRAT5	28.4478	74.6852	.5847	.6323	.5016
STRAT6	28.2910	87.0650	.1464*	.0524	.6015
STRAT7	28.0970	85.0056	.1779*	.0751	.5952

Reliability Coefficients   7 items

Alpha = .5955   Standardized item alpha = .7652

```
-> RELIABILITY
->   /VARIABLES=target1 target2 target3 target4
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	TARGET1	able to influence cust buying decision
2.	TARGET2	able to establish supplier linkages
3.	TARGET3	able to cause threat to competitors
4.	TARGET4	able to build entry barriers

Correlation Matrix

	TARGET1	TARGET2	TARGET3	TARGET4
TARGET1	1.0000			
TARGET2	.1711	1.0000		
TARGET3	.5318	.2989	1.0000	
TARGET4	.4730	.2863	.6113	1.0000

N of Cases = 146.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
TARGET1	10.8630	17.0708	.4920	.3179	.6508
TARGET2	11.4658	19.1747	.2993*	.1067	.7736
TARGET3	10.5548	16.9521	.6470	.4635	.5647
TARGET4	11.1918	16.7906	.6024	.4155	.5848

Reliability Coefficients 4 items

Alpha = .7103 Standardized item alpha = .7234

```
-> RELIABILITY
->   /VARIABLES=use1 use10 use2 use3 use4 use5 use6 use7 use8 use9
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 1568 bytes of workspace for execution.
```

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	USE1	able to coord functions
2.	USE10	increase access to resources
3.	USE2	able to integrate activ across function
4.	USE3	able to integrate expertise
5.	USE4	able to support critical areas of bus
6.	USE5	able to identify new opportunities
7.	USE6	allows staff experiment new idea
8.	USE7	able to gather info about competitors
9.	USE8	able to anticipate compet moves
10.	USE9	making access sources of info

Correlation Matrix

	USE1	USE10	USE2	USE3	USE4
USE1	1.0000				
USE10	.3943	1.0000			
USE2	.7973	.4572	1.0000		
USE3	.5087	.2809	.5071	1.0000	
USE4	.3300	.2030	.3621	.1464	1.0000
USE5	.2810	.2032	.2340	.3081	.0890
USE6	.2587	.1326	.2779	.4010	.1485
USE7	.2847	.2582	.2594	.3533	.1046
USE8	.1937	.2534	.1659	.2563	.0295
USE9	.2776	.2378	.2553	.2811	.1962

	USE5	USE6	USE7	USE8	USE9
USE5	1.0000				
USE6	.6330	1.0000			
USE7	.2979	.2764	1.0000		
USE8	.2962	.3176	.7497	1.0000	
USE9	.2983	.2973	.1813	.0574	1.0000

N of Cases = 143.0

continued...

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
USE1	33.4685	67.7156	.6344	.6638	.7686
USE10	34.5524	74.3617	.4375	.2714	.7935
USE2	33.4895	69.5333	.6402	.6853	.7690
USE3	34.2238	69.1749	.5717	.3905	.7770
USE4	32.3986	81.7062	.2968*	.1615	.8055
USE5	34.0769	72.4095	.4824	.4447	.7885
USE6	34.4685	73.1381	.5071	.4867	.7852
USE7	36.1958	78.4684	.4768	.6071	.7907
USE8	36.2937	80.8990	.3942	.6023	.7979
USE9	33.4615	74.8700	.3850	.1999	.8007

Reliability Coefficients   10 items

Alpha =   .8054   Standardized item alpha =   .8047

Appendix F - Factor analysis on SUIT and re-runs of reliability test

Factor Analysis of SUIT construct and re-runs of reliability tests

SPSS for MS WINDOWS Release 6.0

(Legend: An asterisk (*) denotes item with either factor loading of less than 0.50 or item-total correlation of less than 0.35, and is dropped in subsequent analysis)

```
-> FACTOR
->   /VARIABLES advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->   target3 target4 use1 use10 use2 use3 use5 use6 use7 use8 use9  /MISSING
->   LISTWISE /ANALYSIS advan copy impact1 impact2 strat2 strat3 strat4 strat5
->   target1 target3 target4 use1 use10 use2 use3 use5 use6 use7 use8 use9
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX .
```

There are 512,080 bytes of memory available.
The largest contiguous area has 512,080 bytes.

This FACTOR analysis requires maximum 48440 (47.3K) bytes of memory.

- - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	ADVAN	COPY	IMPACT1	IMPACT2	STRAT2	STRAT3	STRAT4
ADVAN	1.00000						
COPY	.56821	1.00000					
IMPACT1	.06262	.16897	1.00000				
IMPACT2	.30998	.27234	.50288	1.00000			
STRAT2	.28544	.18398	.28516	.31149	1.00000		
STRAT3	.27221	.13148	.30010	.26467	.72831	1.00000	
STRAT4	.23270	.19609	.32426	.28444	.72118	.80203	1.00000
STRAT5	.21669	.14343	.34639	.34746	.77721	.73511	.70637
TARGET1	.12859	.19981	.61293	.38039	.26156	.31006	.23251
TARGET3	.16942	.25517	.57137	.36770	.17519	.25861	.26518
TARGET4	.28705	.38338	.41467	.32291	.17351	.27987	.28735
USE1	.18561	.08578	-.02742	-.02512	.28900	.37680	.35495
USE10	.11317	.04382	-.04032	.00785	.28305	.27788	.20277
USE2	.18189	.04499	-.03191	-.04637	.25346	.27027	.26331
USE3	.22621	.07535	.01715	-.01737	.27892	.35774	.34062
USE5	.10546	.08101	.28576	.24591	.50706	.54778	.51223
USE6	.19804	.15574	.22614	.16927	.36622	.48319	.46095
USE7	.11754	.01712	.13873	-.03106	.26833	.34712	.23119
USE8	.08018	.03311	.26029	.09943	.25978	.36516	.28944
USE9	.16362	-.04256	-.04403	.07742	.16210	.30935	.30493

	STRAT5	TARGET1	TARGET3	TARGET4	USE1	USE10	USE2
STRAT5	1.00000						
TARGET1	.25732	1.00000					
TARGET3	.20750	.54832	1.00000				
TARGET4	.20870	.48126	.61990	1.00000			
USE1	.28670	.08628	.06839	.01412	1.00000		
USE10	.18428	.03414	.04422	.06934	.37623	1.00000	
USE2	.23054	.05599	.07324	-.00738	.79238	.44329	1.00000
USE3	.30772	.10821	.16761	.07276	.49859	.26161	.50272
USE5	.45477	.27176	.15983	.20755	.29962	.21166	.25122
USE6	.31526	.26605	.30417	.21384	.26198	.13129	.27180
USE7	.21251	.10828	.13002	.15587	.27863	.24394	.25150
USE8	.21781	.25857	.24454	.25300	.18351	.23769	.15387
USE9	.22148	-.02490	.04626	.19456	.26873	.23756	.23459

----------- F A C T O R   A N A L Y S I S -----------

	USE3	USE5	USE6	USE7	USE8	USE9
USE3	1.00000					
USE5	.33508	1.00000				
USE6	.42295	.63391	1.00000			
USE7	.35772	.27851	.26181	1.00000		
USE8	.25743	.27399	.30489	.73895	1.00000	
USE9	.27502	.33371	.29473	.18649	.05826	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .80166

Bartlett Test of Sphericity = 1384.5008, Significance = .00000

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	1.00000	*	1	6.19359	31.0	31.0
COPY	1.00000	*	2	2.76420	13.8	44.8
IMPACT1	1.00000	*	3	1.61056	8.1	52.8
IMPACT2	1.00000	*	4	1.56508	7.8	60.7
STRAT2	1.00000	*	5	1.15795	5.8	66.5
STRAT3	1.00000	*	6	1.06792	5.3	71.8
STRAT4	1.00000	*	7	.89303	4.5	76.3
STRAT5	1.00000	*	8	.72555	3.6	79.9
TARGET1	1.00000	*	9	.67101	3.4	83.2
TARGET3	1.00000	*	10	.53418	2.7	85.9
TARGET4	1.00000	*	11	.46247	2.3	88.2
USE1	1.00000	*	12	.40818	2.0	90.3
USE10	1.00000	*	13	.36437	1.8	92.1
USE2	1.00000	*	14	.33288	1.7	93.8
USE3	1.00000	*	15	.28720	1.4	95.2
USE5	1.00000	*	16	.24765	1.2	96.4
USE6	1.00000	*	17	.21237	1.1	97.5
USE7	1.00000	*	18	.20303	1.0	98.5
USE8	1.00000	*	19	.16406	.8	99.3
USE9	1.00000	*	20	.13471	.7	100.0

PC extracted 6 factors.

----------- F A C T O R   A N A L Y S I S -----------

Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT3	.82846	-.08438	-.28696	-.14218	.10575
STRAT4	.79207	-.04456	-.36326	-.07922	.05498
STRAT2	.75162	-.05106	-.42540	-.08239	.18129
STRAT5	.73531	-.00439	-.45555	-.10695	.08038
USE5	.67870	-.10418	-.15807	-.20620	-.15736
USE6	.63878	-.07502	.03389	-.08249	-.16044
USE3	.53347	-.42248	.22155	.11984	-.12206
USE8	.50268	-.04422	.50188	-.41996	.42950
IMPACT1	.48735	.61112	.09171	-.22771	-.20394
USE2	.45673	-.57265	.23848	.28610	-.31226
USE1	.50973	-.55567	.17536	.25967	-.26317
TARGET3	.48874	.53655	.35740	.04102	-.26630
IMPACT2	.42577	.52730	-.18173	.13327	-.04651
TARGET1	.49416	.52627	.23705	-.08951	-.28304
TARGET4	.47766	.51776	.29559	.16572	-.02077
USE10	.37359	-.40320	.17952	.11951	-.00649
USE7	.47454	-.25204	.49068	-.33978	.46004

ADVAN	.40518	.10887	.00193	.67655	.38040
COPY	.31329	.33056	.06030	.65456	.32704
USE9	.37784	-.29527	-.06057	.09143	-.17099

	Factor 6
STRAT3	-.02918
STRAT4	-.01516
STRAT2	-.21623
STRAT5	-.19917
USE5	.30994
USE6	.44480
USE3	.08752
USE8	-.03700
IMPACT1	-.19145
USE2	-.28169
USE1	-.25755
TARGET3	-.01056
IMPACT2	-.06785
TARGET1	-.17210
TARGET4	.19864
USE10	-.23589
USE7	.03473
ADVAN	.10239
COPY	.01754
USE9	.59473

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	.78893	*	1	6.19359	31.0	31.0
COPY	.74677	*	2	2.76420	13.8	44.8
IMPACT1	.74949	*	3	1.61056	8.1	52.8
IMPACT2	.51688	*	4	1.56508	7.8	60.7
STRAT2	.83491	*	5	1.15795	5.8	66.5
STRAT3	.80807	*	6	1.06792	5.3	71.8
STRAT4	.77085	*				
STRAT5	.80580	*				
TARGET1	.69509	*				
TARGET3	.72720	*				
TARGET4	.65097	*				
USE1	.80235	*				
USE10	.40434	*				
USE2	.85212	*				
USE3	.54908	*				
USE5	.65982	*				
USE6	.64520	*				
USE7	.85777	*				
USE8	.86873	*				
USE9	.62492	*				

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 7 iterations.

----------- F A C T O R   A N A L Y S I S -----------

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT2	.87256	.09923	.17361	.06055	.11672
STRAT5	.86366	.15557	.14891	.08746	.03896
STRAT4	.78462	.16657	.16985	.28092	.09118
STRAT3	.78338	.16497	.20008	.27697	.20914
TARGET3	.00796	.82257	.07882	.12691	.09070
TARGET1	.15494	.81289	.07510	-.00029	.06817
IMPACT1	.29460	.80067	-.09087	-.05267	.08232
TARGET4	.01283	.64825	-.05931	.24173	.15530
IMPACT2	.36546	.51752	-.13511	.00409	-.14311
USE2	.09413	.01036	.91097	.11320	.01038
USE1	.17919	.00223	.86525	.13881	.02984
USE10	.15761	-.04253	.57977	.01150	.19452
USE3	.13394	.02998	.57749	.38484	.20663
USE9	.09702	-.08727	.15774	.75934	-.01453
USE6	.27075	.24136	.14996	.68040	.16430
USE5	.48435	.19636	.13270	.58861	.12303
USE8	.16272	.21266	.10820	.05003	.88473
USE7	.12820	.02055	.20888	.13440	.88233
ADVAN	.16331	.04110	.13736	.10246	.03105
COPY	.07548	.21533	.03018	-.03626	-.01605

	Factor 6
STRAT2	.12754
STRAT5	.06593
STRAT4	.10674
STRAT3	.08181
TARGET3	.14130
TARGET1	.00118
IMPACT1	-.06174
TARGET4	.38015
IMPACT2	.27701
USE2	.01902
USE1	.03770
USE10	.05992
USE3	.07713
USE9	.07870
USE6	.03495
USE5	-.08638
USE8	-.00874
USE7	.02671
ADVAN	.85454
COPY	.83200

Factor Transformation Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	.64302	.42669	.37646	.36931	.28256
Factor 2	-.01954	.71828	-.61283	-.20222	-.13045
Factor 3	-.67211	.34207	.32181	-.01503	.57059
Factor 4	-.20739	-.06406	.32714	-.02005	-.45210
Factor 5	.18635	-.40408	-.34190	-.26388	.60992
Factor 6	-.23807	-.13269	-.39401	.86744	.03427

	Factor 6
Factor 1	.21567
Factor 2	.22408
Factor 3	.04360
Factor 4	.80067
Factor 5	.49342
Factor 6	.12978

Factor Score Coefficient Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ADVAN	-.01077	-.11655	-.00780	.00399	.02225
COPY	-.03299	-.02281	-.00841	-.07473	.00380
IMPACT1	.04804	.31613	-.00429	-.12262	-.02190
IMPACT2	.10630	.14696	-.06071	-.05771	-.13501
STRAT2	.34421	-.08486	-.01897	-.16337	-.00166
STRAT3	.24873	-.05326	-.03845	.01227	.03595
STRAT4	.25687	-.04822	-.04176	.03005	-.03910
STRAT5	.33799	-.04616	-.01796	-.13031	-.06080
TARGET1	-.04666	.34496	.08908	-.08539	-.04706
TARGET3	-.14814	.34157	.07326	.03813	-.02886
TARGET4	-.14701	.20601	-.05921	.15180	.04964
USE1	-.03568	.04118	.41622	-.08315	-.11029
USE10	.00242	-.01422	.26190	-.14156	.05416
USE2	-.07342	.06557	.45830	-.09442	-.12381
USE3	-.08912	.00084	.19916	.15802	.02666
USE5	.07007	.01095	-.07823	.33983	-.03350
USE6	-.06134	.03581	-.07175	.44218	-.00172
USE7	-.04240	-.07953	-.03690	-.03011	.54896
USE8	-.02392	.00164	-.06030	-.09403	.54918
USE9	-.10562	-.08153	-.07350	.56557	-.08768

	Factor 6
ADVAN	.54363
COPY	.51569
IMPACT1	-.15766
IMPACT2	.09277
STRAT2	.01934
STRAT3	-.01698
STRAT4	-.00481
STRAT5	-.03175
TARGET1	-.12102
TARGET3	-.02358
TARGET4	.16668
USE1	-.03314
USE10	.01489
USE2	-.04499
USE3	.01026
USE5	-.12397
USE6	-.03943
USE7	.03580
USE8	-.00882
USE9	.03377

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.00000				
Factor 2	.00000	1.00000			
Factor 3	.00000	.00000	1.00000		
Factor 4	.00000	.00000	.00000	1.00000	
Factor 5	.00000	.00000	.00000	.00000	1.00000
Factor 6	.00000	.00000	.00000	.00000	.00000

	Factor 6
Factor 6	1.00000

Re-run of STRAT construct for reliability

```
-> RELIABILITY
->   /VARIABLES=strat2 strat3 strat4 strat5
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	STRAT2	influence direction of strategy
2.	STRAT3	create new strategy
3.	STRAT4	helps modify existing strategy
4.	STRAT5	helps shape strategic plans

Correlation Matrix

	STRAT2	STRAT3	STRAT4	STRAT5
STRAT2	1.0000			
STRAT3	.7282	1.0000		
STRAT4	.7076	.8115	1.0000	
STRAT5	.7347	.7302	.7132	1.0000

N of Cases =   147.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
STRAT2	12.8027	20.5567	.7922	.6318	.9007
STRAT3	13.3878	19.9514	.8391	.7228	.8845
STRAT4	13.4014	20.4474	.8215	.7005	.8907
STRAT5	13.1224	20.4781	.7957	.6367	.8995

Reliability Coefficients   4 items

Alpha =   .9183   Standardized item alpha =   .9183

Re-run of IMPACT construct for reliability

```
-> RELIABILITY
->    /VARIABLES=target3 target1 impact1 target4 impact2
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	TARGET3	able to cause threat to competitors
2.	TARGET1	able to influence cust buying decision
3.	IMPACT1	impact on market share
4.	TARGET4	able to build entry barriers
5.	IMPACT2	impact on profitability

Correlation Matrix

	TARGET3	TARGET1	IMPACT1	TARGET4	IMPACT2
TARGET3	1.0000				
TARGET1	.5505	1.0000			
IMPACT1	.5568	.6282	1.0000		
TARGET4	.6034	.4735	.4165	1.0000	
IMPACT2	.3638	.3760	.5006	.3244	1.0000

N of Cases = 146.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
TARGET3	16.2877	26.5650	.6838	.4982	.7673
TARGET1	16.6233	24.6502	.6631	.4710	.7740
IMPACT1	16.2534	25.9422	.6847	.5157	.7661
TARGET4	16.9589	27.3500	.5798	.3986	.7980
IMPACT2	15.7397	32.0008	.4834	.2702	.8219

Reliability Coefficients   5 items

Alpha = .8222   Standardized item alpha = .8215

Re-run of INTEG construct for reliability

```
-> RELIABILITY
->   /VARIABLES=use2 use1 use10 use3
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S - S C A L E (A L P H A)

1.	USE2	able to integrate activ across function
2.	USE1	able to coord functions
3.	USE10	increase access to resources
4.	USE3	able to integrate expertise

Correlation Matrix

	USE2	USE1	USE10	USE3
USE2	1.0000			
USE1	.8042	1.0000		
USE10	.4651	.4032	1.0000	
USE3	.5141	.5156	.2883	1.0000

N of Cases = 145.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
USE2	11.9448	16.8719	.7696	.6805	.6710
USE1	11.9241	16.1678	.7302	.6615	.6849
USE10	12.9931	20.6041	.4458	.2210	.8225
USE3	12.6690	18.6258	.5251	.2960	.7914

Reliability Coefficients 4 items

Alpha = .7986 Standardized item alpha = .7990

Re-run of INNOV construct for reliability

```
-> RELIABILITY
->   /VARIABLES=use9 use6 use5
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 224 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	USE9	making access sources of info
2.	USE6	allows staff experiment new idea
3.	USE5	able to identify new opportunities

Correlation Matrix

	USE9	USE6	USE5
USE9	1.0000		
USE6	.2973	1.0000	
USE5	.2969	.6440	1.0000

N of Cases = 145.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
USE9	7.5862	9.3831	.3276*	.1074	.7821
USE6	8.6069	7.9625	.5845	.4271	.4578
USE5	8.2207	7.4093	.5759	.4269	.4574

Reliability Coefficients 3 items

Alpha = .6750 Standardized item alpha = .6783

***item dropped due to poor correlation (corr<0.35)**

Re-run of INTEL construct for reliability

```
-> RELIABILITY
->   /VARIABLES=use8 use7
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 128 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	USE8	able to anticipate compet moves
2.	USE7	able to gather info about competitors

Correlation Matrix

	USE8	USE7
USE8	1.0000	
USE7	.7574	1.0000

N of Cases = 147.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
USE8	1.8980	1.3799	.7574	.5736	.
USE7	1.7959	1.1772	.7574	.5736	.

Reliability Coefficients 2 items

Alpha = .8604 Standardized item alpha = .8619

Re-run sustainability construct for reliability

```
-> RELIABILITY
->   /VARIABLES=advan copy
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 128 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1. ADVAN length of advantage
2. COPY difficulty in copying this system

Correlation Matrix

	ADVAN	COPY
ADVAN	1.0000	
COPY	.5387	1.0000

N of Cases = 144.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ADVAN	4.0486	3.7249	.5387	.2902	.
COPY	3.6597	2.4219	.5387	.2902	.

Reliability Coefficients 2 items

Alpha = .6898 Standardized item alpha = .7002

FACTOR ANALYSIS IS RE-RUN DUE TO DELETION OF AN ITEM (USE9).

```
-> FACTOR
->   /VARIABLES advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->   target3 target4 use1 use10 use2 use3 use5 use6 use7 use8  /MISSING LISTWISE
->   /ANALYSIS advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->   target3 target4 use1 use10 use2 use3 use5 use6 use7 use8
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX .
```

There are 512,176 bytes of memory available.
The largest contiguous area has 512,176 bytes.

This FACTOR analysis requires maximum 43972 (42.9K) bytes of memory.

- - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	ADVAN	COPY	IMPACT1	IMPACT2	STRAT2	STRAT3	STRAT4
ADVAN	1.00000						
COPY	.54092	1.00000					
IMPACT1	.07940	.14642	1.00000				
IMPACT2	.30975	.26722	.50036	1.00000			
STRAT2	.29045	.17342	.29051	.31198	1.00000		
STRAT3	.26861	.13172	.29555	.26441	.72620	1.00000	
STRAT4	.22937	.19577	.31942	.28416	.71905	.80206	1.00000
STRAT5	.21168	.14547	.33928	.34683	.77391	.73511	.70638
TARGET1	.13425	.19023	.61356	.38076	.26403	.30900	.23154
TARGET3	.16708	.25379	.56458	.36749	.17438	.25867	.26524
TARGET4	.28136	.38318	.40676	.32227	.17151	.28005	.28753
USE1	.15999	.10687	-.05057	-.02786	.27382	.37320	.35173
USE10	.10198	.05397	-.05082	.00639	.27679	.27786	.20302
USE2	.15391	.06903	-.05704	-.04896	.23720	.26762	.26086
USE3	.21253	.08621	.00471	-.01889	.27197	.35731	.34029
USE5	.09835	.08676	.27577	.24469	.50250	.54764	.51215
USE6	.19893	.15151	.22665	.16957	.36668	.48284	.46061
USE7	.12654	.00577	.14836	-.02945	.27197	.34506	.22950
USE8	.08174	.03039	.26012	.09972	.26032	.36490	.28918

	STRAT5	TARGET1	TARGET3	TARGET4	USE1	USE10	USE2
STRAT5	1.00000						
TARGET1	.25550	1.00000					
TARGET3	.20762	.54709	1.00000				
TARGET4	.20921	.47899	.61987	1.00000			
USE1	.28674	.07576	.06869	.01827	1.00000		
USE10	.18563	.02975	.04467	.07113	.38290	1.00000	
USE2	.23115	.04496	.07337	-.00250	.79875	.44877	1.00000
USE3	.30864	.10295	.16764	.07469	.50421	.26660	.50821
USE5	.45531	.26843	.16000	.20848	.30312	.21454	.25552
USE6	.31460	.26669	.30395	.21321	.25480	.12931	.26342
USE7	.20970	.11217	.12897	.15321	.25996	.23602	.23137
USE8	.21727	.25910	.24436	.25243	.17788	.23556	.14798

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

	USE3	USE5	USE6	USE7	USE8
USE3	1.00000				
USE5	.33761	1.00000			
USE6	.41955	.63209	1.00000		
USE7	.34815	.27334	.26251	1.00000	
USE8	.25490	.27278	.30514	.73782	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .80724

Bartlett Test of Sphericity = 1337.5121, Significance = .00000

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	1.00000	*	1	6.04113	31.8	31.8
COPY	1.00000	*	2	2.70854	14.3	46.1
IMPACT1	1.00000	*	3	1.60507	8.4	54.5
IMPACT2	1.00000	*	4	1.56296	8.2	62.7
STRAT2	1.00000	*	5	1.15700	6.1	68.8
STRAT3	1.00000	*	6	.97280	5.1	73.9
STRAT4	1.00000	*	7	.73101	3.8	77.8
STRAT5	1.00000	*	8	.71511	3.8	81.5
TARGET1	1.00000	*	9	.54400	2.9	84.4
TARGET3	1.00000	*	10	.49470	2.6	87.0
TARGET4	1.00000	*	11	.43210	2.3	89.3
USE1	1.00000	*	12	.40940	2.2	91.4
USE10	1.00000	*	13	.34722	1.8	93.3
USE2	1.00000	*	14	.30102	1.6	94.9
USE3	1.00000	*	15	.24593	1.3	96.1
USE5	1.00000	*	16	.21960	1.2	97.3
USE6	1.00000	*	17	.20977	1.1	98.4
USE7	1.00000	*	18	.16278	.9	99.3
USE8	1.00000	*	19	.13985	.7	100.0

PC extracted 5 factors.

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT3	.82707	-.10390	-.30592	-.09882	.08629
STRAT4	.79051	-.06266	-.37090	-.02290	.03784
STRAT2	.75554	-.07392	-.44439	-.02175	.13943
STRAT5	.73853	-.03017	-.46907	-.02900	.03343
USE5	.67151	-.11435	-.17570	-.17849	-.13537
USE6	.63266	-.07786	.02711	-.09644	-.10551
USE3	.52165	-.44525	.23316	.09674	-.11021
TARGET1	.51083	.50564	.22549	-.09996	-.30680
USE8	.51023	-.06844	.43024	-.49255	.39544
USE7	.46794	-.25365	.42331	-.43223	.45773
USE2	.43877	-.60503	.26772	.28296	-.33974
IMPACT1	.50023	.59753	.05756	-.22676	-.22356
USE1	.49144	-.58729	.20348	.26306	-.29189
IMPACT2	.43553	.52236	-.15605	.16218	-.04062
TARGET3	.50230	.51787	.37168	.01317	-.26534
TARGET4	.48144	.51566	.33281	.12508	.01780
USE10	.36192	-.42036	.19191	.10409	-.02773

COPY	.32445	.28229	.15036	.65068	.31662
ADVAN	.39755	.11840	.07883	.61999	.44939

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	.76462	*	1	6.04113	31.8	31.8
COPY	.73119	*	2	2.70854	14.3	46.1
IMPACT1	.71199	*	3	1.60507	8.4	54.5
IMPACT2	.51485	*	4	1.56296	8.2	62.7
STRAT2	.79370	*	5	1.15700	6.1	68.8
STRAT3	.80564	*				
STRAT4	.76835	*				
STRAT5	.76833	*				
TARGET1	.67158	*				
TARGET3	.72923	*				
TARGET4	.62441	*				
USE1	.78223	*				
USE10	.35612	*				
USE2	.82576	*				
USE3	.54623	*				
USE5	.54506	*				
USE6	.42749	*				
USE7	.85884	*				
USE8	.84910	*				

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 6 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT2	.86053	.06774	.11830	.09828	.15795
STRAT5	.85448	.12632	.11294	.01597	.09607
STRAT4	.82705	.16047	.19340	.08316	.11944
STRAT3	.82651	.15742	.21863	.20209	.09542
USE5	.62117	.22645	.27809	.13643	-.10945
USE6	.44459*	.28994	.32925	.19315	-.00673
TARGET3	.04758	.83148	.11068	.08514	.12690
TARGET1	.16577	.79923	.04846	.05458	-.00077
IMPACT1	.28936	.77229	-.15280	.07431	-.05431
TARGET4	.06630	.67999	.00931	.16697	.36009
IMPACT2	.35404	.50699	-.16822	-.14386	.28891
USE2	.10997	-.00831	.90147	-.01344	.02752
USE1	.19640	-.01422	.86095	.00638	.04655
USE3	.22512	.04634	.66809	.20825	.06070
USE10	.14258	-.05773	.54086	.18421	.07745
USE7	.16244	.02948	.20849	.88744	.02369
USE8	.17805	.21073	.11187	.87202	-.00770
ADVAN	.17293	.05495	.11718	.05964	.84522
COPY	.04566	.21569	.06867	-.04508	.82209

*** Item dropped due to low factor loading (loading < 0.50)**

----------- F A C T O R   A N A L Y S I S -----------

Factor Transformation Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	.71521	.44747	.40110	.28143	.21946
Factor 2	-.07175	.69797	-.66461	-.14538	.21178
Factor 3	-.67675	.36539	.38663	.49471	.11946
Factor 4	-.13774	-.07632	.29847	-.54982	.76408
Factor 5	.07975	-.41626	-.39856	.59382	.55579

Factor Score Coefficient Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ADVAN	-.01297	-.11405	-.02008	.04901	.54853
COPY	-.06798	-.01468	.00368	-.02009	.51524
IMPACT1	.02370	.29564	-.06583	-.02600	-.14907
IMPACT2	.08643	.13804	-.09189	-.13374	.10482
STRAT2	.29030	-.11335	-.09093	-.01859	.04494
STRAT3	.24431	-.06137	-.04188	.02886	-.00770
STRAT4	.25626	-.05452	-.03889	-.04665	.00319
STRAT5	.29087	-.07046	-.07361	-.08120	-.00856
TARGET1	-.06033	.33473	.05076	-.05614	-.12137
TARGET3	-.13041	.35009	.08972	-.03065	-.03462
TARGET4	-.10678	.23179	.00336	.06247	.15228
USE1	-.05536	.02355	.37653	-.12522	-.02454
USE10	-.03802	-.03294	.20283	.04773	.03213
USE2	-.09326	.04595	.41315	-.13848	-.03631
USE3	-.04088	.01191	.25649	.02947	-.00416
USE5	.16301	.03770	.04287	-.02342	-.14991
USE6	.06676	.07564	.08557	.02178	-.07892
USE7	-.04672	-.07791	-.04494	.55286	.03725
USE8	-.04852	-.00012	-.07597	.53627	-.00563

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.00000				
Factor 2	.00000	1.00000			
Factor 3	.00000	.00000	1.00000		
Factor 4	.00000	.00000	.00000	1.00000	
Factor 5	.00000	.00000	.00000	.00000	1.00000

FACTOR ANALYSIS IS RE-RUN DUE TO DELETION OF AN ITEM (USE6).

```
-> FACTOR
->    /VARIABLES advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->    target3 target4 use1 use10 use2 use3 use5 use7 use8  /MISSING LISTWISE
->   /ANALYSIS advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->    target3 target4 use1 use10 use2 use3 use5 use7 use8
->    /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->    /FORMAT SORT
->    /CRITERIA MINEIGEN(1) ITERATE(25)
->    /EXTRACTION PC
->    /CRITERIA ITERATE(25)
->    /ROTATION VARIMAX .
```

There are 512,272 bytes of memory available.
The largest contiguous area has 512,272 bytes.

This FACTOR analysis requires maximum 39720 (38.8K) bytes of memory.

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	ADVAN	COPY	IMPACT1	IMPACT2	STRAT2	STRAT3	STRAT4
ADVAN	1.00000						
COPY	.54092	1.00000					
IMPACT1	.07940	.14642	1.00000				
IMPACT2	.30975	.26722	.50036	1.00000			
STRAT2	.29045	.17342	.29051	.31198	1.00000		
STRAT3	.26861	.13172	.29555	.26441	.72620	1.00000	
STRAT4	.22937	.19577	.31942	.28416	.71905	.80206	1.00000
STRAT5	.21168	.14547	.33928	.34683	.77391	.73511	.70638
TARGET1	.13425	.19023	.61356	.38076	.26403	.30900	.23154
TARGET3	.16708	.25379	.56458	.36749	.17438	.25867	.26524
TARGET4	.28136	.38318	.40676	.32227	.17151	.28005	.28753
USE1	.15999	.10687	-.05057	-.02786	.27382	.37320	.35173
USE10	.10198	.05397	-.05082	.00639	.27679	.27786	.20302
USE2	.15391	.06903	-.05704	-.04896	.23720	.26762	.26086
USE3	.21253	.08621	.00471	-.01889	.27197	.35731	.34029
USE5	.09835	.08676	.27577	.24469	.50250	.54764	.51215
USE7	.12654	.00577	.14836	-.02945	.27197	.34506	.22950
USE8	.08174	.03039	.26012	.09972	.26032	.36490	.28918

	STRAT5	TARGET1	TARGET3	TARGET4	USE1	USE10	USE2
STRAT5	1.00000						
TARGET1	.25550	1.00000					
TARGET3	.20762	.54709	1.00000				
TARGET4	.20921	.47899	.61987	1.00000			
USE1	.28674	.07576	.06869	.01827	1.00000		
USE10	.18563	.02975	.04467	.07113	.38290	1.00000	
USE2	.23115	.04496	.07337	-.00250	.79875	.44877	1.00000
USE3	.30864	.10295	.16764	.07469	.50421	.26660	.50821
USE5	.45531	.26843	.16000	.20848	.30312	.21454	.25552
USE7	.20970	.11217	.12897	.15321	.25996	.23602	.23137
USE8	.21727	.25910	.24436	.25243	.17788	.23556	.14798

	USE3	USE5	USE7	USE8
USE3	1.00000			
USE5	.33761	1.00000		
USE7	.34815	.27334	1.00000	
USE8	.25490	.27278	.73782	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .80657

Bartlett Test of Sphericity = 1242.4300, Significance = .00000

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	1.00000	*	1	5.68515	31.6	31.6
COPY	1.00000	*	2	2.70349	15.0	46.6
IMPACT1	1.00000	*	3	1.60469	8.9	55.5
IMPACT2	1.00000	*	4	1.55764	8.7	64.2
STRAT2	1.00000	*	5	1.15363	6.4	70.6
STRAT3	1.00000	*	6	.78565	4.4	74.9
STRAT4	1.00000	*	7	.71546	4.0	78.9
STRAT5	1.00000	*	8	.61270	3.4	82.3
TARGET1	1.00000	*	9	.54124	3.0	85.3
TARGET3	1.00000	*	10	.49470	2.7	88.1
TARGET4	1.00000	*	11	.43146	2.4	90.5
USE1	1.00000	*	12	.35680	2.0	92.5
USE10	1.00000	*	13	.32177	1.8	94.2
USE2	1.00000	*	14	.28689	1.6	95.8
USE3	1.00000	*	15	.22682	1.3	97.1
USE5	1.00000	*	16	.21144	1.2	98.3
USE7	1.00000	*	17	.17043	.9	99.2
USE8	1.00000	*	18	.14001	.8	100.0

PC extracted 5 factors.

Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT3	.82790	-.11580	-.30604	-.10057	.07572
STRAT4	.79163	-.07406	-.36905	-.02049	.03135
STRAT2	.76573	-.08795	-.44056	-.02517	.11820
STRAT5	.75380	-.04529	-.46497	-.03367	.00760
USE5	.64173	-.11379	-.18526	-.15539	-.09712
TARGET1	.51762	.49907	.22293	-.11000	-.31694
USE3	.50530	-.44854	.23524	.09385	-.09014
USE7	.46776	-.26027	.41277	-.46016	.44162
USE2	.43574	-.61278	.27895	.26524	-.35365
USE1	.49293	-.59694	.21478	.24463	-.30733
IMPACT1	.51159	.59006	.05181	-.23480	-.24030
IMPACT2	.44974	.51377	-.14910	.16003	-.05248
TARGET3	.50441	.51275	.37176	.00212	-.26796
TARGET4	.49285	.50780	.33790	.10919	.01275
USE10	.37110	-.43042	.20014	.07705	-.06784
COPY	.33204	.27583	.17137	.64443	.33042
ADVAN	.40404	.11050	.09977	.61239	.45989
USE8	.50917	-.07464	.41736	-.51905	.37760

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	.77194	*	1	5.68515	31.6	31.6
COPY	.74017	*	2	2.70349	15.0	46.6
IMPACT1	.72546	*	3	1.60469	8.9	55.5
IMPACT2	.51682	*	4	1.55764	8.7	64.2
STRAT2	.80277	*	5	1.15363	6.4	70.6
STRAT3	.80833	*				
STRAT4	.76977	*				
STRAT5	.78765	*				
TARGET1	.67924	*				
TARGET3	.72736	*				
TARGET4	.62702	*				
USE1	.79974	*				
USE10	.37356	*				
USE2	.83861	*				

USE3	.52879	*
USE5	.49267	*
USE7	.86370	*
USE8	.85101	*

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 6 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT2	.86488	.08287	.13171	.10131	.14239
STRAT5	.86201	.14553	.13134	.02083	.07569
STRAT4	.82589	.16587	.19715	.08772	.11658
STRAT3	.82503	.16380	.22357	.20628	.09106
USE5	.60306	.20059	.25120	.14284	-.07239
TARGET3	.04101	.83064	.10959	.08734	.12680
TARGET1	.16296	.80393	.05392	.05846	-.00724
IMPACT1	.28925	.78157	-.14265	.07808	-.06699
TARGET4	.06541	.68317	.01134	.16928	.35670
IMPACT2	.35627	.51739	-.15985	-.14369	.27568
USE2	.10943	-.00149	.90886	-.01131	.02177
USE1	.19875	-.00507	.87095	.01055	.03921
USE3	.21645	.03221	.65400	.21484	.08385
USE10	.14739	-.03676	.56165	.18019	.05075
USE7	.16089	.03163	.21151	.88970	.02271
USE8	.17407	.21283	.11462	.87302	-.01027
ADVAN	.17220	.05258	.10927	.05722	.85106
COPY	.04460	.21191	.05985	-.04689	.82915

Factor Transformation Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	.71051	.45512	.39255	.28181	.23352
Factor 2	-.08172	.69486	-.66987	-.14831	.19943
Factor 3	-.68412	.35627	.39220	.47790	.15114
Factor 4	-.11997	-.08251	.28094	-.57855	.75176
Factor 5	.07800	-.41989	-.40550	.57920	.56365

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Factor Score Coefficient Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ADVAN	-.01145	-.11693	-.02630	.04712	.55440
COPY	-.06719	-.01888	-.00344	-.02110	.52259
IMPACT1	.02585	.30402	-.05610	-.02502	-.16131
IMPACT2	.08837	.14557	-.08538	-.13608	.09393
STRAT2	.29611	-.10081	-.07910	-.01973	.02907
STRAT3	.25030	-.05367	-.03370	.03162	-.01490
STRAT4	.26221	-.04792	-.03190	-.04326	-.00228
STRAT5	.29691	-.05551	-.05912	-.08230	-.02871
TARGET1	-.05839	.34038	.05813	-.05360	-.12887
TARGET3	-.12923	.35212	.09321	-.02773	-.03634
TARGET4	-.10536	.23457	.00601	.06305	.14846
USE1	-.05154	.03262	.38659	-.12402	-.03565
USE10	-.03646	-.01587	.21893	.03893	.00638
USE2	-.09029	.05399	.42225	-.13779	-.04581
USE3	-.03690	.00523	.25213	.03960	.01108
USE5	.16802	.02457	.03334	-.00816	-.12193
USE7	-.04435	-.07417	-.04055	.55303	.03258
USE8	-.04653	.00429	-.07069	.53600	-.01130

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.00000				
Factor 2	.00000	1.00000			
Factor 3	.00000	.00000	1.00000		
Factor 4	.00000	.00000	.00000	1.00000	
Factor 5	.00000	.00000	.00000	.00000	1.00000

```
-> RELIABILITY
->   /VARIABLES=strat2 strat5 strat4 strat3 use5
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	STRAT2	influence direction of strategy
2.	STRAT5	helps shape strategic plans
3.	STRAT4	helps modify existing strategy
4.	STRAT3	create new strategy
5.	USE5	able to identify new opportunities

Correlation Matrix

	STRAT2	STRAT5	STRAT4	STRAT3	USE5
STRAT2	1.0000				
STRAT5	.7347	1.0000			
STRAT4	.7076	.7132	1.0000		
STRAT3	.7282	.7302	.8115	1.0000	
USE5	.4803	.4664	.5094	.5342	1.0000

N of Cases =   147.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
STRAT2	16.7755	32.1753	.7795	.6349	.8693
STRAT5	17.0952	32.1689	.7769	.6376	.8698
STRAT4	17.3741	31.9481	.8129	.7036	.8621
STRAT3	17.3605	31.2458	.8356	.7305	.8566
USE5	17.5714	35.2329	.5552	.3139	.9183

Reliability Coefficients   5 items

Alpha =   .8984   Standardized item alpha =   .8995

```
-> RELIABILITY
->   /VARIABLES=target3 target1 impact1 target4 impact2
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	TARGET3	able to cause threat to competitors
2.	TARGET1	able to influence cust buying decision
3.	IMPACT1	impact on market share
4.	TARGET4	able to build entry barriers
5.	IMPACT2	impact on profitability

Correlation Matrix

	TARGET3	TARGET1	IMPACT1	TARGET4	IMPACT2
TARGET3	1.0000				
TARGET1	.5505	1.0000			
IMPACT1	.5568	.6282	1.0000		
TARGET4	.6034	.4735	.4165	1.0000	
IMPACT2	.3638	.3760	.5006	.3244	1.0000

N of Cases =   146.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
TARGET3	16.2877	26.5650	.6838	.4982	.7673
TARGET1	16.6233	24.6502	.6631	.4710	.7740
IMPACT1	16.2534	25.9422	.6847	.5157	.7661
TARGET4	16.9589	27.3500	.5798	.3986	.7980
IMPACT2	15.7397	32.0008	.4834	.2702	.8219

Reliability Coefficients   5 items

Alpha =   .8222   Standardized item alpha =   .8215

```
-> RELIABILITY
->   /VARIABLES=use1 use10 use2 use3
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	USE1	able to coord functions
2.	USE10	increase access to resources
3.	USE2	able to integrate activ across function
4.	USE3	able to integrate expertise

Correlation Matrix

	USE1	USE10	USE2	USE3
USE1	1.0000			
USE10	.4032	1.0000		
USE2	.8042	.4651	1.0000	
USE3	.5156	.2883	.5141	1.0000

N of Cases =   145.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
USE1	11.9241	16.1678	.7302	.6615	.6849
USE10	12.9931	20.6041	.4458	.2210	.8225
USE2	11.9448	16.8719	.7696	.6805	.6710
USE3	12.6690	18.6258	.5251	.2960	.7914

Reliability Coefficients   4 items

Alpha =   .7986   Standardized item alpha =   .7990

```
-> RELIABILITY
->   /VARIABLES=use7 use8
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 128 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1. USE7 able to gather info about competitors
2. USE8 able to anticipate compet moves

Correlation Matrix

	USE7	USE8
USE7	1.0000	
USE8	.7574	1.0000

N of Cases = 147.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
USE7	1.7959	1.1772	.7574	.5736	.
USE8	1.8980	1.3799	.7574	.5736	.

Reliability Coefficients 2 items

Alpha = .8604 Standardized item alpha = .8619

```
-> RELIABILITY
->   /VARIABLES=advan copy
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 128 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1. ADVAN   length of advantage
2. COPY   difficulty in copying this system

Correlation Matrix

	ADVAN	COPY
ADVAN	1.0000	
COPY	.5387	1.0000

N of Cases = 144.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ADVAN	4.0486	3.7249	.5387	.2902	.
COPY	3.6597	2.4219	.5387	.2902	.

Reliability Coefficients   2 items

Alpha = .6898   Standardized item alpha = .7002

SPSS for MS WINDOWS Release 6.0

Purpose : FACTOR ANALYSIS ON SUIT construct

FINAL RUN OF FACTOR ANALYSIS ON SUIT TOGETHER WITH CALCULATION OF FACTOR SCORE

```
-> FACTOR
->   /VARIABLES advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->   target3 target4 use1 use10 use2 use3 use5 use7 use8  /MISSING LISTWISE
->  /ANALYSIS advan copy impact1 impact2 strat2 strat3 strat4 strat5 target1
->   target3 target4 use1 use10 use2 use3 use5 use7 use8
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 511,984 bytes of memory available.
The largest contiguous area has 511,984 bytes.

This FACTOR analysis requires maximum 42352 (41.4K) bytes of memory.

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	ADVAN	COPY	IMPACT1	IMPACT2	STRAT2	STRAT3	STRAT4
ADVAN	1.00000						
COPY	.54092	1.00000					
IMPACT1	.07940	.14642	1.00000				
IMPACT2	.30975	.26722	.50036	1.00000			
STRAT2	.29045	.17342	.29051	.31198	1.00000		
STRAT3	.26861	.13172	.29555	.26441	.72620	1.00000	
STRAT4	.22937	.19577	.31942	.28416	.71905	.80206	1.00000
STRAT5	.21168	.14547	.33928	.34683	.77391	.73511	.70638
TARGET1	.13425	.19023	.61356	.38076	.26403	.30900	.23154
TARGET3	.16708	.25379	.56458	.36749	.17438	.25867	.26524
TARGET4	.28136	.38318	.40676	.32227	.17151	.28005	.28753
USE1	.15999	.10687	-.05057	-.02786	.27382	.37320	.35173
USE10	.10198	.05397	-.05082	.00639	.27679	.27786	.20302
USE2	.15391	.06903	-.05704	-.04896	.23720	.26762	.26086
USE3	.21253	.08621	.00471	-.01889	.27197	.35731	.34029
USE5	.09835	.08676	.27577	.24469	.50250	.54764	.51215
USE7	.12654	.00577	.14836	-.02945	.27197	.34506	.22950
USE8	.08174	.03039	.26012	.09972	.26032	.36490	.28918

	STRAT5	TARGET1	TARGET3	TARGET4	USE1	USE10	USE2
STRAT5	1.00000						
TARGET1	.25550	1.00000					
TARGET3	.20762	.54709	1.00000				
TARGET4	.20921	.47899	.61987	1.00000			
USE1	.28674	.07576	.06869	.01827	1.00000		
USE10	.18563	.02975	.04467	.07113	.38290	1.00000	
USE2	.23115	.04496	.07337	-.00250	.79875	.44877	1.00000
USE3	.30864	.10295	.16764	.07469	.50421	.26660	.50821
USE5	.45531	.26843	.16000	.20848	.30312	.21454	.25552
USE7	.20970	.11217	.12897	.15321	.25996	.23602	.23137
USE8	.21727	.25910	.24436	.25243	.17788	.23556	.14798

USE3   USE5   USE7   USE8

USE3	1.00000			
USE5	.33761	1.00000		
USE7	.34815	.27334	1.00000	
USE8	.25490	.27278	.73782	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .80657

Bartlett Test of Sphericity = 1242.4300, Significance = .00000

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ADVAN	1.00000	*	1	5.68515	31.6	31.6
COPY	1.00000	*	2	2.70349	15.0	46.6
IMPACT1	1.00000	*	3	1.60469	8.9	55.5
IMPACT2	1.00000	*	4	1.55764	8.7	64.2
STRAT2	1.00000	*	5	1.15363	6.4	70.6
STRAT3	1.00000	*	6	.78565	4.4	74.9
STRAT4	1.00000	*	7	.71546	4.0	78.9
STRAT5	1.00000	*	8	.61270	3.4	82.3
TARGET1	1.00000	*	9	.54124	3.0	85.3
TARGET3	1.00000	*	10	.49470	2.7	88.1
TARGET4	1.00000	*	11	.43146	2.4	90.5
USE1	1.00000	*	12	.35680	2.0	92.5
USE10	1.00000	*	13	.32177	1.8	94.2
USE2	1.00000	*	14	.28689	1.6	95.8
USE3	1.00000	*	15	.22682	1.3	97.1
USE5	1.00000	*	16	.21144	1.2	98.3
USE7	1.00000	*	17	.17043	.9	99.2
USE8	1.00000	*	18	.14001	.8	100.0

PC extracted 5 factors.

Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT3	.82790	-.11580	-.30604	-.10057	.07572
STRAT4	.79163	-.07406	-.36905	-.02049	.03135
STRAT2	.76573	-.08795	-.44056	-.02517	.11820
STRAT5	.75380	-.04529	-.46497	-.03367	.00760
USE5	.64173	-.11379	-.18526	-.15539	-.09712
TARGET1	.51762	.49907	.22293	-.11000	-.31694
USE3	.50530	-.44854	.23524	.09385	-.09014
USE7	.46776	-.26027	.41277	-.46016	.44162
USE2	.43574	-.61278	.27895	.26524	-.35365
USE1	.49293	-.59694	.21478	.24463	-.30733
IMPACT1	.51159	.59006	.05181	-.23480	-.24030
IMPACT2	.44974	.51377	-.14910	.16003	-.05248
TARGET3	.50441	.51275	.37176	.00212	-.26796
TARGET4	.49285	.50780	.33790	.10919	.01275
USE10	.37110	-.43042	.20014	.07705	-.06784
COPY	.33204	.27583	.17137	.64443	.33042
ADVAN	.40404	.11050	.09977	.61239	.45989
USE8	.50917	-.07464	.41736	-.51905	.37760

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
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IMPACT2	.51682	*	4	1.55764	8.7	64.2
STRAT2	.80277	*	5	1.15363	6.4	70.6
STRAT3	.80833	*				
STRAT4	.76977	*				
STRAT5	.78765	*				
TARGET1	.67924	*				
TARGET3	.72736	*				
TARGET4	.62702	*				
USE1	.79974	*				
USE10	.37356	*				
USE2	.83861	*				
USE3	.52879	*				
USE5	.49267	*				
USE7	.86370	*				
USE8	.85101	*				

----------- F A C T O R A N A L Y S I S -----------

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 6 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
STRAT2	.86488	.08287	.13171	.10131	.14239
STRAT5	.86201	.14553	.13134	.02083	.07569
STRAT4	.82589	.16587	.19715	.08772	.11658
STRAT3	.82503	.16380	.22357	.20628	.09106
USE5	.60306	.20059	.25120	.14284	-.07239
TARGET3	.04101	.83064	.10959	.08734	.12680
TARGET1	.16296	.80393	.05392	.05846	-.00724
IMPACT1	.28925	.78157	-.14265	.07808	-.06699
TARGET4	.06541	.68317	.01134	.16928	.35670
IMPACT2	.35627	.51739	-.15985	-.14369	.27568
USE2	.10943	-.00149	.90886	-.01131	.02177
USE1	.19875	-.00507	.87095	.01055	.03921
USE3	.21645	.03221	.65400	.21484	.08385
USE10	.14739	-.03676	.56165	.18019	.05075
USE7	.16089	.03163	.21151	.88970	.02271
USE8	.17407	.21283	.11462	.87302	-.01027
ADVAN	.17220	.05258	.10927	.05722	.85106
COPY	.04460	.21191	.05985	-.04689	.82915

Factor Transformation Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	.71051	.45512	.39255	.28181	.23352
Factor 2	-.08172	.69486	-.66987	-.14831	.19943
Factor 3	-.68412	.35627	.39220	.47790	.15114
Factor 4	-.11997	-.08251	.28094	-.57855	.75176
Factor 5	.07800	-.41989	-.40550	.57920	.56365

----------- FACTOR ANALYSIS -----------

Factor Score Coefficient Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ADVAN	-.01145	-.11693	-.02630	.04712	.55440
COPY	-.06719	-.01888	-.00344	-.02110	.52259
IMPACT1	.02585	.30402	-.05610	-.02502	-.16131
IMPACT2	.08837	.14557	-.08538	-.13608	.09393
STRAT2	.29611	-.10081	-.07910	-.01973	.02907
STRAT3	.25030	-.05367	-.03370	.03162	-.01490
STRAT4	.26221	-.04792	-.03190	-.04326	-.00228
STRAT5	.29691	-.05551	-.05912	-.08230	-.02871
TARGET1	-.05839	.34038	.05813	-.05360	-.12887
TARGET3	-.12923	.35212	.09321	-.02773	-.03634
TARGET4	-.10536	.23457	.00601	.06305	.14846
USE1	-.05154	.03262	.38659	-.12402	-.03565
USE10	-.03646	-.01587	.21893	.03893	.00638
USE2	-.09029	.05399	.42225	-.13779	-.04581
USE3	-.03690	.00523	.25213	.03960	.01108
USE5	.16802	.02457	.03334	-.00816	-.12193
USE7	-.04435	-.07417	-.04055	.55303	.03258
USE8	-.04653	.00429	-.07069	.53600	-.01130

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	1.00000				
Factor 2	.00000	1.00000			
Factor 3	.00000	.00000	1.00000		
Factor 4	.00000	.00000	.00000	1.00000	
Factor 5	.00000	.00000	.00000	.00000	1.00000

5 PC EXACT factor scores will be saved.

Following factor scores will be added to the working file:

Name	Label
FAC1_2	REGR factor score 1 for analysis 1
FAC2_2	REGR factor score 2 for analysis 1
FAC3_2	REGR factor score 3 for analysis 1
FAC4_2	REGR factor score 4 for analysis 1
FAC5_2	REGR factor score 5 for analysis 1

```
-> RENAME VARIABLES (fac1_2=FACSTRAT).

-> RENAME VARIABLES (fac2_2=FACIMPAC).

-> RENAME VARIABLES (fac3_2=FACINTEG).

-> RENAME VARIABLES (fac4_2=FACINTEL).

-> RENAME VARIABLES (fac5_2=FACSUSTA).

-> COMPUTE facsuit = facstrat + facimpac + facinteg + facintel + facsusta .
-> VARIABLE LABELS facsuit 'SUIT Factor  score (facstrat+...facsusta)' .

-> EXECUTE .
```

Preceding task required 8.35 seconds elapsed.

Appendix G - Reliability and factor analysis on other constructs

SPSS for MS WINDOWS Release 6.0

Reliability and Factor Analysis on perceived PERFORMANCE and other constructs

```
-> RELIABILITY
->   /VARIABLES=perf1 perf2 perf3 perf4
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,360 bytes of memory available.
The largest contiguous area has 515,360 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	PERF1	LT profitability vs indus avg
2.	PERF2	sales growth vs indus avg
3.	PERF3	financial strength vs indus avg
4.	PERF4	public image vs indus avg

Correlation Matrix

	PERF1	PERF2	PERF3	PERF4
PERF1	1.0000			
PERF2	.3647	1.0000		
PERF3	.3513	.2601	1.0000	
PERF4	.0642	.1834	.1103	1.0000

N of Cases =   167.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
PERF1	15.0000	6.5181	.3941	.2040	.4037
PERF2	14.7305	7.5956	.4075	.1747	.4047
PERF3	14.2335	7.1680	.3632	.1476	.4345
PERF4	14.3293	9.3427	.1546*	.0383	.5904

Reliability Coefficients   4 items

Alpha = .5399   Standardized item alpha = .5335

```
-> FACTOR
->   /VARIABLES perf1 perf2 perf3  /MISSING LISTWISE /ANALYSIS perf1 perf2 perf3
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 513,552 bytes of memory available.
The largest contiguous area has 513,552 bytes.

This FACTOR analysis requires maximum 1972 (1.9K) bytes of memory.

----------- F A C T O R   A N A L Y S I S -----------

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	PERF1	PERF2	PERF3
PERF1	1.00000		
PERF2	.36474	1.00000	
PERF3	.35128	.26008	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .62350

Bartlett Test of Sphericity = 48.86227, Significance =   .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
PERF1	1.00000	*	1	1.65281	55.1	55.1
PERF2	1.00000	*	2	.74031	24.7	79.8
PERF3	1.00000	*	3	.60687	20.2	100.0

PC   extracted   1 factors.

Factor Matrix:

	Factor 1
PERF1	.78796
PERF2	.72409
PERF3	.71248

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
PERF1	.62088	*	1	1.65281	55.1	55.1
PERF2	.52431	*				
PERF3	.50763	*				

Factor Score Coefficient Matrix:

	Factor 1
PERF1	.47674
PERF2	.43810
PERF3	.43107

Covariance Matrix for Estimated Regression Factor Scores:

Factor 1

Date : 22 Aug 1994
Reliability and factor analysis for DYNAMISM construct

```
-> RELIABILITY
->    /VARIABLES=dyn1 dyn2 dyn3 dyn4 dyn5
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,720 bytes of memory available.
The largest contiguous area has 515,720 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	DYN1	rate product becomes obsolete
2.	DYN2	rate new markets emerge
3.	DYN3	predictability of actions of competitors
4.	DYN4	predictability of demands
5.	DYN5	frequency of change to keep pace

Correlation Matrix

	DYN1	DYN2	DYN3	DYN4	DYN5
DYN1	1.0000				
DYN2	.4054	1.0000			
DYN3	.2768	.2517	1.0000		
DYN4	.2615	.2573	.5596	1.0000	
DYN5	.3682	.3166	.3726	.1863	1.0000

N of Cases = 166.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
DYN1	16.1325	15.1702	.4670	.2481	.6553
DYN2	15.3855	15.9353	.4374	.2168	.6670
DYN3	15.8012	15.6875	.5260	.3904	.6312
DYN4	15.8795	15.9369	.4452	.3384	.6636
DYN5	15.1145	16.8656	.4394	.2408	.6661

Reliability Coefficients 5 items

Alpha = .7053 Standardized item alpha = .7071

```
-> FACTOR
->   /VARIABLES dyn1 dyn2 dyn3 dyn4 dyn5  /MISSING LISTWISE /ANALYSIS dyn1 dyn2
->   dyn3 dyn4 dyn5
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX .
```

There are 514,000 bytes of memory available.
The largest contiguous area has 514,000 bytes.

This FACTOR analysis requires maximum 4100 (4.0K) bytes of memory.

- - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	DYN1	DYN2	DYN3	DYN4	DYN5
DYN1	1.00000				
DYN2	.40536	1.00000			
DYN3	.27684	.25165	1.00000		
DYN4	.26152	.25731	.55965	1.00000	
DYN5	.36822	.31655	.37256	.18628	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .67694

Bartlett Test of Sphericity = 156.83631, Significance = .00000

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
DYN1	1.00000	*	1	2.30656	46.1	46.1
DYN2	1.00000	*	2	.98937	19.8	65.9
DYN3	1.00000	*	3	.72489	14.5	80.4
DYN4	1.00000	*	4	.58667	11.7	92.1
DYN5	1.00000	*	5	.39251	7.9	100.0

PC extracted 1 factors.

Factor Matrix:

	Factor 1
DYN3	.74265
DYN1	.67654
DYN4	.67371
DYN5	.65456
DYN2	.64420

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
DYN1	.45771	*	1	2.30656	46.1	46.1
DYN2	.41500	*				
DYN3	.55152	*				
DYN4	.45388	*				
DYN5	.42844	*				

Factor Score Coefficient Matrix:

	Factor 1
DYN1	.29331
DYN2	.27929
DYN3	.32197
DYN4	.29208
DYN5	.28378

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1
Factor 1	1.00000

```
Date :  22 Aug 1994
Reliability test for HOSTILITY construct

-> RELIABILITY
->    /VARIABLES=hst1 hst2 hst3 hst4 hst5
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,720 bytes of memory available.
The largest contiguous area has 515,720 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S - S C A L E (A L P H A)

1.	HST1	threat of price competition
2.	HST2	threat of quality competition
3.	HST3	threat of dwindling markets
4.	HST4	threat of scarce resources
5.	HST5	threat of govt interference

Correlation Matrix

	HST1	HST2	HST3	HST4	HST5
HST1	1.0000				
HST2	.2418	1.0000			
HST3	-.0832	.0510	1.0000		
HST4	-.1036	.2091	.4818	1.0000	
HST5	-.1738	.0535	.1859	.2479	1.0000

N of Cases =   166.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
HST1	14.5723	15.4099	-.0764*	.1069	.5043
HST2	14.9639	13.0532	.2196*	.1182	.3176
HST3	16.6627	9.7037	.2952*	.2395	.2275
HST4	17.7892	10.7613	.4330	.2973	.1470
HST5	16.3494	11.7196	.1475*	.0908	.3735

Reliability Coefficients   5 items

Alpha = .3823   Standardized item alpha = .3844

* items dropped due to poor correlation (corr<0.35)

Due to only one item left, NO FACTOR ANALYSIS IS CARRIED OUT

SPSS for MS WINDOWS Release 6.0

Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on ANALYSIS construct

```
> RELIABILITY
->    /VARIABLES=anal1 anal2 anal3
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 516,240 bytes of memory available.
The largest contiguous area has 516,240 bytes.

RELIABILITY requires 224 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	ANAL1	effort put in to review SWOT
2.	ANAL2	effort to obtain industry info
3.	ANAL3	effort to obtain info about tech trends

Correlation Matrix

	ANAL1	ANAL2	ANAL3
ANAL1	1.0000		
ANAL2	.4944	1.0000	
ANAL3	.3909	.4317	1.0000

N of Cases = 167.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ANAL1	8.8263	6.2769	.5215	.2831	.6025
ANAL2	8.9461	5.8706	.5533	.3116	.5603
ANAL3	9.6287	5.9698	.4762	.2280	.6613

Reliability Coefficients 3 items

Alpha = .6996 Standardized item alpha = .7013

```
-> FACTOR
->   /VARIABLES anal1 anal2 anal3  /MISSING LISTWISE /ANALYSIS anal1 anal2 anal3
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .

There are 514,296 bytes of memory available.
The largest contiguous area has 514,296 bytes.

This FACTOR analysis requires maximum 1972 (       1.9K) bytes of memory.

 - - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -


Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

            ANAL1     ANAL2     ANAL3

ANAL1     1.00000
ANAL2      .49443   1.00000
ANAL3      .39086    .43172   1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy =  .66507

Bartlett Test of Sphericity =  88.51006, Significance =     .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable     Communality  *  Factor   Eigenvalue   Pct of Var   Cum Pct
                          *
ANAL1            1.00000  *     1       1.87941       62.6        62.6
ANAL2            1.00000  *     2        .62026       20.7        83.3
ANAL3            1.00000  *     3        .50033       16.7       100.0

PC    extracted    1 factors.

Factor Matrix:

             Factor  1

ANAL2          .81956
ANAL1          .79706
ANAL3          .75660

Final Statistics:

Variable     Communality  *  Factor   Eigenvalue   Pct of Var   Cum Pct
                          *
ANAL1             .63530  *     1       1.87941       62.6        62.6
ANAL2             .67167  *
ANAL3             .57244  *

Factor Score Coefficient Matrix:

             Factor  1

ANAL1          .42410
ANAL2          .43607
ANAL3          .40257
```

Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on CENTRALISATION construct

```
-> RELIABILITY
->    /VARIABLES=rigid1 rigid2 rigid3 rigid4
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 516,192 bytes of memory available.
The largest contiguous area has 516,192 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	RIGID1	very structured channel of comm
2.	RIGID2	holding fast to established practice
3.	RIGID3	allows line mgrs to make own decision
4.	RIGID4	restrict access to important info

Correlation Matrix

	RIGID1	RIGID2	RIGID3	RIGID4
RIGID1	1.0000			
RIGID2	.2673	1.0000		
RIGID3	.4189	.0748	1.0000	
RIGID4	-.1720	.2639	-.2893	1.0000

N of Cases = 168.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
RIGID1	12.1607	7.8962	.2505*	.2483	.0654
RIGID2	12.7917	7.0641	.3739	.1717	-.1143
RIGID3	12.1071	9.8687	.0847*	.2253	.2758
RIGID4	12.8155	10.4268	-.0828*	.1840	.5050

Reliability Coefficients   4 items

Alpha = .2713   Standardized item alpha = .2931

* items dropped in subsequent analysis

NO FACTOR ANALYSIS CARRIED OUT ON THIS CONSTRUCT

```
SPSS for MS WINDOWS Release 6.0


Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on INNOVATION construct


-> RELIABILITY
->    /VARIABLES=innov1 innov2
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 516,192 bytes of memory available.
The largest contiguous area has 516,192 bytes.

RELIABILITY requires 128 bytes of workspace for execution.

 R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

 1.     INNOV1        org supports innovation
 2.     INNOV2        org rewards innovations

                   Correlation Matrix

                INNOV1         INNOV2

INNOV1          1.0000
INNOV2           .3666         1.0000

       N of Cases =          168.0

Item-total Statistics

               Scale          Scale        Corrected
               Mean          Variance        Item-          Squared           Alpha
              if Item        if Item         Total          Multiple         if Item
              Deleted        Deleted      Correlation     Correlation        Deleted

INNOV1         3.4107         3.2974         .3666           .1344             .
INNOV2         4.1131         1.8015         .3666           .1344             .

Reliability Coefficients       2 items

Alpha =    .5190           Standardized item alpha =    .5365
```

```
-> FACTOR
->   /VARIABLES innovl innov2  /MISSING LISTWISE /ANALYSIS innovl innov2
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 514,368 bytes of memory available.
The largest contiguous area has 514,368 bytes.

This FACTOR analysis requires maximum 1136 (1.1K) bytes of memory.

\- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	INNOV1	INNOV2
INNOV1	1.00000	
INNOV2	.36656	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .50000

Bartlett Test of Sphericity = 23.88001, Significance = .00000

Extraction 1 for analysis 1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
INNOV1	1.00000	*	1	1.36656	68.3	68.3
INNOV2	1.00000	*	2	.63344	31.7	100.0

PC extracted 1 factors.

Factor Matrix:

	Factor 1
INNOV2	.82661
INNOV1	.82661

\- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
INNOV1	.68328	*	1	1.36656	68.3	68.3
INNOV2	.68328	*				

Factor Score Coefficient Matrix:

	Factor 1
INNOV1	.60488
INNOV2	.60488

SPSS for MS WINDOWS Release 6.0

Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on INVOLVEMENT construct

```
-> RELIABILITY
->   /VARIABLES=invol1 invol2 invol3
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,984 bytes of memory available.
The largest contiguous area has 515,984 bytes.

RELIABILITY requires 224 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S - S C A L E   (A L P H A)

1.	INVOL1	involved in identifying IT projects
2.	INVOL2	involved in authorising IT project
3.	INVOL3	involved in monitoring IT project

Correlation Matrix

	INVOL1	INVOL2	INVOL3
INVOL1	1.0000		
INVOL2	.5611	1.0000	
INVOL3	.7194	.6755	1.0000

N of Cases = 168.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
INVOL1	10.8155	6.4268	.7078	.5279	.7957
INVOL2	9.9821	7.9578	.6672	.4680	.8368
INVOL3	10.5476	5.9259	.7908	.6253	.7097

Reliability Coefficients 3 items

Alpha = .8469 Standardized item alpha = .8490

```
-> FACTOR
->   /VARIABLES invol1 invol2 invol3  /MISSING LISTWISE /ANALYSIS invol1 invol2
->   invol3
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 514,080 bytes of memory available.
The largest contiguous area has 514,080 bytes.

This FACTOR analysis requires maximum 1972 (1.9K) bytes of memory.

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	INVOL1	INVOL2	INVOL3
INVOL1	1.00000		
INVOL2	.56112	1.00000	
INVOL3	.71936	.67549	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .69858

Bartlett Test of Sphericity = 224.60315, Significance =   .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
INVOL1	1.00000	*	1	2.30618	76.9	76.9
INVOL2	1.00000	*	2	.44197	14.7	91.6
INVOL3	1.00000	*	3	.25185	8.4	100.0

PC   extracted   1 factors.

Factor Matrix:

	Factor 1
INVOL3	.91531
INVOL1	.86754
INVOL2	.84603

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
INVOL1	.75262	*	1	2.30618	76.9	76.9
INVOL2	.71577	*				
INVOL3	.83779	*				

```
Following factor scores will be added to the working file:

  Name        Label

FAC1_1        REGR factor score   1 for analysis    1


-> RENAME VARIABLES (fac1_1=FACINVO).
-> VARIABLE LABELS FACINVO "REGR factor score for involvement".
```

SPSS for MS WINDOWS Release 6.0

Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on IT MATURITY construct

```
-> RELIABILITY
->   /VARIABLES=itmat1 itmat2 itmat3 itmat4 itmat5 itmat6 itmat7 itmat8 itmat9
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,928 bytes of memory available.
The largest contiguous area has 515,928 bytes.

RELIABILITY requires 1304 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1. ITMAT1 Prevalence of IT in organisation
2. ITMAT2 All depts supported by IT
3. ITMAT3 Activities within dept well coordinated
4. ITMAT4 Activities between dept well coordinated
5. ITMAT5 Dept highly dependent on IT
6. ITMAT6 Extent IT planning is formalised.
7. ITMAT7 Extent IT plan considers overall plan
8. ITMAT8 Mgmt knowledgeable about IT
9. ITMAT9 IT knowledgeable about business

Correlation Matrix

	ITMAT1	ITMAT2	ITMAT3	ITMAT4	ITMAT5
ITMAT1	1.0000				
ITMAT2	.6102	1.0000			
ITMAT3	.4198	.5630	1.0000		
ITMAT4	.2512	.4264	.6819	1.0000	
ITMAT5	.3850	.5385	.3676	.3526	1.0000
ITMAT6	-.0653	-.1034	.0284	.0832	.0128
ITMAT7	-.0064	-.0971	.0105	.0332	.0061
ITMAT8	.2405	.4122	.4157	.3417	.3007
ITMAT9	.1882	.3342	.3313	.3599	.2855

	ITMAT6	ITMAT7	ITMAT8	ITMAT9
ITMAT6	1.0000			
ITMAT7	.5730	1.0000		
ITMAT8	.0692	.1150	1.0000	
ITMAT9	-.0410	.1219	.5649	1.0000

N of Cases = 166.0

```
-> FACTOR
->   /VARIABLES itmat1 itmat2 itmat3 itmat4 itmat8 itmat9 itmat5  /MISSING
->   LISTWISE /ANALYSIS itmat1 itmat2 itmat3 itmat4 itmat8 itmat9 itmat5
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX .
```

There are 513,872 bytes of memory available.
The largest contiguous area has 513,872 bytes.

This FACTOR analysis requires maximum 7204 (7.0K) bytes of memory.

\- - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	ITMAT1	ITMAT2	ITMAT3	ITMAT4	ITMAT8	ITMAT9	ITMAT5
ITMAT1	1.00000						
ITMAT2	.63598	1.00000					
ITMAT3	.44843	.58461	1.00000				
ITMAT4	.28199	.44954	.69217	1.00000			
ITMAT8	.27067	.43507	.43434	.35958	1.00000		
ITMAT9	.22521	.36489	.35560	.37942	.57771	1.00000	
ITMAT5	.42050	.56592	.39631	.37675	.32600	.31512	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .79481

Bartlett Test of Sphericity = 456.11516, Significance =   .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ITMAT1	1.00000	*	1	3.56967	51.0	51.0
ITMAT2	1.00000	*	2	1.02603	14.7	65.7
ITMAT3	1.00000	*	3	.81297	11.6	77.3
ITMAT4	1.00000	*	4	.59505	8.5	85.8
ITMAT8	1.00000	*	5	.42996	6.1	91.9
ITMAT9	1.00000	*	6	.30423	4.3	96.3
ITMAT5	1.00000	*	7	.26209	3.7	100.0

PC   extracted   2 factors.

----------- F A C T O R   A N A L Y S I S -----------

Factor Matrix:

	Factor 1	Factor 2
ITMAT2	.82274	-.29893
ITMAT3	.80024	-.03342
ITMAT4	.71767	.11602
ITMAT5	.67948	-.25730
ITMAT8	.67119	.49977
ITMAT1	.65873	-.51264
ITMAT9	.62549	.58594

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ITMAT1	.69672	*	1	3.56967	51.0	51.0
ITMAT2	.76626	*	2	1.02603	14.7	65.7

	Factor 1	Factor 2
ITMAT1	.83444	.02100
ITMAT2	.82584	.29024
ITMAT5	.68864	.23165
ITMAT3	.64016	.48135
ITMAT9	.11243	.84966
ITMAT8	.20240	.81198
ITMAT4	.48157	.54460

Factor Transformation Matrix:

	Factor 1	Factor 2
Factor 1	.77349	.63381
Factor 2	-.63381	.77349

Factor Score Coefficient Matrix:

	Factor 1	Factor 2
ITMAT1	.45941	-.26950
ITMAT2	.36293	-.07927
ITMAT3	.19404	.11689
ITMAT4	.08384	.21488
ITMAT8	-.16329	.49594
ITMAT9	-.22642	.55278
ITMAT5	.30617	-.07332

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2
Factor 1	1.00000	
Factor 2	.00000	1.00000

Re-run

```
-> RELIABILITY
->    /VARIABLES=itmat1 itmat2 itmat3 itmat5
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,928 bytes of memory available.
The largest contiguous area has 515,928 bytes.

RELIABILITY requires 344 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S - S C A L E (A L P H A)

1.	ITMAT1	Prevalence of IT in organisation
2.	ITMAT2	All depts supported by IT
3.	ITMAT3	Activities within dept well coordinated
4.	ITMAT5	Dept highly dependent on IT

Correlation Matrix

	ITMAT1	ITMAT2	ITMAT3	ITMAT5
ITMAT1	1.0000			
ITMAT2	.6360	1.0000		
ITMAT3	.4484	.5846	1.0000	
ITMAT5	.4205	.5659	.3963	1.0000

N of Cases = 167.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ITMAT1	16.3832	13.8763	.6082	.4176	.7603
ITMAT2	16.3114	12.7699	.7594	.5800	.6858
ITMAT3	17.4970	14.3961	.5705	.3566	.7778
ITMAT5	16.6886	14.1193	.5490	.3316	.7898

Reliability Coefficients   4 items

Alpha = .8044   Standardized item alpha = .8055

Re-run

```
-> RELIABILITY
->    /VARIABLES=itmat4 itmat8 itmat9
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,928 bytes of memory available.
The largest contiguous area has 515,928 bytes.

RELIABILITY requires 224 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	ITMAT4	Activities between dept well coordinated
2.	ITMAT8	Mgmt knowledgeable about IT
3.	ITMAT9	IT knowledgeable about business

Correlation Matrix

	ITMAT4	ITMAT8	ITMAT9
ITMAT4	1.0000		
ITMAT8	.3582	1.0000	
ITMAT9	.3746	.5774	1.0000

N of Cases = 168.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
ITMAT4	8.8155	7.4089	.4126	.1705	.7321
ITMAT8	9.0238	6.7419	.5622	.3568	.5448
ITMAT9	8.5774	6.5808	.5749	.3657	.5271

Reliability Coefficients   3 items

Alpha = .6977   Standardized item alpha = .6993

```
-> FACTOR
->   /VARIABLES itmat1 itmat2 itmat3 itmat4 itmat8 itmat9 itmat5  /MISSING
->   LISTWISE /ANALYSIS itmat1 itmat2 itmat3 itmat4 itmat8 itmat9 itmat5
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 513,584 bytes of memory available.
The largest contiguous area has 513,584 bytes.

This FACTOR analysis requires maximum 7636 (7.5K) bytes of memory.

- - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	ITMAT1	ITMAT2	ITMAT3	ITMAT4	ITMAT8	ITMAT9	ITMAT5
ITMAT1	1.00000						
ITMAT2	.63598	1.00000					
ITMAT3	.44843	.58461	1.00000				
ITMAT4	.28199	.44954	.69217	1.00000			
ITMAT8	.27067	.43507	.43434	.35958	1.00000		
ITMAT9	.22521	.36489	.35560	.37942	.57771	1.00000	
ITMAT5	.42050	.56592	.39631	.37675	.32600	.31512	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .79481

Bartlett Test of Sphericity = 456.11516, Significance =   .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
ITMAT1	1.00000	*	1	3.56967	51.0	51.0
ITMAT2	1.00000	*	2	1.02603	14.7	65.7
ITMAT3	1.00000	*	3	.81297	11.6	77.3
ITMAT4	1.00000	*	4	.59505	8.5	85.8
ITMAT8	1.00000	*	5	.42996	6.1	91.9
ITMAT9	1.00000	*	6	.30423	4.3	96.3
ITMAT5	1.00000	*	7	.26209	3.7	100.0

PC   extracted   2 factors.

- - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -

Factor Matrix:

	Factor 1	Factor 2
ITMAT2	.82274	-.29893
ITMAT3	.80024	-.03342
ITMAT4	.71767	.11602
ITMAT5	.67948	-.25730
ITMAT8	.67119	.49977
ITMAT1	.65873	-.51264
ITMAT9	.62549	.58594

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 3 iterations.

Rotated Factor Matrix:

	Factor 1	Factor 2
ITMAT1	.83444	.02100
ITMAT2	.82584	.29024
ITMAT5	.68864	.23165
ITMAT3	.64016	.48135
ITMAT9	.11243	.84966
ITMAT8	.20240	.81198
ITMAT4	.48157	.54460

Factor Transformation Matrix:

	Factor 1	Factor 2
Factor 1	.77349	.63381
Factor 2	-.63381	.77349

Factor Score Coefficient Matrix:

	Factor 1	Factor 2
ITMAT1	.45941	-.26950
ITMAT2	.36293	-.07927
ITMAT3	.19404	.11689
ITMAT4	.08384	.21488
ITMAT8	-.16329	.49594
ITMAT9	-.22642	.55278
ITMAT5	.30617	-.07332

Covariance Matrix for Estimated Regression Factor Scores:

	Factor 1	Factor 2
Factor 1	1.00000	
Factor 2	.00000	1.00000

2 PC EXACT factor scores will be saved.

Following factor scores will be added to the working file:

Name	Label
FAC1_1	REGR factor score 1 for analysis 1
FAC2_1	REGR factor score 2 for analysis 1

```
-> RENAME VARIABLES (fac1_1=FACMAT1).
-> VARIABLE LABELS FACMAT1 "REGR factor score for maturity factor1".

-> RENAME VARIABLES (fac2_1=FACMAT2).
-> VARIABLE LABELS FACMAT2 "REGR factor score  maturity factor2".

-> COMPUTE facmatu = facmat1 + facmat2 .
-> VARIABLE LABELS facmatu 'Composite score for IT maturity (facmat1...facmat3)'
      .

-> EXECUTE .
```

Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on CENTRALISATION construct

```
-> RELIABILITY
->   /VARIABLES=cent1 cent2 cent3 cent4 cent5
->   /FORMAT=LABELS
->   /SCALE(ALPHA)=ALL/MODEL=ALPHA
->   /STATISTICS=CORR
->   /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,928 bytes of memory available.
The largest contiguous area has 515,928 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	CENT1	decision about dev of new products
2.	CENT2	decision to raise LT capital
3.	CENT3	decision to select new investment
4.	CENT4	decision to acquire controlling interest
5.	CENT5	decision to hire & fire personnel

Correlation Matrix

	CENT1	CENT2	CENT3	CENT4	CENT5
CENT1	1.0000				
CENT2	.2878	1.0000			
CENT3	.3241	.7233	1.0000		
CENT4	.1607	.6564	.6200	1.0000	
CENT5	.2689	.3308	.3734	.2928	1.0000

N of Cases = 164.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
CENT1	25.2866	10.4143	.3325*	.1435	.7901
CENT2	23.9573	11.1086	.6720	.5994	.6427
CENT3	24.1951	10.2316	.6876	.5866	.6221
CENT4	23.8963	11.3941	.5449	.4821	.6780
CENT5	24.5671	11.6090	.4124	.1734	.7223

Reliability Coefficients 5 items
Alpha = .7366 Standardized item alpha = .7720

```
-> FACTOR
->   /VARIABLES cent2 cent3 cent4 cent5  /MISSING LISTWISE /ANALYSIS cent2
->   cent3 cent4 cent5
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 513,920 bytes of memory available.
The largest contiguous area has 513,920 bytes.

This FACTOR analysis requires maximum 3040 (3.0K) bytes of memory.

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	CENT2	CENT3	CENT4	CENT5
CENT2	1.00000			
CENT3	.72439	1.00000		
CENT4	.65730	.62108	1.00000	
CENT5	.32913	.37127	.29146	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .76396

Bartlett Test of Sphericity = 252.47419, Significance =   .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
		*				
CENT2	1.00000	*	1	2.54851	63.7	63.7
CENT3	1.00000	*	2	.79275	19.8	83.5
CENT4	1.00000	*	3	.38838	9.7	93.2
CENT5	1.00000	*	4	.27036	6.8	100.0

PC   extracted   1 factors.

```
Factor Matrix:

              Factor  1

CENT2           .88183
CENT3           .87887
CENT4           .83120
CENT5           .55459

 - - - - - - - - - - -   F A C T O R   A N A L Y S I S   - - - - - - - - - - -


Final Statistics:

Variable      Communality  *  Factor   Eigenvalue   Pct of Var   Cum Pct
                           *
CENT2              .77763  *    1       2.54851        63.7        63.7
CENT3              .77241  *
CENT4              .69089  *
CENT5              .30757  *



Factor Score Coefficient Matrix:

              Factor  1

CENT2           .34602
CENT3           .34486
CENT4           .32615
CENT5           .21762

Covariance Matrix for Estimated Regression Factor Scores:

              Factor  1

Factor  1      1.00000


  1 PC  EXACT  factor scores will be saved.

Following factor scores will be added to the working file:

  Name        Label

FAC1_1       REGR factor score   1 for analysis    1


-> RENAME VARIABLES (fac1_1=FACCENT).
-> VARIABLE LABELS FACCENT 'REGR factor score  centralisation'.
```

Date: 19 Aug 1994
Purpose : Reliability and Factor Analysis on FORMALISATION construct

```
-> RELIABILITY
->    /VARIABLES=form1 form2 form3 form4 form5r
->    /FORMAT=LABELS
->    /SCALE(ALPHA)=ALL/MODEL=ALPHA
->    /STATISTICS=CORR
->    /SUMMARY=TOTAL .
```

****** Method 2 (covariance matrix) will be used for this analysis ******

There are 515,880 bytes of memory available.
The largest contiguous area has 515,880 bytes.

RELIABILITY requires 488 bytes of workspace for execution.

R E L I A B I L I T Y   A N A L Y S I S   -   S C A L E   (A L P H A)

1.	FORM1	strict procedures in any situation
2.	FORM2	procedures are written
3.	FORM3	rule violation checked regularly
4.	FORM4	strong penalties for rule violation
5.	FORM5R	Recoded-rules bent to handle some situat

Correlation Matrix

	FORM1	FORM2	FORM3	FORM4	FORM5R
FORM1	1.0000				
FORM2	.5346	1.0000			
FORM3	.3950	.4290	1.0000		
FORM4	.2869	.2414	.6304	1.0000	
FORM5R	.3131	.3774	.2887	.2931	1.0000

N of Cases = 168.0

Item-total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
FORM1	15.4583	23.1599	.5216	.3308	.7089
FORM2	14.7738	22.5593	.5407	.3815	.7017
FORM3	15.9345	20.9119	.6169	.4875	.6717
FORM4	15.6190	22.5486	.4991	.4179	.7170
FORM5R	15.3095	23.9994	.4219	.1945	.7435

Reliability Coefficients 5 items
Alpha = .7533 Standardized item alpha = .7532

```
-> FACTOR
->   /VARIABLES form1 form2 form3 form4 form5r  /MISSING LISTWISE /ANALYSIS
->   form1 form2 form3 form4 form5r
->   /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION FSCORE
->   /FORMAT SORT
->   /CRITERIA MINEIGEN(1) ITERATE(25)
->   /EXTRACTION PC
->   /CRITERIA ITERATE(25)
->   /ROTATION VARIMAX
->   /SAVE REG(ALL) .
```

There are 513,768 bytes of memory available.
The largest contiguous area has 513,768 bytes.

This FACTOR analysis requires maximum 4340 (4.2K) bytes of memory.

- - - - - - - - - - - F A C T O R   A N A L Y S I S - - - - - - - - - - -

Analysis number 1   Listwise deletion of cases with missing values

Correlation Matrix:

	FORM1	FORM2	FORM3	FORM4	FORM5R
FORM1	1.00000				
FORM2	.53464	1.00000			
FORM3	.39504	.42896	1.00000		
FORM4	.28694	.24137	.63039	1.00000	
FORM5R	.31307	.37744	.28874	.29306	1.00000

Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .69671

Bartlett Test of Sphericity = 216.99982, Significance =   .00000

Extraction   1 for analysis   1, Principal Components Analysis (PC)

Initial Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
FORM1	1.00000	*	1	2.52872	50.6	50.6
FORM2	1.00000	*	2	.94438	18.9	69.5
FORM3	1.00000	*	3	.72906	14.6	84.0
FORM4	1.00000	*	4	.47359	9.5	93.5
FORM5R	1.00000	*	5	.32426	6.5	100.0

PC   extracted   1 factors.

Factor Matrix:

	Factor 1
FORM3	.79168
FORM2	.73258
FORM1	.71585
FORM4	.69341
FORM5R	.60993

Final Statistics:

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
FORM1	.51244	*	1	2.52872	50.6	50.6
FORM2	.53667	*				
FORM3	.62676	*				
FORM4	.48082	*				
FORM5R	.37202	*				

```
Factor  1       1.00000

  1 PC  EXACT  factor scores will be saved.

Following factor scores will be added to the working file:

  Name        Label

FAC1_1        REGR factor score   1 for analysis    1


-> RENAME VARIABLES (fac1_1=FACFORM).
-> VARIABLE LABELS FACFORM "REGR factor score formalisation measure".
```

Appendix H - One-way ANOVA (SUIT vs system development)

ONE-WAY ANOVA

Purpose: To explore significant differences in the way IT is developed and its contribution to strategic use of IT.

```
                         - - - - -  O N E W A Y  - - - - -

     Variable  FACSUIT     SUIT Factor  5-item score (facstrat+...f
  By Variable  NATURE      how system was developed

                                Analysis of Variance

                                   Sum of         Mean          F        F
       Source              D.F.    Squares       Squares       Ratio    Prob.

Between Groups               4     117.3689      29.3422       6.8840   .0000
Within Groups              132     562.6311       4.2624
Total                      136     680.0000

                                  Standard   Standard
Group       Count        Mean    Deviation     Error     95 Pct Conf Int for Mean

internal      56        .5887     2.0507       .2740       .0395  TO      1.1379
external      27        .0371     2.1098       .4060      -.7975  TO       .8717
purchase      10      -2.4253     1.8293       .5785     -3.7339  TO     -1.1168
purchase      37       -.6194     2.0712       .3405     -1.3100  TO       .0711
others e       7       1.8862     2.2749       .8598      -.2177  TO      3.9901

Total        137        .0000     2.2361       .1910      -.3778  TO       .3778

GROUP       MINIMUM     MAXIMUM

internal    -5.6047      5.0770
external    -4.0446      5.9333
purchase    -5.0771       .4018
purchase    -5.1997      4.1115
others e     -.7013      5.6182

TOTAL       -5.6047      5.9333

                         - - - - -  O N E W A Y  - - - - -

     Variable  FACSUIT     SUIT Factor  5-item score (facstrat+...f
  By Variable  NATURE      how system was developed

Multiple Range Tests:  Tukey-HSD test with significance level .050

The difference between two means is significant if
  MEAN(J)-MEAN(I)  >= 1.4599 * RANGE * SQRT(1/N(I) + 1/N(J))
  with the following value(s) for RANGE: 3.91

   (*) Indicates significant differences which are shown in the lower triangle

                             p p e i o
                             u u x n t
                             r r t t h
                             c c e e e
                             h h r r r
                             a a n n s
                             s s a a
                             e e l l e
    Mean      NATURE

  -2.4253     purchase
   -.6194     purchase
    .0371     external       *
    .5887     internal       *
   1.8862     others e       * *
```

ONE-WAY ANOVA

Purpose: To explore significant differences in the way IT is developed and its contribution to perceived success.

- - - - - O N E W A Y - - - - -

Variable FACPERF REGR factor score 1 for analysis 1
By Variable NATURE how system was developed

Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	4	11.7150	2.9287	3.1156	.0171
Within Groups	142	133.4851	.9400		
Total	146	145.2000			

Group	Count	Mean	Standard Deviation	Standard Error	95 Pct Conf Int for Mean		
internal	60	.3040	.8587	.1109	.0822	TO	.5258
external	28	-.1388	.9464	.1789	-.5058	TO	.2282
purchase	10	.0029	.8461	.2675	-.6023	TO	.6082
purchase	42	-.2967	1.1759	.1814	-.6631	TO	.0698
others e	7	.5559	.6654	.2515	-.0595	TO	1.1713
Total	147	.0395	.9973	.0823	-.1230	TO	.2021

GROUP	MINIMUM	MAXIMUM
internal	-1.7490	1.8426
external	-2.1235	1.5827
purchase	-1.4752	1.4820
purchase	-3.1046	1.5757
others e	-.7818	1.1648
TOTAL	-3.1046	1.8426

- - - - - O N E W A Y - - - - -

Variable FACPERF REGR factor score 1 for analysis 1
By Variable NATURE how system was developed

Multiple Range Tests: Tukey-HSD test with significance level .050

The difference between two means is significant if
MEAN(J)-MEAN(I) >= .6856 * RANGE * SQRT(1/N(I) + 1/N(J))
with the following value(s) for RANGE: 3.91

(*) Indicates significant differences which are shown in the lower triangle

Mean	NATURE	purchase	external	purchase	internal	others e
-.2967	purchase					
-.1388	external					
.0029	purchase					
.3040	internal	*				
.5559	others e					

Appendix I - Regression and correlation analyses

SPSS For Windows 6.0

HYPOTHESES TESTING : SUIT vs. PERFORMANCE (ROI, SALES and PERCEIVED PERFORMANCE)

H1 : The degree of SUIT is positively correlated with ROI
H1 : The degree of SUIT is positively correlated with SALES GROWTH
H1 : The degree of SUIT is positively correlated with PERCEIVED PERFORMANCE

Technique used: REGRESSION and CORRELATION

H1: The higher the degree of SUIT in an organisation, the higher tends to be its performance as measured by return on investment (ROI).

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT roi
->   /METHOD=ENTER facsuit  .
```

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

4124 bytes of memory required for REGRESSION procedure.
0 more bytes may be needed for Residuals plots.

* * * * M U L T I P L E   R E G R E S S I O N * * * *

Listwise Deletion of Missing Data

Equation Number 1   Dependent Variable..   ROI   return on investment

Block Number 1. Method: Enter   FACSUIT

Variable(s) Entered on Step Number
1..   FACSUIT   SUIT Factor 5-item score (facstrat+...f

Multiple R	.05054
R Square	.00255
Adjusted R Square	-.00494
Standard Error	69.56767

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	1648.63569	1648.63569
Residual	133	643674.79512	4839.66011

F =   .34065   Signif F = .5604

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
FACSUIT	1.558792	2.670751	.050544	.584	.5604
(Constant)	19.234214	5.987504		3.212	.0017

End Block Number 1 All requested variables entered.

```
-> CORRELATIONS
->   /VARIABLES=facsuit roi
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.


                       - -  Correlation Coefficients  - -

             FACSUIT    ROI

FACSUIT       1.0000      .0505
             (  137)    (  135)
             P= .       P= .560

ROI            .0505     1.0000
             (  135)    (  166)
             P= .560    P= .


(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The higher the degree of SUIT in an organisation, the higher tends to be its performance as measured by 3-year average sales growth (SALGROW).

```
-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT salgrow
->    /METHOD=ENTER facsuit  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.


          * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   SALGROW   3-yr sales growth

Block Number  1.  Method:  Enter      FACSUIT

Variable(s) Entered on Step Number
   1..    FACSUIT   SUIT Factor  5-item score (facstrat+...f


Multiple R           .09782
R Square             .00957
Adjusted R Square    .00189
Standard Error    136.09560

Analysis of Variance
                     DF      Sum of Squares      Mean Square
Regression            1         23084.38385      23084.38385
Residual            129       2389339.75356      18522.01359

F =       1.24632       Signif F =  .2663

------------------ Variables in the Equation ------------------

Variable              B          SE B       Beta          T  Sig T

FACSUIT        5.898793      5.283821    .097821      1.116  .2663
(Constant)    58.053295     11.893876                 4.881  .0000


End Block Number   1   All requested variables entered.


-> CORRELATIONS
->    /VARIABLES=facsuit salgrow
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.


                       - -  Correlation Coefficients  - -

             FACSUIT    SALGROW

FACSUIT       1.0000      .0978
            (  137)    (  131)
            P= .       P= .266

SALGROW        .0978     1.0000
            (  131)    (  157)
            P= .266    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The higher the degree of SUIT in an organisation, the higher tends to be its performance as measured by perceived success.

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facperf
->   /METHOD=ENTER facsuit  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.

          * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACPERF   REGR factor score   1 for

Block Number  1.  Method:  Enter      FACSUIT

Variable(s) Entered on Step Number
   1..     FACSUIT   SUIT Factor  5-item score (facstrat+...f


Multiple R           .22705
R Square             .05155
Adjusted R Square    .04447
Standard Error       .98191

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1             7.02197          7.02197
Residual           134           129.19614           .96415

F =       7.28307       Signif F =  .0079

------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta         T  Sig T

FACSUIT         .101660     .037670    .227045     2.699  .0079
(Constant)  9.42406E-04     .084198                 .011  .9911

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit facperf
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                       - -  Correlation Coefficients  - -

             FACSUIT    FACPERF

FACSUIT       1.0000      .2270
            (  137)    (  136)
            P= .       P= .008

FACPERF        .2270     1.0000
            (  136)    (  167)
            P= .008    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The more an organisation perceives the environment as being dynamic, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER facdyn  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.


           * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACDYN

Variable(s) Entered on Step Number
   1..     FACDYN    REGR factor score   1 for analysis    1


Multiple R           .10431
R Square             .01088
Adjusted R Square    .00339
Standard Error      2.23863

Analysis of Variance
                    DF       Sum of Squares      Mean Square
Regression           1              7.27665          7.27665
Residual           132            661.51257          5.01146

F =       1.45200       Signif F =  .2304

------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta         T  Sig T

FACDYN          .237425     .197035    .104309     1.205  .2304
(Constant)     -.041309     .193574                -.213  .8313


End Block Number   1   All requested variables entered.


-> CORRELATIONS
->    /VARIABLES=facsuit facdyn
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                      - -  Correlation Coefficients  - -

             FACSUIT    FACDYN

FACSUIT       1.0000      .1043
            (  137)    (  134)
            P= .       P= .230

FACDYN         .1043     1.0000
            (  134)    (  165)
            P= .230    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The more an organisation perceives the environment as being hostile,
the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER hst4  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.


           * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter     HST4

Variable(s) Entered on Step Number
   1..    HST4      threat of scarce resources


Multiple R           .10421
R Square             .01086
Adjusted R Square    .00342
Standard Error      2.23030

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1             7.26286          7.26286
Residual           133           661.57392          4.97424

F =       1.46010       Signif F =  .2291

------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta         T  Sig T

HST4            .166931     .138148    .104206     1.208  .2291
(Constant)     -.421435     .376931               -1.118  .2656

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit hst4
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                      - -  Correlation Coefficients  - -

             FACSUIT    HST4

FACSUIT       1.0000      .1042
            (  137)    (  135)
            P= .       P= .229

HST4           .1042     1.0000
            (  135)    (  166)
            P= .229    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The more top management of an organisation is involved in identifying, authoring and monitoring IT projects, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->   /MISSING LISTWISE
```

```
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER facinvo  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.

          * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACINVO

Variable(s) Entered on Step Number
   1..     FACINVO   REGR factor score for involvement


Multiple R           .06559
R Square             .00430
Adjusted R Square   -.00307
Standard Error      2.23950

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1             2.92581          2.92581
Residual           135           677.07419          5.01536

F =        .58337       Signif F =  .4463


------------------ Variables in the Equation ------------------

Variable              B         SE B       Beta          T  Sig T

FACINVO         .163482      .214041    .065595       .764  .4463
(Constant)     -.015704      .192435                 -.082  .9351

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit facinvo
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                      - -  Correlation Coefficients  - -

             FACSUIT    FACINVO

FACSUIT       1.0000       .0656
            (  137)    (  137)
            P= .       P= .446

FACINVO        .0656     1.0000
            (  137)    (  168)
            P= .446    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The more an organisation put its effort in analysing the environment and in reviewing its strengths and weaknesses, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
```

```
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER facanal  .
```

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

4124 bytes of memory required for REGRESSION procedure.
0 more bytes may be needed for Residuals plots.

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1   Dependent Variable..   FACSUIT   SUIT Factor 5-item score

Block Number 1. Method: Enter   FACANAL

Variable(s) Entered on Step Number
1..   FACANAL   REGR factor score for Analysis (anal1...

Multiple R	.21998
R Square	.04839
Adjusted R Square	.04129
Standard Error	2.19740

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	32.90194	32.90194
Residual	134	647.03057	4.82859

F =   6.81399   Signif F = .0101

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
FACANAL	.524934	.201096	.219977	2.610	.0101
(Constant)	-.028277	.188780		-.150	.8812

End Block Number 1   All requested variables entered.

```
-> CORRELATIONS
->   /VARIABLES=facsuit facanal
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .
```

PEARSON CORR problem requires 80 bytes of workspace.

- - Correlation Coefficients - -

	FACSUIT	FACANAL
FACSUIT	1.0000	.2200
	(137)	(136)
	P= .	P= .010
FACANAL	.2200	1.0000
	(136)	(167)
	P= .010	P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

H1: The more an organisation support and rewards innovation, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER facinno  .
```

```
There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.

          * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..  FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACINNO

Variable(s) Entered on Step Number
   1..    FACINNO   REGR factor score  for innovation


Multiple R           .10330
R Square             .01067
Adjusted R Square    .00334
Standard Error      2.23233

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1             7.25659          7.25659
Residual           135           672.74341          4.98328

F =       1.45619       Signif F =  .2296


------------------ Variables in the Equation ------------------

Variable              B         SE B       Beta         T  Sig T

FACINNO         .244546     .202652    .103303     1.207  .2296
(Constant)     -.014098     .191078                -.074  .9413

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit facinno
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.


                    - -  Correlation Coefficients  - -

            FACSUIT    FACINNO

FACSUIT      1.0000      .1033
            (  137)    (  137)
            P= .       P= .230

FACINNO       .1033     1.0000
            (  137)    (  168)
            P= .230    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The more an organisation aligns or considers IT plans in its strategic plan, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER facalig  .

There are 515,352 bytes of memory available.
```

```
The largest contiguous area has 512,536 bytes.

      4124 bytes of memory required for REGRESSION procedure.
         0 more bytes may be needed for Residuals plots.

           * * * *   M U L T I P L E    R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACSUIT    SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACALIG

Variable(s) Entered on Step Number
   1..     FACALIG   REGR factor score   alignment measure


Multiple R           .33214
R Square             .11031
Adjusted R Square    .10314
Standard Error      2.04659

Analysis of Variance
                    DF       Sum of Squares       Mean Square
Regression           1             64.39925          64.39925
Residual           124            519.37866           4.18854

F =       15.37512       Signif F =  .0001

------------------ Variables in the Equation ------------------

Variable               B        SE B       Beta          T  Sig T

FACALIG          .705929     .180033    .332136      3.921  .0001
(Constant)      -.001507     .182397                 -.008  .9934

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit facalig
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                         - -  Correlation Coefficients  - -

              FACSUIT    FACALIG

FACSUIT        1.0000      .3321
             (  137)    (  126)
             P= .       P= .000

FACALIG         .3321     1.0000
             (  126)    (  152)
             P= .000    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed


H1: The more prevalent IT is made available and departments are supported by IT,
    the higher is the degree of SUIT in the organisation.


-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER facmat1  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.
```

```
     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.

          * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACMAT1

Variable(s) Entered on Step Number
   1..    FACMAT1   REGR factor score for maturity factor1


Multiple R           .02908
R Square             .00085
Adjusted R Square   -.00656
Standard Error      2.24339

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1              .57492           .57492
Residual           135           679.42508          5.03278

F =        .11423       Signif F =  .7359


------------------ Variables in the Equation ------------------

Variable               B        SE B       Beta          T  Sig T

FACMAT1          .068055     .201355    .029077       .338  .7359
(Constant)      -.004610     .192150                 -.024  .9809

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->    /VARIABLES=facsuit facmat1
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                      - -  Correlation Coefficients  - -

             FACSUIT    FACMAT1

FACSUIT       1.0000      .0291
            (  137)    (  137)
            P= .       P= .736

FACMAT1        .0291     1.0000
            (  137)    (  167)
            P= .736    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

H1: The more knowledgeable top management is about IT and IT staff is about
    the business of an organisation, the higher is the degree of SUIT in
    the organisation.


-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER facmat2  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.
```

```
**** M U L T I P L E   R E G R E S S I O N ****

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..  FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACMAT2

Variable(s) Entered on Step Number
   1..    FACMAT2   REGR factor score   maturity factor2


Multiple R            .18619
R Square              .03467
Adjusted R Square     .02752
Standard Error       2.20509

Analysis of Variance
                     DF      Sum of Squares      Mean Square
Regression            1            23.57289         23.57289
Residual            135           656.42711          4.86242

F =       4.84797       Signif F =  .0294


------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta         T  Sig T

FACMAT2         .414630     .188313    .186188     2.202  .0294
(Constant)     -.025760     .188757                -.136  .8917

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->    /VARIABLES=facsuit facmat2
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                      - -  Correlation Coefficients  - -

             FACSUIT    FACMAT2

FACSUIT       1.0000      .1862
             (  137)    (  137)
             P= .       P= .029

FACMAT2        .1862     1.0000
             (  137)    (  167)
             P= .029    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed.
```

H1: The higher the expenditure on IT (as a percentage of sales) is relative to the industry, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER itspen   .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.
```

```
**** MULTIPLE REGRESSION ****

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..  FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      ITSPEN

Variable(s) Entered on Step Number
   1..    ITSPEN    IT spending vs indus avg


Multiple R           .20902
R Square             .04369
Adjusted R Square    .03655
Standard Error      2.20205

Analysis of Variance
                    DF       Sum of Squares      Mean Square
Regression           1           29.68534          29.68534
Residual           134          649.76969           4.84903

F =       6.12192       Signif F =  .0146

------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta          T  Sig T

ITSPEN          .316385     .127871    .209021      2.474  .0146
(Constant)    -1.238378     .532896                -2.324  .0216

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit itspen
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                      - -  Correlation Coefficients  - -

            FACSUIT    ITSPEN

FACSUIT      1.0000      .2090
            (  137)    (  136)
            P= .       P= .015

ITSPEN        .2090     1.0000
            (  136)    (  167)
            P= .015    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The longer the business planning horizon of an organisation is, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->   /MISSING LISTWISE
->   /STATISTICS COEFF OUTS R ANOVA
->   /CRITERIA=PIN(.05) POUT(.10)
->   /NOORIGIN
->   /DEPENDENT facsuit
->   /METHOD=ENTER busplan  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.

        **** MULTIPLE REGRESSION ****

Listwise Deletion of Missing Data
```

```
Equation Number 1    Dependent Variable..  FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      BUSPLAN

Variable(s) Entered on Step Number
   1..    BUSPLAN   Business planning horizon in YEARS


Multiple R           .12615
R Square             .01591
Adjusted R Square    .00857
Standard Error      2.23109

Analysis of Variance
                    DF       Sum of Squares       Mean Square
Regression           1             10.78573          10.78573
Residual           134            667.02039           4.97776

F =       2.16678       Signif F =  .1434


------------------ Variables in the Equation ------------------

Variable              B          SE B        Beta          T  Sig T

BUSPLAN         .102661      .069743     .126146      1.472  .1434
(Constant)     -.450180      .354511                 -1.270  .2063

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->   /VARIABLES=facsuit busplan
->   /PRINT=TWOTAIL SIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.


                     - -  Correlation Coefficients  - -

             FACSUIT   BUSPLAN

FACSUIT       1.0000     .1261
             (  137)   (  136)
             P= .      P= .143

BUSPLAN        .1261    1.0000
             (  136)   (  167)
             P= .143   P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The less centralised a decision making structure and the more authority is delegated to lower level of an organisation, the higher is the degree of SUIT in an organisation.

```
-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER faccent  .
```

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

4124 bytes of memory required for REGRESSION procedure.
0 more bytes may be needed for Residuals plots.

* * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1   Dependent Variable.. FACSUIT   SUIT Factor 5-item score

Block Number 1. Method: Enter   FACCENT

Variable(s) Entered on Step Number
1..   FACCENT   REGR factor score centralisation

Multiple R	.21267
R Square	.04523
Adjusted R Square	.03816
Standard Error	2.19299

Analysis of Variance

	DF	Sum of Squares	Mean Square
Regression	1	30.75576	30.75576
Residual	135	649.24424	4.80922

F =   6.39517   Signif F = .0126

------------------ Variables in the Equation ------------------

Variable	B	SE B	Beta	T	Sig T
FACCENT	-.530226	.209669	-.212671	-2.529	.0126
(Constant)	.050115	.188405		.266	.7906

End Block Number 1   All requested variables entered.

```
-> CORRELATIONS
->    /VARIABLES=facsuit faccent
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .
```

PEARSON CORR problem requires 80 bytes of workspace.

- - Correlation Coefficients - -

	FACSUIT	FACCENT
FACSUIT	1.0000	-.2127
	(137)	(137)
	P= .	P= .013
FACCENT	-.2127	1.0000
	(137)	(166)
	P= .013	P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

H1: The less an organisation formalises or adhere to its procedures, the higher is the degree of SUIT in the organisation.

```
-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER facform  .

There are 515,352 bytes of memory available.
The largest contiguous area has 512,536 bytes.

     4124 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.

          * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   FACSUIT   SUIT Factor  5-item score

Block Number  1.  Method:  Enter      FACFORM

Variable(s) Entered on Step Number
   1..    FACFORM   REGR factor score formalisation measure


Multiple R           .02545
R Square             .00065
Adjusted R Square   -.00676
Standard Error      2.24361

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1              .44030           .44030
Residual           135           679.55970          5.03378

F =        .08747       Signif F =  .7679


------------------ Variables in the Equation ------------------

Variable              B        SE B       Beta         T  Sig T

FACFORM        -.054657     .184808   -.025446     -.296  .7679
(Constant) -8.28338E-05     .191685                 .000  .9997

End Block Number   1   All requested variables entered.


-> CORRELATIONS
->    /VARIABLES=facsuit facform
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.

                     - -  Correlation Coefficients  - -

            FACSUIT    FACFORM

FACSUIT      1.0000     -.0254
           (  137)    (  137)
           P= .       P= .768

FACFORM      -.0254     1.0000
           (  137)    (  168)
           P= .768    P= .


(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed
```

H1: The bigger the organisation, the higher is the degree of SUIT.

```
-> REGRESSION
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER employ  .

 There are 515,352 bytes of memory available.
 The largest contiguous area has 512,536 bytes.

      4124 bytes of memory required for REGRESSION procedure.
         0 more bytes may be needed for Residuals plots.

            * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

 Listwise Deletion of Missing Data

 Equation Number 1    Dependent Variable..  FACSUIT   SUIT Factor  5-item score

 Block Number  1.  Method:  Enter      EMPLOY

 Variable(s) Entered on Step Number
    1..    EMPLOY    No of FT employees


 Multiple R           .07434
 R Square             .00553
 Adjusted R Square   -.00184
 Standard Error      2.23812

 Analysis of Variance
                     DF      Sum of Squares      Mean Square
 Regression           1             3.75782          3.75782
 Residual           135           676.24218          5.00920

 F =        .75018       Signif F =  .3880

 ------------------ Variables in the Equation ------------------

 Variable              B        SE B       Beta         T  Sig T

 EMPLOY      1.72131E-05  1.9873E-05    .074338      .866  .3880
 (Constant)     -.056844     .202165                -.281  .7790

 End Block Number   1   All requested variables entered.

-> CORRELATIONS
->    /VARIABLES=employ facsuit
->    /PRINT=TWOTAIL SIG
->    /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.


                        - -  Correlation Coefficients  - -

            EMPLOY     FACSUIT

EMPLOY       1.0000      .0743
            (  168)    (  137)
            P= .       P= .388

FACSUIT       .0743     1.0000
            (  137)    (  137)
            P= .388    P= .

(Coefficient / (Cases) / 2-tailed Significance)

" . " is printed if a coefficient cannot be computed

H1: The older the IT department is, the higher is the degree of SUIT in
    the organisation.

-> REGRESSION
```

```
->    /MISSING LISTWISE
->    /STATISTICS COEFF OUTS R ANOVA
->    /CRITERIA=PIN(.05) POUT(.10)
->    /NOORIGIN
->    /DEPENDENT facsuit
->    /METHOD=ENTER itage  .

 There are 515,352 bytes of memory available.
 The largest contiguous area has 512,536 bytes.

      4124 bytes of memory required for REGRESSION procedure.
         0 more bytes may be needed for Residuals plots.

           * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

 Listwise Deletion of Missing Data

 Equation Number 1    Dependent Variable..  FACSUIT   SUIT Factor  5-item score

 Block Number  1.  Method:  Enter      ITAGE

 Variable(s) Entered on Step Number
    1..    ITAGE     No of years IT dept established


 Multiple R           .03283
 R Square             .00108
 Adjusted R Square   -.00673
 Standard Error      2.29057

 Analysis of Variance
                     DF      Sum of Squares      Mean Square
 Regression           1              .72442           .72442
 Residual           128           671.57979          5.24672

 F =        .13807       Signif F =  .7108

 ------------------ Variables in the Equation ------------------

 Variable              B          SE B       Beta         T  Sig T

 ITAGE          -.008591      .023120   -.032826      -.372  .7108
 (Constant)      .117565      .341958                  .344  .7316

 End Block Number   1   All requested variables entered.


 -> CORRELATIONS
 ->    /VARIABLES=facsuit itage
 ->    /PRINT=TWOTAIL SIG
 ->    /MISSING=PAIRWISE .

 PEARSON CORR problem requires 80 bytes of workspace.


                         - -  Correlation Coefficients  - -

              FACSUIT    ITAGE

 FACSUIT       1.0000     -.0328
             (  137)    (  130)
             P= .       P= .711

 ITAGE         -.0328     1.0000
             (  130)    (  161)
             P= .711    P= .

 (Coefficient / (Cases) / 2-tailed Significance)

 " . " is printed if a coefficient cannot be computed

 H1:

 -> REGRESSION
 ->    /MISSING LISTWISE
 ->    /STATISTICS COEFF OUTS R ANOVA
 ->    /CRITERIA=PIN(.05) POUT(.10)
 ->    /NOORIGIN
```

```
->   /DEPENDENT roi
->   /METHOD=ENTER facperf  .

There are 515,096 bytes of memory available.
The largest contiguous area has 512,192 bytes.

     4228 bytes of memory required for REGRESSION procedure.
        0 more bytes may be needed for Residuals plots.


           * * * *   M U L T I P L E   R E G R E S S I O N   * * * *

Listwise Deletion of Missing Data

Equation Number 1    Dependent Variable..   ROI   return on investment

Block Number  1.  Method:  Enter      FACPERF


Variable(s) Entered on Step Number
   1..    FACPERF   REGR factor score   1 for analysis    1


Multiple R            .15543
R Square              .02416
Adjusted R Square     .01817
Standard Error      64.53057

Analysis of Variance
                    DF      Sum of Squares      Mean Square
Regression           1         16804.67854      16804.67854
Residual           163        678763.80049       4164.19510

F =       4.03552       Signif F =  .0462

------------------ Variables in the Equation ------------------

Variable              B          SE B       Beta          T  Sig T

FACPERF       10.094011      5.024747    .155434      2.009  .0462
(Constant)    19.803988      5.023890                 3.942  .0001


End Block Number   1   All requested variables entered.


Preceding task required 18.68 seconds elapsed.
```

```
-> CORRELATIONS
->   /VARIABLES=facperf roi
->   /PRINT=TWOTAIL NOSIG
->   /MISSING=PAIRWISE .

PEARSON CORR problem requires 80 bytes of workspace.


                        - -  Correlation Coefficients  - -

              FACPERF    ROI

FACPERF      1.0000      .1554*

* - Signif. LE .05     ** - Signif. LE .01     (2-tailed)

" . " is printed if a coefficient cannot be computed
```