# STRATEGIC ALIGNMENT: THE ROLE OF INFORMATION & MANAGEMENT SYSTEMS IN ORGANISATIONAL PERFORMANCE

## A Study of the Role of the Information & Management Systems in the Performance of 24 Major Organisations

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# ABSTRACT

The research reported in this thesis investigates the role of information systems and management systems in business performance. The research objective is twofold:

- to establish which organisational factors (if any), explain the role of information systems and management systems in business performance,
- to provide managers with a practical diagnostic tool enabling them to identify and manage those factors found to be critical to improving business performance through information and management systems.

Previous attempts to link business performance with information and management systems advocated the alignment of IS/IT strategies with those of the business, assuming that the appropriate information and management system strategy is simply an extension of the business's overall strategy and its efforts to adapt to its external environment. This research takes a different approach, focusing on the ability of an organisation to create and leverage distinctive knowledge, competencies and capabilities, and the role which IS/IT plays in the underlying processes of learning and adaptation. The need to strike a balance between learning and control in a specific business and its environment to generate superior performance is also highlighted

Eight groups of variables were identified as key to the improvement of organisational performance through management and information systems: **Environment** type, **Nature** of the **business**, **Focus** of the organisation's **mindset**, **Management** style, **Organisational** type and **culture**, **Processes** of **control**, **Information** and performance **measures** and, finally, **Technologies** for management **systems** (including IS/IT). (defined hereafter as "**ENFMOPIT**")

A strong correlation between the alignment of these "**ENFMOPIT**" variables and superior performance of the businesses in the research sample was found, and the implications of the interaction between these variables for alignment and superior performance established. A diagnostic method for displaying and interpreting alignment called "**the wheel**", was also developed and tested.

The role of IS and the IT infrastructure in each organisation was extensively documented, together with senior management's views on their IS successes and failures. This narrative was used to explain the extent to which IS and IT could be considered to have contributed to the success or failure of each participant over a five year period, in the light of the degree of alignment between the wheel variables.

This research lays a foundation for the investigation of the specific role of information and management systems in organisational performance, where previous attempts in the fields of information systems and management theory to explain this linkage succeeded only at the most aggregate of levels. The wheel diagnosis also provides a useful framework for senior management teams to diagnose their own organisation and systems, in order to improve:

- the alignment between the eight spokes of the wheel in their organisation,
- their information and management systems payoff and
- organisational performance.

Further research in this area can now build upon these foundations to enable management teams to use information and management systems both to improve current performance and enhance future strategic potential.

*For my Wife, Suzanne Jane Wood and*
*my newborn son, Callum James Lincoln Wood:*
*you are the sunshine of my life!*

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The 24 participating organisations are:

BBA Automotive
BIS Banking Systems
Bull HN
BUPA Health Insurance
CAA
Enterprise Oil
Extel
Friends Provident
Hill-Samuel Bank
ICI Chemicals & Polymers
ICI Fibres
Josiah Wedgwood
Prudential Insurance
Rank Xerox
Rover Group
Sainsburys
Shorts Aviation
Southern Water
TSB Bank
TWIL
Watson & Philip
Welsh Water
WH Smith
Lloyds Register

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# CHAPTER ONE: INTRODUCTION

The aims of this chapter are to:

- summarise the current limited understanding of the role of IS/IT in organisational performance
- describe the need for a model that explains the role of information systems in organisational performance more fully
- outline the seeds of a new approach to this problem, combining "hard" economic and "soft" organisational factors
- pose five key research questions using a new research model. The answers to these questions demonstrate the power of the research model to explain the role of IS/IT in organisational performance
- briefly introduce this model and its eight components (the "ENFMOPIT" factors)
- provide an overview of the research findings together with a brief explanation of the structure of the thesis.

The ENFMOPIT model is introduced in this chapter. This model comprises three groups of eight variables identified as key to the improvement of organisational performance through management and information systems:

CONTEXTUAL STRATEGIC VARIABLES

- **Environment** type
- **Nature** of the **business**

ORGANISATIONAL PROCESS VARIABLES

- **Focus** of top management's **mindset**
- **Management** process and style
- **Organisational** type and **culture**
- **Processes** of **control**

MANAGEMENT SYSTEM CONTENT VARIABLES

- **Information** and performance **measures** and
- **Technologies** for management **systems** (including IS/IT).

# CHAPTER 1. INTRODUCTION

## 1.1. OUR CURRENT LIMITED UNDERSTANDING OF THE ROLE OF IS/IT IN ORGANISATIONAL PERFORMANCE

### 1.1.1. DEFINITIONS OF IS AND IT

Information systems have been variously defined as:

"An information system is a collection of people, procedures, a base of data and (sometimes) hardware and software, that collects, processes, stores and communicates data for transaction processing at operational level and information to support management decision making" *(Duffy and Assad, 1980);*

"An artifactual representation of a real world system as perceived by someone, built to perform information processing functions...and a state-tracking system for the real world system it is intended to model" *(Wand and Weber, 1990);*

and as a human activity system by *Land (1986) (see diagram 1 below).*

Although "information system" appears to be used by technologists to denote machinery more often than people or organisations, Land's definition of an information system as a human activity system is wider and much more appropriate. Information technology is the mechanism used in an information system, sandwiched between and /or supporting human activity systems. The technology varies from the elementary (filing, noticeboards and related technologies) to the advanced (computers and telecommunications, for example).

From a technical perspective, an information system's function is to store, control and communicate information between the various parts of a larger system of which it forms a part. From a human and organisational perspective, an information system models consensual domains created by the interlocking of individual fields of consciousness. Events in the world (either immediate or known) trigger interactions between individuals. Such interactions create information. To the extent that such information is modelled in the same way within both fields of consciousness ("paradigm-

sharing" or "model-sharing"), an interlocked consensual domain (agreed or shared events/facts/ feelings/maps/models), will emerge betwen the two (or more) individuals involved.

Organisational information systems then become the means of gathering, processing, storing and disseminating information created out of the consensual domain which is in the minds/hearts of members of the organisation.Information systems contain both latent and instrumental components. Latent information resides in or on archives, repositories, disks, files, books, human memories, within "core" CPU, programs, memoranda and so on. Instrumental information is created when this latent information together with latent information from outside the organisation is interacted with or activated. Latent information comprises the "stocks" of information available within and to the organisation, while instrumental information is embodied both in the "flows" between members of the organisation inter se and with outsiders, and in the "interactions" which enable such exchanges of information.

Land's model of an information system *(Land, 1986)* is set out in *diagram 1.* Land's distinction between formal and informal systems still holds, though the cognitive filter is split into two distinct parts: perception and intentionality, which can be both active and passive. Filtering is also carried out in multiple modes- action, language, observation, listening and so on. Information technology is seen to be a tool which is occasionally employed in an information system, whether the information system be designed/formal or undesigned/informal.

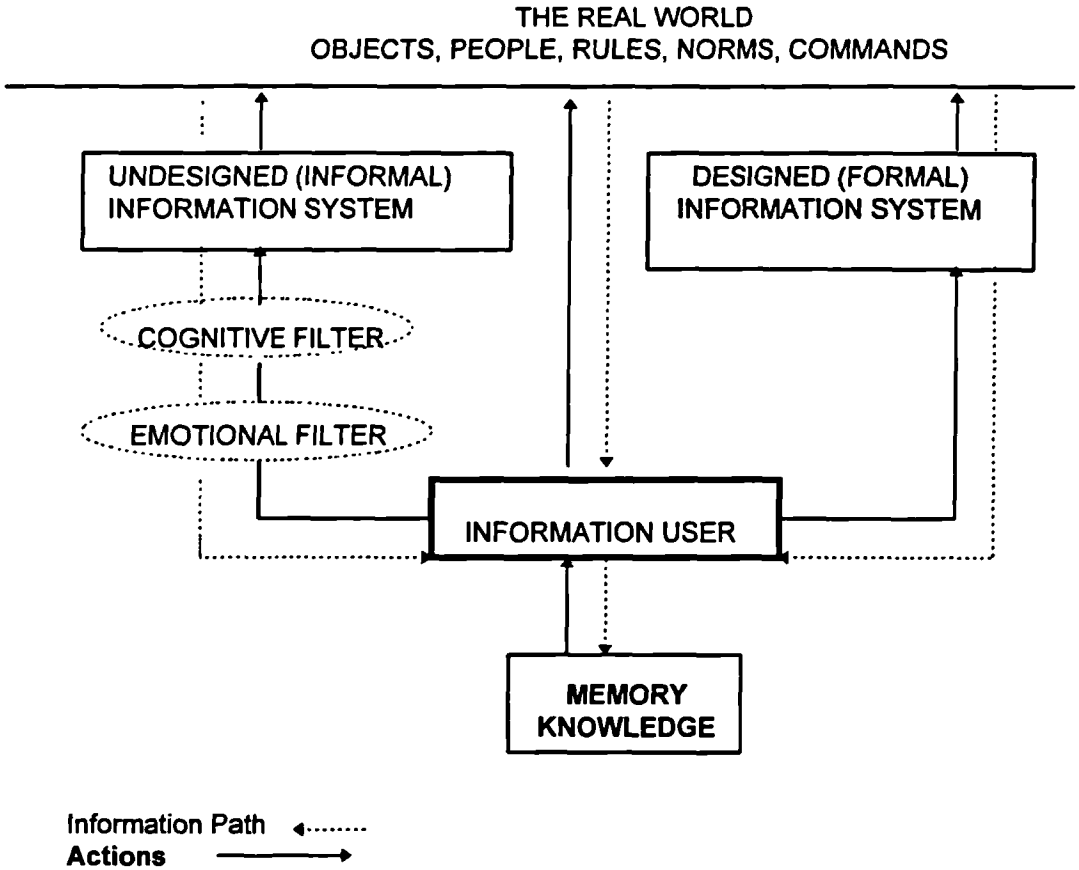



**DIAGRAM 1: Land's Model of an Information System (Land, 1983) updated in Galliers (1992)**

Earl (1989) defines information management as the management of information technology and the information resource. A simple task model which suggests that information management comprises planning, organisation and control of information resources is then put forward as a formal model for information management. Both the information resource of the firm and the information technology/systems applied to that resource are thus the subject of the tasks of information management.

Farbey, Land and Targett (1993) propose an eight fold categorisation of IS/IT benefits in organisations. The staircase approach combines an external competitive perspective with an internal process perspective. As one ascends the staircase, both the external competitive and internal process implications of IS/IT increase. For example, step 1 IS/IT investments can be easily emulated by competitors, and have a limited impact on an organisation

as a whole. Step 8 IS/IT investments are very difficult to emulate, and are intertwined with profound organisational change which reaches into every part of the organisation.

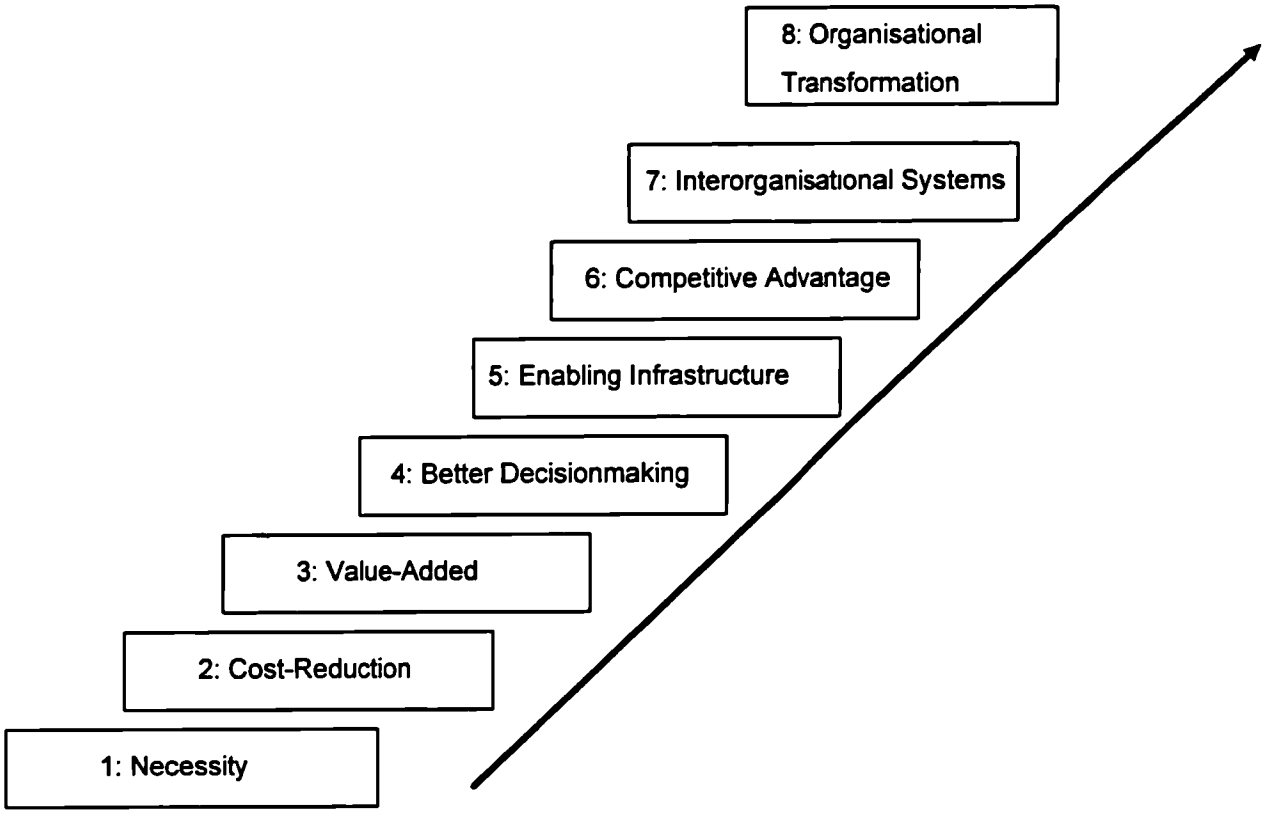



**DIAGRAM 2: THE IS/IT EVALUATION STAIRCASE**

This categorisation framework is based upon the nature of the fundamental IS/IT drivers i.e. what drives an organisation to make an IS/IT investment, while the MIT framework we will cover below is based upon the Porterian value-chain. Both are useful ways of distinguishing between the different purposes of IS/IT investment.

### 1.1.2. THE EMPIRICAL EVIDENCE

There is much evidence to suggest that IT has had a major impact on organisations in modern societies over the past fourty years. Technological advances have changed the way in which organisations operate, in some cases quite dramatically. What is less well understood are the implications of the introduction and assimilation of IS/IT for organisational performance.

There appear to be examples of cases in which IS/IT has had beneficial impacts on performance for relatively short periods- there are also cases where IT/IS has had little or negative impacts on an organisation.

In many cases, the impact upon efficiency in those organisations which have used IT extensively has been dramatic (particularly in manufacturing ), while in others the impact has been minimal (financial institutions, for example, where computing increased staffing until the late 1980's). Today, however, banks and insurance companies would be hard pressed to operate within their current cost structures if they did not have extensive information systems and technology .

IT and IS have also enabled many new businesses to come into existence, such as credit card processors and data network providers. Although IT and IS contribute towards operational efficiency in many cases (hence to the success of those businesses where such efficiency is critical to survival), and enabled new businesses in others, there is less evidence to suggest whether IT and IS actually improve the effectiveness of a firm or its management.

The benefits of the application of IT have accrued to both consumers and producers. Consumers have experienced increased convenience and faster service at the bank or supermarket, for example, with Automated Teller Machines and Electronic Point of Sale. Producers have been able to cut costs, increase throughput, add greater value to their offerings, create new products and services and restructure the way they distribute their offerings. There is, however, also evidence to suggest that the return on capital employed in buying IT was below average in up to 50% of UK firms, and that firms were failing to get adequate results from their IT investment *(Price-Waterhouse IT Review, 1990).* In such cases IT may create a drain rather than a benefit.

There is much less direct evidence on the impact of information systems in their wider, "softer" sense in organisations. In other words, in situations where a specific project is not identifiable or separable from other investments, the information system is often hidden within other aspects of the organisation's investments and costs. While investments, costs and benefits associated with specific, hard technologies are often readily identifiable, those associated with softer systems are often not. IS crosses hierarchical, departmental, functional and organisational boundaries, which is why authors like *Strassman (1990)* and *Ward (1987)* recommend we measure return on IT and IS investments at the strategic business unit level.

Like IT, softer systems also have unintended consequences and hence unpredictable costs and benefits. Furthermore, they are much harder to measure- *(Checkland's soft systems method (1985)* was developed to deal with the intangibility and incommensurability of soft systems). We face problems of both definition and measurement at both the hard end of IT and the soft end of IS.

The Strategic Planning Institute *(Strassman, 1985),* attempted to assess the contribution IT made to managerial performance, using a value-added approach. The limited results available are inconclusive- no correlation exists between IT investment and the value-added/cost of management ratio, though it was found that high value-added managements used IT more effectively than low value-added managements. The study showed that IT is generally more effectively deployed where a firm is structured in strategic business units (SBU), rather than if the firm is functionally organised. The study would suggest that it is easier to develop an IT strategy for an SBU than for any other organisational form.

These findings appear logical, as the vertical integration of management and a business approach focussed around specific products and markets

enables a more coordinated approach to the management of resources, including information.The trend over the past decade towards the reorganisation of businesses into SBU's has repositioned most support services within the SBU. Information intensive support services such as market planning and research, forecasting, accounting and information systems, are more tightly focussed on primary activities within the SBU, and by implication, more integrated. Such integrated SBU-based systems are more likely to add-value to the business through more effective management of the SBU's information assets, information systems and information technology.

*Strassman (1990)* suggests the obvious: that good managers get better results out of IT than bad managers. In other words, successful firms are more likely to use IT successfully, and unsuccessful firms are less likely to use IT effectively. There is limited evidence to suggest that successful firms plan better than unsuccessful firms, but, again, this may be due to the effects of good or bad management. *Strassman (1990)* could not initially find any reliable way to measure the business value of computers. Neither the amount spent on information technology in a firm, or the way in which it is spent, appear to be related to the performance of a firm. Strassman settled on a variable called R-O-M (return-on- management), which measures the contribution managers make to a firm's overall performace taking the costs associated with them into account.

Firms which are profitable and successful ('over-achievers' in the sample used by Strassman), tended to spend more on the operational applications of IT than under-achievers. The latter tended to spend more on the IT in management applications. Over-achievers also tended to reduce overhead costs as a result of IT investment in administrative applications, while under-achievers did not achieve corresponding administrative cost reductions. As a result, over-achievers had a much higher return-on-management (defined as

management value-added divided by management costs). Management value added is revenue minus purchases, taxes, shareholder returns, operations costs and management costs.

In manufacturing companies, the R-O-M of over-achievers was 300% i.e. management value-added exceeded management costs three times over. In service companies, the R-O-M was 600%, due to their lower capital base. (An average R-O-M is 100%, with under-achievers falling below this figure). R-O-M also correlates well with return-on-assets and return-on-equity figures in the 292 companies analysed by Strassman in the Management Productivity through Information Technology (MPIT) database which is a subset of the PIMS database of the Strategic Planning Institute. R-O-M also correlates well with relative market share and quality measures which are highly correlated with a firm's performance and strategic position in the PIMS database.

Strassman relates profits per employee to IT per employee and gets a nonsignificant result. When the deployment of IT and productivity are correlated, management productivity is highest where a greater proportion of IT spend is on operational rather than management systems. There is a clear correlation between market share, quality and management productivity. A strong positive correlation between return-on-management, return on equity and return on assets also exists. This suggests that the management process lies at the heart of superior performance if profits per employee, relative market share, relative quality, return on equity, return on assets and return on management are acceptable as measures of performance.

Although Strassman's work highlights the key role played by management in attaining above average returns on IT/IS investment, he was not able to demonstrate a significant direct relationship between any other factors in an organisation and the overall level of IT/IS investment. Despite the non-

significance of previous quantitative attempts to explain the role of IS in organisational performance, there are other ways to measure the role of IS in organisational performance, if we accept that other performance measures are as valid as those used by Strassman and the MPIT survey. Like any other technology, the effective use of IT in an organisation depends upon a large number of factors: understanding and awareness of the technology in the firm; the skill levels and experience of people in the firm with the technology; the level of investment in the technology; the diffusion of the technology and the effectiveness of the management of the technology.

The big IT "success stories" have, for example, been drawn in the main from large, mature firms, with large IT budgets, sophisticated management, operating in global, rapidly changing marketplaces. On the other hand, some of the less publicised successes have occurred in medium sized firms operating in a regional market, who were fairly new to IT. There appear to be some guidelines, but no hard and fast rules, in predicting cases where information systems success leads to business success. What qualitative measures might be available to shed further light on the role of IS in organisational performance?

The contribution of IT/IS to a business might be evaluated from a number of qualitative perspectives:

***technical:***
- are the systems efficient/effective?

***managerial:***
- do the systems work?
- are they fit for the use they were intended?
- are the systems performing the necessary functions to enhance effectiveneness and competitive advantage?
- is management able to align the organisation with environmental opportunities and constraints?

***operations:***
- scale- are scale benefits available in the business as a result of systems?

- scope- can a greater number of activities and more complex activities be supported/automated?
- cost reduction- operational unit costs down?
- cost of control reductions?
- have information systems created new product/service/market opportunities?

***organisational:***
- does the organisation function more effectively?
- are employees more motivated and satisfied?

To establish whether IT is being used effectively, one can also employ quantitative and qualitative measures relating to IT/IS. For example, benchmarks in the following areas either already exist or could be developed:

- proportion of revenue spent on IT and IS;
- percentage of employees working in the IS/IT area;
- the information intensity of a business (for which a rough surrogate is the total capital employed divided by the revenue);
- level of systems sophistication and maturity as measured by number of terminals/PC's per employee, MIPS per employee, networks (both LAN and WAN) per employee, use of advanced technologies such as EDI, expert systems and so on;
- strategic advantage created by IT/IS
- return on investment on IT/IS using a variety of ROI measures
- intangible or hard to measure benefits of IT/IS.

The work of Martin (1989, 1990) and others has laid the foundations for comparing IT/IS efficiency across industries. Strassman and others have suggested measures such as effectiveness productivity and return on management to establish the effectiveness of IT/IS in an organisation. Because information is so pervasive in organisations, there will always be difficulties in measuring information "payoff" accurately, just as it would be difficult to measure the energy or asset "payoff" in a business. There will also continue to be many different ways of measuring such payoff, each appropriate to a different situation. These measures, however, cannot explain **how** IT/IS can be used to improve performance. Such an explanation is offered by studies exploring the role of IT/IS in adding value.

### 1.1.3. THE ROLE OF IS/IT IN ADDING VALUE

The role of IS in adding value through the value-chain of a business has been extensively documented. Much of the IS and strategy literature of the 1980's focussed on this area, and culminated in works such as "The Corporation of the 1990's- Information Technology and Organizational Transformation" (Scott Morton, 1991). The reengineering of business processes has also been demonstrated to have much potential to transform organisations and their performance. Reengineering also has major implications for management processes and the use of IT/IS (Hammer and Champny, 1993); (Wood and Taylor, 1994).

Many firms have transformed their businesses using information technology- the number of published case studies in this area has increased dramatically in the past decade (Earl (1989) and Somogyi and Galliers (1987)) cite over 70 references in total to such cases). Such transformation consists mainly of operational changes which improve efficiency and effectiveness. A small number of firms have also gained well publicised, (though once-off) competitive advantage through IT. The question we need to pose, though, is to what extent has IT transformed the organisations within which it has been implemented? And if such a transformation has occurred, to what extent was such a transformation deliberate, or mere accident? Many of the best commercial information system innovations have been serendipitous, while some of the biggest failures have been meticulously planned.

The conventional approach to the use of information technology in organisations focuses on the firm's internal processes, while the strategic approach targets external factors which affect the industry structure and the competitive position of the firm. Traditionally, IT was and still is used to automate or support basic internal processes in an organisation, such as research, production, marketing, finance and service, and to satisfy information needs about these processes.

The strategic approach to IT focuses on external factors such as information about suppliers, channels, customers, rivals and so on. Such an approach is used to achieve differentiation, lower cost, improve growth (through vertical integration or new products) or create/support alliances (Wiseman, 1985).

Once an organisation innovates using IT, other players in the industry can emulate the innovation, depending upon the size of the barriers which prevent such emulation. The response time of competitors is also influenced by the extent of the gains yielded by the innovation and the publicity associated with it. The American Airlines SABRE system could not be copied, simply because it connected into all the other airlines and the cost of building a competitive system would be too high. The Merrill Lynch CMA account was not emulated immediately, but because other banks were slow on the uptake. But many other IT-led innovations can be and are copied, resulting in only a temporary advantage for the firm concerned.

Thinking about the business as a whole, the way it is run and the way it operates, must incorporate an awareness of what can be done with information systems both within the firm and between the firm and its customers and suppliers. The process by which management comes to know about the potential of strategic information systems is fourfold: awareness, identification, monitoring and management. Tools such as the customer life cycle (covering requirements definition, product acquisition, use and disposal) can help managers to think productively about how IT could be used in automating or supporting business processes they are responsible for managing. Critical Success Factor analysis (Rockart and Scott-Morton, 1984), is also useful to highlight possible strategic applications. One must continually perturbate between the system (or user) focus, and the competitive arena in which the system is expected to operate in order to winkle out potential opportunities.

The application of IT/IS to improve organisational performance can be both top-down and bottom-up. Some cases of transformation (such as Federal Express), involved the board specifying an entire system, while in others the system was developed by a "skunk-works", and then diffused through the organisation. Either way, once the system-based opportunity has been identified, it must be diffused throughout the organisation, and then maintained. In each case, there are still risks involved, and neither approach guarantees that the system will contribute to the bottom line, even though it may be a technical success. Business planning and information systems planning linkages assist in coordinating IT investment with business priorities, but it also possible that a new system may come into being because a group of people had a common need and decided to develop a common solution, outside of the planning process.

There are five ways in which IT has an impact on the value-chain of a firm *(Scott-Morton, 1991):*

1. Automation

Jobs within a company are automated, typically to boost productivity e.g. by installing a computerised accounting system. Little changes but the number of people and the capital costs of doing business.

2. Electronic infrastructure

Islands of automation within a firm are linked together electronically, so that information about the processes which have been automated can be shared. The way in which the firm operates does not change, although a certain degree of efficiency may be achieved through such an infrastructure.

These two impacts may be termed "business as usual", as they do not require major changes to the business to achieve small productivity gains.

The next three impacts require a redesign of the business in order to gain the benefits of new information technology, and can be termed "business transformation".

3. Business-process redesign

This impact arises from the fact that information technology enables firms to do things in different ways. For example, Ford was able to do away with invoices from its suppliers, by following the example of Mazda, who use bar-code readers at their factory loading dock to enter parts received from suppliers into inventory, update production records and pay the supplier electronically. In this example, the business process of receiving goods and waiting for the supplier's invoice to arrive before paying him, was dramatically redesigned into a single step replacing the several steps previously required to process supplier invoices.

4. Business-network redesign

The external relationships of a firm with its suppliers and customers can be redesigned so as to speed up and simplify these relationships. For example, the classic case of American Hospital Supply, where AHS supplied each of its customers with a terminal through which the customer orders the products required from AHS. Examples of suppliers being required to use Electronic Data Interchange in the US and UK automobile industries illustrate the way in which Just-in-Time manufacturing can be implemented, eliminating stocks and paperwork between a firm and its suppliers in one step.

5. Business-scope redesign

Information technology also enables some firms to enter new, profitable business areas which would not have been possible without IT. For example, Merrill Lynch's cash management account (which sweeps the cash balances of brokerage clients into interest-bearing securities daily), gave the firm a profitable new banking business within months of the implementation of the

new system. Airlines, travel agents, banks and insurance companies have also created new business areas as a result of innovations in reservation and financial systems. This means that most firms are spending much more on IT/IS than they did ten years ago. The average large UK firm now spends upwards of £3 million per annum on IT/IS *(Grindley, 1990, 1991).* Although IT evaluation techniques are now being used more often, there is little in the way of evidence to guide managers to the likely payoff of IS/IT in their organisation. (Though see *Land, Farbey and Targett, 1993* and *Wood 1993).* The currently fashionable advice is for organisations to align their IS/IT strategies with their business strategies, and many techniques (such as Information Systems Planning techniques, Critical Success Factors, Value-Chains, McFarlan Grids and Competitive Forces) are used to do this. Such advice and techniques focus primarily on the operations and business processes in a firm, and ignore the way in which businesses are run or the nature of the organisations and people in them.

Yet it appears that many of the impacts of IS/IT are more subtle, influencing the way in which managers manage, workers work, how organisational culture is formed, and how organisations learn and are controlled. As such factors can account for 60-70% of a firm's performance in the longer term *(Hansen and Wernerfelt, 1989),* they cannot be ignored. Yet, because they are difficult to measure and hard to track, they are not usually considered as having any implications for the role of IS in organisational performance.

IT and IS cannot, however, be treated separately from other management issues- structure, strategy, style, culture, skills and systems are inextricably bound together. Due to the complexity and volume of material in the areas of corporate strategy and organisational behaviour, assessing the role of IT and IS in business success is not a simple matter. The key to understanding the link between IT/IS and business success may lie in a clearer understanding

of the role of information in economic processes and in the formation, operation and development of organisations.

## 1.2. THE NEED FOR THIS RESEARCH

Developments in telecommunications and computing technologies in the last century have highlighted the importance of information in modern economies. Yet the measures we use to manage organisations take little account of the value of information- for example, accounting practices which reflect people as costs and physical property as assets reflect this industrial age paradigm. It is therefore not surprising that organisations find it particularly difficult to evaluate the role which IS plays in their performance. Despite the extensive literature on IT investment assessment techniques and the limited but increasing use of such techniques, there is still considerable unease in the boardroom about the business value of IT and IS spending.

The management literature reflects a dichotomy in approaches to evaluating the role of IS in organisational performance: on the one hand there is the hard approach of economists, accountants and business strategists who stress the use of IS/IT for competitive advantage and cost reduction; on the other, there are the proponents of the soft approach, who stress the necessity (but not sufficiency) of human factors in performance. Neither of these approaches explains the role of IS in organisational performance satisfactorily.

Whatever the limitations and uncertainties of the management literature, it is clear that organisational performance is the result of the interaction of a myriad of factors. The challenge for business researchers is to isolate one or more factors which have some predictive power, as the PIMS programme has done with market share and quality. As Strassman has shown, a purely empirical approach to assessing the role of IS in organisational performance does not yield much beyond insights which many would say echo common

sense- for example, that a better quality management team will achieve a higher return on IS investment *(Strassman, 1989).*

The challenge facing IS researchers is the all-pervading nature of IS in an organisation. IS permeates most if not all levels and functions in a firm, making it very difficult to isolate its impact. Though IS costs can often be identified on a project-by- project basis, the cross-functional and inter-level nature of IS benefits make it difficult to attribute benefits. IS benefits may also be of a subtle, long-term nature not susceptible to current measurement techniques. Inter-firm effects also complicate the picture. An approach is required which enables a more holistic measurement of the role of IS in organisational performance. Such an approach should also enable a clear link to be established between IS and corporate performance.

From the random-walk theory of stock markets to a cursory look at the business pages of any newspaper, it is apparent that chance plays a large role in organisational life and performance. Although IS may, in appropriate circumstances, enable an organisation to meet unpredictable challenges and opportunities better prepared, the effects of such events needs to be discounted for the purposes of explaining the role of IS in organisational performance. This is done by measuring the longer term performance trends of an organisation over a period of several years.

We also know that management teams inherit different business strengths and weaknesses from their predecessors- the impact of the inherited strategic position needs to be discounted in order to measure the effectiveness of the current management team and their IS investment decisions. This is done using the PIMS (Profit Impact of Market Strategy) database to compare the strategic positions of those businesses being researched.

Once random events and inherited strategic positions are taken into account, we can begin to assess management's competence in building the capability of the firm to deliver superior performance in the future. This is the point at which the role of IS in organisational performance can be isolated. This role splits into "hard" and "soft" components based upon the ideas of organisational learning and control processes and organisational alignment.

The "soft" organisational learning and control process approach:

- provides a framework within which the value of information at both operational and strategic levels can be assessed
- highlights the contention between the processes of learning and control in organisations and the need to resolve such contention in a way which enables sustainable organisational development
- links the measurable economic performance of the firm (discounted for external factors) to the nature of the management systems which are in place and the information which such systems consume, create and diffuse.

The "hard" organisational alignment approach:

- highlights the many factors which contribute to the capability of an organisation to improve its economic performance
- identifies whether the degree of alignment between these factors in a specific firm enhances or limits capability and performance
- measures whether IS is aligned with the other factors, and the extent to which IS is an enabler or constraint in the improvement of organisation performance and in organisational development.

## 1.3. RESEARCH APPROACH & KEY RESEARCH QUESTIONS

This research develops and tests a diagnostic framework within which the role of IS in organisational performance can be assessed using both the "Soft" and "Hard" approaches mentioned above. A model was constructed from three groups of eight variables identified as key to the improvement of organisational performance through management and information systems:

CONTEXTUAL STRATEGIC VARIABLES

- **Environment** type
- **Nature** of the **business**

ORGANISATIONAL PROCESS VARIABLES

- **Focus** of top management's **mindset**
- **Management** process and style
- **Organisational** type and **culture**
- **Processes** of **control**

MANAGEMENT SYSTEM CONTENT VARIABLES

- **Information** and performance **measures** and
- **Technologies** for management **systems** (including IS/IT).

This model is referred to hereafter as the **"ENFMOPIT"** model. This ENFMOPIT model was used to test a series of hypotheses about the role of IS/IT in organisational performance, using a combination of qualitative and quantitative research methods. Based upon eight normalised scales developed by the author from prior organisational and IS/IT research and theory, the ENFMOPIT model was used to measure the alignment between the eight composite variables comprising the model. Correlation matrices were created and standard statistical tests conducted to relate each of the eight factors in the ENFMOPIT model to each other, and to the performance of the organisation concerned.

A sample of 24 large UK organisations across a variety of industries was selected to test a series of hypotheses designed to answer the following questions arising from previous research, and the ENFMOPIT model:

a. which aspects of organisational performance are related to IS performance, and how close is that relationship?

b. can theories of organisational learning and strategic control be demonstrated to have any significance for the role of IS in organisational performance?

c. is alignment between the ENFMOPIT variables related to superior organisational performance?

d. how does such alignment relate to IS in an organisation, and does IS play any role in achieving alignment?

e. is effective use of IT/IS a cause or effect (or both) in facilitating organisational learning and beneficial change?

These questions and their associated hypotheses generated a set of questionnaires, and data was gathered over a period of two years to test the hypotheses. Four questionnaire sets were completed by the CEO's, IT directors and one or more of the finance, planning or marketing directors in each of the 24 firms. Each of the 72 questionnaire respondents was also interviewed.

In order to benchmark the financial performance and strategic position of each of the 24 firms, extensive data was gathered from public databases, annual reports and sources in each firm. This data included the standard Dun & Bradstreet or equivalent set of financial ratios, together with the limited data set used in the PIMS database to measure strategic position.

## 1.4. OVERVIEW OF FINDINGS

The findings grouped into the five categories of research questions are as follows:

a: is organisational performance related to IS and IS performance?

Over a period of five years it was clear that those organisations which used IS as a substantial part of a major change process dramatically improved their performance if alignment between the key organisational variables was maintained. It was equally clear that despite high levels of expenditure on IS, those organisations with poor alignment fared as badly if not worse than those with substantially lower levels of IS spend. A specific relationship between any particular aspect of organisational performance and IS could not be identified. In some cases, however, IS had clearly enabled the creation of greater organisational capability in a particular area.

b: can theories of organisational learning and strategic control be demonstrated to have any significance for the role of IS in organisational performance?

Thinking with information in order to "do the same things right" (incremental improvement), or to "do the right thing more often" (radical change), appears to be at the heart of how organisations learn to improve their performance and satisfy the demands of their environment. How such information is created and shared in an organisation appears to play a key role in the effectiveness of that information, and its ability to contribute to superior organisational performance.

Organisations operating in simple, stable environments tended to be good at "single loop" learning, focussing on mastery of detail. These organisations worked hard at doing what they already do, but better. In other words, they seldom used their information systems to initiate radical changes, but rather used them as a means of monitoring and controlling existing variables in current lines of business. As stability was key to these organisations, they emphasised fairly rigid operational controls. Sainsburys, the Civil Aviation

Authority, TWIL and Watson & Philip were typical of the organisations in this sample.

In contrast, those organisations operating in complex, dynamic environments tended to do more "double loop" learning. With the environment changing at a faster rate, they had to question their assumptions more often, and enter and exit lines of business to adapt to the changes in their technologies and markets. These organisations, such as Xerox, Extel and Rover, emphasised strategic controls, measuring the "big picture" and major changes in their environment.

IS infrastructures and applications portfolios tended to reflect the single loop learning, operational control approach or an emphasis on double loop learning, strategic control in various ways. Some firms opted for centralisation/ formalisation of both strategic and operational controls, while others decentralised/ informalised them or used a mixed approach somewhere between these two. From the perspective of organisational performance, what mattered was the degree of alignment between the organisational variables rather than the level of management system and IT/IS centralisation/ formalisation in itself.

c: is organisational alignment related to superior organisational performance?

The research findings indicate that level of alignment between the eight groups of ENFMOPIT variables is weakly correlated with the five year profit growth of the 24 research participants, and strongly correlated with the difference between the strategic potential of the participants and their actual strategic performance over a three year period as measured using the Profit Impact of Market Strategy database.

d: how is such alignment related to IS in an organisation, and does IS play any role in achieving alignment?

In some of the participants it appeared that IS had played a major role in enabling the organisation to better meet the challenges facing them. IS was in the vanguard of such change, and may initially have been out of alignment in the direction in which change was desired. IS helped break restrictive practises in some of the firms, and enabled them to automate previously uncompetitive processes.

IS may have been a constraint on progress in some of the respondents, but it was difficult to judge whether this was due to a failure of management or a failure of IS or both. (Though in one case a "new generation" system had failed to deliver to specification with serious repercussions for business growth). It is clear that IS cannot significantly lag the other variables without diminishing the capability of the organisation, though the impact of this on performance may only be felt in years to come.

e. is effective use of IT/IS a cause or effect (or both) in facilitating organisational learning and beneficial change?

It was clear that IS/IT was both a cause and effect in most of the participants' ability to learn. IS enabled learning to occur both due to demand for more and better information (demand pull), and the existence of an effective IS infrastructure (supply push), which encouraged communication and experimentation.

## 1.5. STRUCTURE OF THIS THESIS

This thesis first sets out the elements of the research model developed to explain the role of IS/IT in organisational performance. The ENFMOPIT model contains three levels of variables, the covariance (or "alignment") of which should predict superior "hard" performance of an organisation:

CONTEXTUAL STRATEGIC VARIABLES (CHAPTERS 3&4)

- E: the composition and effect of the four **environment** types
- N: **nature** of the business (formed by the distinctive capabilities of a firm in its industry operating in its characteristic mode)

ORGANISATIONAL PROCESS VARIABLES (CHAPTERS 5, 6, 7 & 8)

- F: top management's internal or external mindset **focus**
- M: **management process and** style in organisational learning and control
- O: **organisational** culture and structure
- P: **processes of control** in human activities

MANAGERIAL CONTENT VARIABLES (CHAPTERS 9 & 10)

- I: **information** and performance measures used to manage
- T: **technologies** for management systems.

In chapter 2 we start out with a review of the complementary but opposing "hard" economic and "soft" organisational approaches to understanding organisational performance. Chapters 3 and 4 deal with the contextual strategic factors: the **EN** variables measure those aspects of the situation an organisation is in which are largely external to the organisation, and which are the most difficult to change: the environment of the firm,and the nature of its business. In chapter 3, we explore the role of the environment in organisational performance to create a framework which enables us to measure different kinds of environment from stable to turbulent. In chapter 4, the nature of the business,(including its characteristic operating mode distinctive capabilities /core competences and criteria of good performance.), and the role of these three factors in contributing to superior organisational performance through IT/IS , are discussed.

Chapters 5, 6, 7 and 8 deal with the organisational process variables **F, M, O** and **P**. These variables measure the softest, internal aspects of the

organisation: the focus of the organisation's mindset (from top management's perspective);nature of its management process and the style of its management team, the type of organisational culture, and the processes of control by which work is regulated in the organisation.

In chapters 9 and 10, the managerial system content "IT" variables are discussed. These variables measure the harder, managerial systems which are used to navigate the environment and control the organisation: the information and performance measures by which success is calibrated and rewarded, and the technologies for management systems used to manage the organisation, including IS/IT. The nature of the role of IS/IT in organisational performance is also discussed in greater detail in these chapters.

Chapter 11 leads us into the next section, where the research objectives, main research questions and hypotheses are posed. The research approach and method are then described. Findings and conclusions are then discussed in chapter 12, followed by the recommendations for further research in chapter 13. The bibliography ends the main part of the thesis.

Appendices A, B, C, D and E set out the five questionnaires used in the research:

**A.** IT/IS Infrastructure, Applications & Benefits and Business/Information Systems Planning Methods
**B.** CEO Questionnaire & Interview
**C.** Mission Critical Variables, Nature of the Business, Control Archetype & IS Benefits Questionnaire
**D.** Management Style, Control Processes, Organisation & Environment Type
**E.** Overachiever/Underachiever Analysis.

Appendices F and G list the mission critical variables and technologies for management systems variables. H sets out the 24 company financial profiles, while in I the relevant data analysis & statistical results can be found.

# CHAPTER TWO: THE ORIGINS OF ORGANISATIONAL PERFORMANCE

The purpose of this chapter is to explore two contrasting perspectives on the origin of organisational performance. Performance is seen to have two different meanings in the literature:

- the "hard" approach, drawn from work in microeconomic theory and empirical research as exemplified by the PIMS database and the research findings drawn from research using the database, such as those of Strassman (1989) and Porter (1983). The hard approach also draws on specific financial measures of organisational performance, as exemplified by the MicroExstat database. Success, in this meaning, revolves around strategic position and return on investment, two "hard" results of organisational activity based on an instrumental paradigm.

- the "soft" approach, drawn from organisational behaviour and interpretive approaches to organisations such as Mintzberg (1983), Boisot (1987), Hirschheim (1985) and others. These approaches are based upon cognitive science, hermeneutics and systems science. The soft approaches emphasise the relativistic nature of work and information, and are based upon a paradigm of liberation, focussing on individuals and relationships. Here the results of organisational activity are not absolute, but rather relative to the effectiveness of individuals and the social systems which they create and function within.

The need for an integrated model to explain the role of information systems in organisational performance is explained, and the foundations of the ENFMOPIT model laid.

# CHAPTER 2. THE ORIGINS OF ORGANISATIONAL PERFORMANCE

A predictive model of business success has been as elusive as the holy grail in management research during the past century (Pascale, 1990). The role which information systems play in business success is even less clear. What makes some organisations succeed, and others fail? And what role do IS/IT play in success or failure? These questions lie at the heart of most management, business policy, organisational behaviour and information systems theory. The different theories and approaches to organisations in the business policy, organisational behaviour and information systems fields have led to many different explanations of organisational behaviour and performance.

## MANAGERIAL PERCEPTIONS OF BUSINESS SUCCESS

There are a large number of variables one might select as potential determinants of organisational behaviour and performance. Much of the research done to date has categorised these variables into groups with headings such as "environment", "market", "organisation", "management", "culture" and so on. Not only are the relationships between the variables and firm performance and behaviour largely unfathomed: the relationships between the variables themselves are largely unexplored.

Although organisational behaviour models provide useful insights into the processes within organisations, they provide little if any predictive ability with regard to performance. In the absence of such predictive ability, managers and consultants have developed their own rules of thumb. Researchers have tried to understand these "secrets of success" by selecting samples of successful organisations and interviewing their senior managers about their philosophies, beliefs and practises. Such research has then been published to wide audiences, and has had a significant effect on managerial thinking

and vocabulary. Let us summarise what such popular approaches to organisational performance have to say.

Grinyer, Mayes and McKiernan (1988) investigated the causes of relative decline or improvement in performance in 25 UK companies between 1984-85, as measured against a control population of 25 firms. Their results indicated the same mix of economic and organisational variables found in the "In Search of Excellence" (Peters and Waterman,1982) sample of ten US corporations in 1981/82. Goldsmith and Clutterbuck's (1984) survey of 23 UK firms also reflects a similar mix of variables, as does Peters' (1987) list. The four different lists of variables are set out in table 1.

**TABLE 1: VARIABLES EXPLAINING COMPANY SUCCESS**
**CONCLUSIONS FROM FOUR DIFFERENT SURVEYS**

**PETERS AND WATERMAN: IN SEARCH OF EXCELLENCE**

1. A Bias for Action
2. Closeness to the Customer
3. Autonomy and entrepreneurship
4. Productivity through people
5. Hands-on, value-driven
6. Sticking to the knitting
7. Simple form, lean staff
8. Simultaneous loose-tight properties

**GOLDSMITH AND CLUTTERBUCK: THE WINNING STREAK**

1. Leadership
2. Autonomy
3. Control
4. Involvement
5. Market Orientation
6. Zero-basing (or "stick to the knitting"- keeping in close touch with the fundamentals of the business)
7. Innovation
8. Integrity

**GRINYER, MAYES AND MCKIERNAN: SHARPBENDERS**

1. Good management
2. Appropriate organisational structure
3. Effective financial and other controls
4. Sound product/market posture
5. Good marketing management
6. High quality maintained
7. Tightly controlled costs

1. Higher value-added
2. Responsiveness
3. Making products that work
4. Service
5. Flatness of organisation
6. Innovation
7. People-centred
8. Leadership

The assumption in these popular recipes for success is that the organisations which "get it right" in each attribute will prevail irrespective of the environmental challenges or opportunities facing them. Subsequent evidence suggests to the contrary that such recipes for success do not predict superior long term performance, as is illustrated by the fact that over two-thirds of Peters and Waterman's (1982) excellent companies were no longer excellent five years after publication of In Search of Excellence .

Other authors have developed models of organisational performance which explicitly include both the economic and organisational variables. By way of introduction to their article, Hansen and Wernerfelt (1989) comment that:

"In the business policy literature there are two major streams of research on the determinants of firm performance. One is based primarily upon an economic tradition, emphasizing the importance of external market factors in determining firm success. The other line of research builds on the behavioral and sociological paradigm and sees organizational factors and their fit with the environment as the major determinants of success. Within this school of thought, little direct attention is given to the firm's competitive position. Similarly, economics has disregarded factors internal to the firm. Theory or empirical evidence of linkages to performance abound within each paradigm, but surprisingly little has been done to integrate the two and evaluate the relative effect of each on firm profitability."

The economic paradigm explains behaviour and performance using models which measure explicit variables such as accounting information and market and industry statistics. The organisational behaviour model relies upon the measurement of some external variables such as size, history and environment, together with more implicit variables such as management

quality, culture and style. The payoff in an economic game is likely to be fairly "hard", such as assets, cash, or promotion, while the payoff in a sociopolitical game is often softer, such as a change in behaviour, a motivated employee or a shared perspective. Both paradigms are useful in understanding the role which information plays in the control and adaptation processes in organisations, but require integration to form a new paradigm.

Hansen and Wernerfelt decomposed the inter-firm variance in profit rates into economic and organisational components, and found that both sets of factors are significant determinants of firm performance. Their further findings are that the two effects are roughly independant, and that organisational factors explain about twice as much variance in profit rates as economic factors.

What is interesting about all attempts to uncover the determinants of firm performance, is the similarity of the models which are used. Almost every one of the thousands of books and articles on strategic planning acknowledges the troika of environment, organisation and management. (With various additions depending upon the purpose of the book or article, such as the role of the market, culture, innovation and control).

Predictors of firm performance in the last decade have become more "organic" than their counterparts in the previous three decades. In other words, the reality of human qualities are more apparent in much of recent thinking. Culture, particularly, is a variable which though difficult to measure, recognises the importance of meaning, symbols, and communication in an organisation.

This research seeks to explain the role of IS and IT in organisational performance by measuring the alignment of the softer, internal factors which provide a firm with its capability. The impact of the harder, economic

variables on firm performance will be discounted through the use of the strategic position and potential measure in the PIMS database, to render the implications of the softer internal variables for performance more visible. The alignment of the management style, organisation type, processes of control, information and performance measures and IS/IT (the "MOPIT" variables in the ENFMOPIT model, which measure the internal capability of an organisation), with the challenges posed by its environment and the nature of its business (the "ENF" variables in the ENFMOPIT model), should then explain the role of IS/IT in organisational performance.

The hard and soft models of organisational performance are derived from two fundamentally different ways of looking at the world. A structurally static, "socially rational", collective and predictable perspective on organisations tends to be characterise the hard approach, while a dynamic, personally motivated, individual and unpredictable perspective tends to characterise the soft approach. The following descriptions illustrate the polarities in the two approaches (Miner,1983):

i) STATIC OR DYNAMIC IN NATURE
a. As solid technological structures seeking static equilibrium; or
b. As learning systems only temporarily manifest as globally stable structures;

ii) SOCIAL OR PERSONAL IN PURPOSE
a. As organs of society, functioning on behalf of society; or
b. As instruments of individuals, to achieve personal goals;

iii) COLLECTIVE OR INDIVIDUAL
a. As populations of organisations, grouped by type, industry, geography or
b. As uniquely individual entities, with "personalities", cultures and biographies;

iv) PREDICTABLE OR UNPREDICTABLE
a. As rational entities using logic to achieve predetermined goals in a predictable environment; or
b. As entities adapting themselves to unpredictable environments with unforeseeable emergent characteristics.

Diagram 3 (Wood, 1992), illustrates the intersection between the hard and soft perspectives, mirroring the distinction drawn by the sociotechnical school between technical and social systems:

- "hard" value-adding **production or service processes** (represented by the economic processes on the horizontal axis, supported by the technical and physical infrastructure in organisations) and
- "soft" **human processes** involving the creation, sharing and processing of information and meaning (as represented by the learning and cultural processes on the vertical axis, and enabled by social and cognitive processes).

The latter explains more about organisations learning new behaviours in unpredictable environments with unforeseeable, emergent characteristics, while the former explains more about organisations in predictable environments acting as rational entities using logic to achieve predetermined goals.

The central intersection between the economic and cognitive perspectives forms the characteristic organisational cultures and processes which we recognise as "IBM", or "Sainsburys", or "McDonalds". It is at this level that we need to understand the forces driving and constraining the future progress and success of the organisation, and the impact of the degree of alignment of those forces on the performance of the organisation.

**DIAGRAM 3: ECONOMIC AND COGNITIVE PERSPECTIVES ON ORGANISATIONS**
**(Wood 1992)**

The horizontal arrow in diagram 3 :

- represents the Porterian value-chain perspective, which explains how organisations add value in a flow of goods and services. The focus on business processes and the way in which they are arranged in a firm for competitive advantage.
- illustrates the operational process and infrastructure of an organisation- materials/energy/ information which are processed through physical/ chemical/ informatic systems using a variety of technologies, and distributed through economic systems and organisations.

Value chains map the physical flow of production and distribution, resulting in economic outcomes for the firm (such as strategic position and organisational performance). Material wealth is the ultimate measure of performance in the hard approach.

Venkatraman (1991) and K. Hugh McDonald (1991) deal with the implications of IT for "IT-Induced Business Reconfiguration" and "Business Strategy Development, Alignment and Redesign" respectively in the "The Corporation of the 1990's". In other words, one can rationally determine the best way in which to reengineer this horizontal flow of goods and services to take full advantage of IT. In this approach, we view the organisation as a set of business processes which must be optimised to deliver maximum value-added and competitive advantage. We can use the word "hard" as shorthand for this highly rational, economic approach.

The vertical arrow in diagram 3 represents a very different perspective on the organisation- one which draws more on socio-political, psychological and biological theory than economic theory. This "soft" approach to the organisation emphasises people, their needs and wants, their limitations and potential. Just as an organisation in real life must deliver added-value to a

customer in the hard world of business, so too must that same organisation motivate and develop the people in it to be able to deliver that value-added.

The vertical arrow:

- illustrates the process of organisational development- organisations are founded, grow and either succeed or fail depending upon their response to selection pressures (many of which may be economic in origin). Such selection pressures shape the culture of the firm (beliefs in behaviours associated with success), which in turn influences the social processes operating in an organisation. Organisation types (such as those characterised by Mintzberg) emerge. Cognitive processes and behaviour emerge from and also shape organisational cultures and types. The achievement of the goals of individuals and groups represent the ultimate measure of performance in the soft approach.

- highlights the more emergent approach to the world which the soft perspective requires. Human and political processes appear less predictable than economic processes, and hence less susceptible to an "engineering" approach. The subtleties of management style, corporate culture, human relationships in the workplace and the effects of leadership and facilitation require a very different perspective and approach if they are to be understood and changed beneficially.

A key feature of diagram 3 is the intersection between the horizontal and vertical axes: the "organisational process and type". Organisational processes and types form the "crossroads" between economic and cognitive/ organisational behaviour approaches to organisational performance. Authors such as Mintzberg (1983) and Miles and Snow (1986) have developed different typologies for organisations based upon their methods of work

coordination and control, and the way in which they respond to their environments, respectively.

This research seeks to integrate both the hard and soft approaches represented by the vertical and horizontal arrows. If this can be done, it may be possible to explain the impact of IS and IT on organisational performance in a more comprehensive way. In carrying out this research, the author will attempt to be a "model agnostic", in the belief that the different perspectives represented in the hard and soft approaches each contribute something unique to our understanding of different organisations in different situations.

We will now explore the two very different ways of understanding organisations outlined so far: the "hard" economic approach, and the "soft" organisational behaviour approach. In order to have any credibility with the results oriented manager, it is essential that IS be demonstrated to have a positive impact on the economic performance of the firm. To appreciate how IS actually adds value, however, we must also understand how organisations develop their distinctive capabilities through people and systems. Let us explore the "hardest" models (the economic models of performance) first, before discussing the "softer" organisational behaviour approaches.

## 2.1. "HARD" FACTORS PLAYING A ROLE IN ORGANISATIONAL PERFORMANCE

Despite the failure of most theories and prescriptions in the management literature to offer a universal explanation of why some organisations fail and others succeed, some progress has been made in explaining organisational success in terms of hard, quantifiable outcomes.

Much of business theory is based upon economic analysis. Such analysis is helpful at the level of the organisation, though incomplete. Porter's "Competitive Strategy" (1980) and "Competitive Advantage" (1983), assume

that economic considerations are primary in determining the performance of organisations.

### 2.1.1. COMPETITIVE STRATEGY AND VALUE CHAINS

Porter's analytical framework is based on ideas such as "the five forces", "the value chain", "competitive advantage", "generic strategies", "factor conditions", "demand conditions" and "the diamond". His work derives from extensive empirical research into the dynamics of competition in various industries over the past decade- the PIMS programme, upon which Porter based much of his initial thinking, has championed this approach at the firm level. The key framework is the "five competitive forces" which explain profitability within an industry and firm:

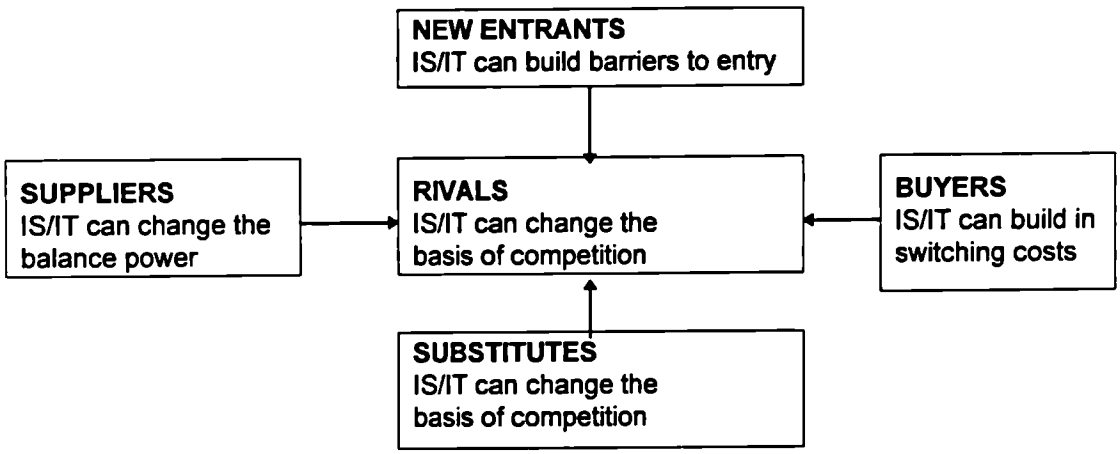


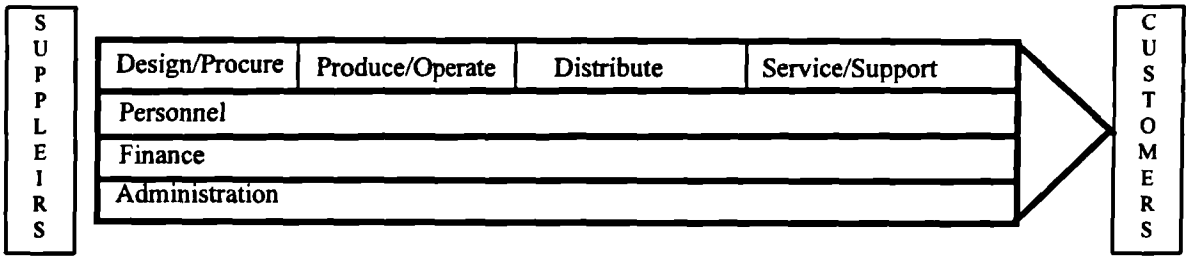

**DIAGRAM 4: PORTER'S INDUSTRY ANALYSIS MODEL- THE 5 FORCES & THEIR RELATIONSHIP TO IS/IT**

Porter's value chain model provides a framework to describe the way firms add value through their activities. Value-adding activities can be analysed in different firms, leading to an understanding of the relative competitive advantage which different combinations of activities can yield in different firms. Every firm is a collection of activities designed to transact. (i.e. design, produce, market, deliver and support its product).

Such activities are remarkably consistent whether the product flow is physical, such as a cement production line, or abstract, such as the

compilation of items of information for a newspaper. Porter refers to the set of activities causing the product to flow from the input to the output ends of a firm, as primary activities. He refers to other activities conducted by the firm as support activities. These activities are comprised of flows of materials, services and information required to ensure the continuity and integrity of the product/service flow. A simplified version of value chain theory is represented in diagram 5:

**DIAGRAM 5: PORTER'S VALUE CHAIN MODEL**




The value chain works from left to right: organisations take in a variety of inputs from suppliers, and together with their own resources, transform those inputs into outputs which add value to customers. These inputs and outputs can be both goods and/or services. In manufacturing businesses, the inputs and outputs tend to be physical things, while in service businesses they are usually human labour and/or information. Design, procurement, production/operations, distribution and service/support are typical stages in the primary processes of a value chain. Personnel, finance and administration are typical functions in the secondary or support processes in a value chain. IT/IS can be used to enable people to add more value in their organisation's value chain, by automating and reengineering business processes. Porter's competitive analysis framework is often used to identify the areas in the value chain which will provide greatest competitive advantage, which has led to the popularity of benchmarking processes and the systems used in processes as to their value-adding characteristics.

### 2.1.2. THE PROFIT IMPACT OF MARKET STRATEGY PROGRAMME

Some commonly accepted measures of hard business success are:

- profitability
- satisfied stakeholders such as customers/shareholders/employees
- revenue and profit growth
- growth in market share

If some or all of these (mainly financial) measures constitute success, then what are the prerequisites for success? The research findings made with the Profit Impact of Market Strategy database (Buzzell and Gale, 1987) have been surprisingly consistent over the past thirty years. The general insights into corporate success achieved using the database endure, despite some criticism about the limited nature of the 3 000 plus members of the database (predominantly large manufacturers, plus some service companies and smaller firms together with a reasonable number of financial institutions).

The PIMS programme emerged out of the General Electric corporation in the 1960's, and developed into the Strategic Planning Institute, established in conjunction with Harvard Business School. Since that date, over 3 000 businesses from most industries, in many countries, have contributed information about anywhere from 200 to 500 factors in their business over a period of 5 years or more. Over the years PIMS has been in operation, it has been established that some 15 of these variables account for about 80% of the variation in performance between the business as in the database (Buzzell and Gale, 1987).

According to the findings of the research into corporate success using the PIMS database, a high value in the first group of the following variables and a low value in the second group appear to be strong predictors of success:

**STRONG PREDICTORS OF BUSINESS SUCCESS: HIGH VALUES DESIRABLE**

1. absolute and relative market share
2. relative quality
3. real market growth
4. industry concentration
5. operating effectiveness
6. capacity utilisation
7. value-added per employee

**STRONG PREDICTORS OF BUSINESS SUCCESS: LOW/MODERATE VALUES DESIRABLE**

8. investment intensity
9. fixed/working capital mix
10. customer power
11. distribution complexity
12. moderate levels of innovation.

According to the cumulative experience of the PIMS database, the maximisation of variables 1 to 7 and the minimisation of variables 8 to 12 should lead to business success. Out of the large number of economic factors which play a role in organisational performance, it is difficult if not impossible to select a few in which IS plays a key role. The PIMS database measures nearly 500 variables, of which a core of 15 account for about 80% of performance over a three to five year period in most of the 3 000 firms in the database. Variables such as market growth, market share, capital intensity, rate of innovation, productivity and relative quality are captured in this core group of variables. Although such information is useful in focussing the mind of management on major issues, the PIMS variables measure macro-phenomena over long periods of time. As IS may affect many or most of the PIMS variables in direct or subtle ways, it is difficult to explain the role of IS at this level.

At the opposite extreme, IS can be and is studied in a microcosm by many researchers- studies at a departmental or firm level of one specific aspect of IS are common. Such studies highlight important factors in the successful development and implementation of IS, but cannot explain the role of IS in organisational performance in any generalisable way.What this research aims to do is to bridge this gap using an intermediate level of description: a

smaller number of firms than are in the PIMS database. A sample size of 24 firms enables in-depth information on each firm to be gathered. Research at this level will enable us to examine the firm as an intersection of economic and personal variables.

One of the more important findings in the PIMS research is that incremental return on investment is not related at all to historic return on investment. In other words, how well the firm did in the past bears no relation to how well it will do in the future. Other important findings of the PIMS programme are that what determines how well a firm will do in the future, depends largely upon the market environment in which the firm operates, what the competitive position of the firm is in that environment (its market share, quality, price and so on), and what the nature of the firm's production structure is. Amongst the firms in the database, about 80% of the performance of a firm is explained by the 12 variables set out above.

No absolute logical model exists which can explain the causal relationships between the large variety of factors which may explain business success. Such factors will vary from situation to situation, depending upon the competitive environment the firm operates in. This is why strategic peer analysis can help simulate the competitive situation a firm finds itself in. Strategic peers are firms which look similar to your firm in many of the most important ways- they operate in similar market environments (in structural terms), have similar competitive positions (though in different industries), and have similar production structures. They are "lookalikes" for your business, though some of them may have performed better or worse than your firm for a variety of reasons.

It must be stressed that peers are not competitors, but firms in other industries who are in a similar competitive situation (Buzzell and Gale,1987). Over 30 years the evidence from the PIMS database suggests that the

strategies followed by successful peers in the past are likely to work in similar situations in the future in a similar situation. For example, a "number two" strategy followed by Pepsi to Coca Cola can be emulated by Avis to try to win market share from Hertz, (or Apple to win share from IBM), as the competitive dynamics in both situations are similar. By comparing one's business against a group of about 30 strategic peers, the merits/demerits of various strategic options begin to emerge. This is achieved by comparing the strategies of those lookalikes which succeeded over a 5 year period, with the strategies of those that failed in the same period. Such a comparison highlights the effects of competitive interactions, marketing, production, finance and human resource decisions, on the performance of a firm with the specific strategic position of one's own business.

The PIMS database provides a useful way of benchmarking the performance of organisations against each other using common, tried and tested yardsticks. As PIMS measures the business/economic variables and not organisational variables, it can be used to discount the strategic position of a group of firms, allowing the difference in performance due to other variables to become more apparent. This is the way in which the PIMS database will be used in this research, in order to highlight the impact of IS/IT on organisational rather than business variables.

### 2.1.3. SUMMARY OF AN ECONOMIC APPROACH

I have selected above two examples of a widely used economic approach to modelling the performance of organisations, to provide a brief overview of what is in reality a vast field. When this approach has been applied to explaining the impact of IS/IT on the performance of organisations, however, it has met with little success (Strassman,1989).

The pure economic approach to organisational performance is essentially an "external control" model of the business. Outside forces such as market

attractiveness and competitive position influence decisions about internal variables such as production and organisational structure. Of course, we know that not all organisations are founded for economic reasons or judged by economic criteria. Other evidence also suggests that strategy follows structure, rather than vice versa. What is "value-added" is a value-judgement itself, both on the part of the producer and consumer. The economic approach assumes rational decision-making, based upon 'facts'- the relevant facts dictated by the economic model being used.

Traditional micro and macro economics rely upon two key assumptions to enable the models which they predicate to be built: rational behaviour of the seller and buyer (to maximise their economic gain or profit), and perfect information about the state of demand and supply in a market. We shall explore some of the assumptions underlying theories of rational action below in examining organisational behaviour theories.

The classic tools of economics such as production functions, cost curves, and price setting demand and supply curves cannot operate without these assumptions (Samuelson, 1976). Of course, certain markets (such as the foreign exchange markets in free currencies) are virtually perfect examples of economic theory. Much of the way in which organisations operate, however, depends upon a great deal of uncertainty. The inherent problem is that although today's decisions have great effect on tomorrow, we can never have perfect knowledge about tomorrow's environment. One may even go so far as to say that some firms create order out of chaos, in situations where very little or no information is available ex ante. Theories of leadership and management have developed to explain how leaders navigate such uncertainty (Bennis 1990).

Capra (1981) has critiqued traditional economics for being based upon highly aggregated data, inappropriately derived from microanalyses, resulting in

elaborate quantitative models describing fragmented segments of economic activity- all based upon tacitly assumed neo-classical concepts. Although economic approaches to understanding the impact of IS/IT can yield some insights, they have failed to provide any systematic evidence of improved performance as a result of investment in IS/IT. This may be because the correct measurements are not being taken- or because the benefits of IS/IT can only be measured at a more fundamental level in the organisation.

The traditional economic approaches work best where:

- **a degree of certainty prevails in markets**, and large volumes of reasonably accurate data are available about macro and micro economic variables
- when return on assets and capital are being judged, or where continuous or batch production makes **capital intensivity** and large scale infrastructure important, and people relatively unimportant in the overall equation.

Transaction cost theory (Clemons, 1992) has been applied with some success in explaining the exchange of information between firms, but it tends to be limited to situations where there is a market between organisations or between large departments in organisations where costs are readily calculable. The other major drawback of classic economic models and transaction cost theory is their reliance on one or more stable equilibrium points in order to determine costs and income. This results in static models which do not reflect the dynamic nature of organisations and their environments. Transaction cost theory takes no account of the **transition costs** involved in the almost continuous changes which organisations need to make in their affairs if they are to adapt and survive. Ciborra (1991) has also downgraded his estimation of the significance of transaction cost theory, (a derivative of this approach), in evaluating the strategic significance of IS/IT for organisations.

Economic approaches have limited predictive ability except at high levels of aggregation.Such a level of aggregation explains very little about how high performance is to be achieved under conditions of uncertainty. The economic approach does not quantify, (nor can it, since the variables are "intangible"), variables such as culture, decision-processes, or cognition and "irrational" factors such as personality. Management and workers have a significant influence on organisational performance and direction, however.

Organisational behaviour, cultural and cognitive approaches to understanding organisational performance are therefore insightful and complementary to the economic approach, and may yet provide the requisite insight to explain the impact of IS/IT on organisations.

Ciborra (1991) emphasised the need for such an approach when he said that:

"Tapping standard models of strategy analysis and data sources for industry analysis will lead to similar systems and enhance, rather than decrease, imitation. How then should 'true' SIS (Strategic Information Systems), be developed? In order to avoid easy imitation, it should emerge from the grassroots of the organisation, out of end-user hacking, computing and tinkering. In this way, the innovative SIS is going to be highly entrenched with the specific culture of the firm. Top management needs to appreciate local fluctuations in systems practices as a repository of unique innovations and commit adequate resources to their development, even if they fly in the face of traditional approaches. Rather than looking for standard models in the business strategy literature, SIS's should be looked for in the theory and practice of organizational learning and innovation, both incremental and radical."

We therefore need to look beyond economic theory for a more complete answer about the impact of IS/IT on organisational performance.

## 2.2 "SOFT" FACTORS PLAYING A ROLE IN ORGANISATIONAL PERFORMANCE: ORGANISATIONAL BEHAVIOUR & COGNITIVE MODELS

The difficulties of economic approaches to understanding firm performance were outlined above: that quantitative economic models rely upon normative assumptions which are often a poor reflection of reality. The study of organisational behaviour is even more difficult in many ways than economic analysis of organisational performance. The roots of this difficulty lie in the nature of organisations: they are multi-level, highly complex, sensitive systems which resist being probed. We will examine two different approaches to explaining organisations and their performance: the organisational behaviour approach, where contingency theory has become popular, and the cognitive approach, which emphasises the role of corporate culture.

### 2.2.1. ORGANISATIONAL BEHAVIOUR MODELS

Organisational complexity arises largely due to the fact that organisations are themselves comprised of many people, each with different objectives, needs and wants. It is not therefore surprising that the field of organisational behaviour contains a large number of competing theories which attempt to explain why organisations behave as they do.

Miner (1983) ranked 32 organisational behaviour theories according to their estimated scientific validity and estimated usefulness, using a panel of 35 experts in the field of organisational behaviour. These 32 categories do not include another seven which this author has identified. The "top 10" theories (i.e. which received the most mentions by the panel), included the contingency theory of organisation, expectancy theories, contingency theory of leadership, decision-making concepts and constructs, need hierarchy theory, psychological open systems theory, technological determinism, job characteristics theory, behaviour modification and operant learning and path-goal theory. In terms of both usefulness and validity, however, the top

scorers were job characteristics theory, goal-setting theory, achievement motivation theory and role motivation theory.

Depending upon one's perspective of organisations, the approach one chooses in order to interact with or understand them will vary. The sheer complexity of organisations may explain why so many theories of organisational behaviour abound. Yet, within this complexity, there is considerable order. Pfeffer (1978) grouped the large number of theories of organisational behaviour found in his survey of the field, according to the dominant assumptions underlying each theory. These three groups are:

**a. Rational action:** micro-level rational action
organisation-level rational action

**b. External control:** of individual behaviour
of organisational behaviour

**c. Cognitive Approaches:**
Social constructionist views of individual behaviour
Organisations as paradigms and processes.

Over the course of the next few chapters, we will draw upon some of the building blocks from each of these areas of theory to develop a comprehensive model of the organisation which combines the key attributes necessary to explain the role of IS/IT in organisational performance.

We will focus on the external control and cognitive approaches in order to extract a framework of organisational types to measure the alignment between the eight ENFMOPIT variables, including an organisation's management style, processes of control, information and performance measures and technologies for management systems (including its IS/IT infrastructure). First we will briefly explore the structural contingency theory which forms part of the rational school, as some of its principles are useful in building the ENFMOPIT model.

Structural contingency theory concentrates on the form and structural dimensions of organisations. Professional managers are assumed to be motivated by a desire to maximise efficiency and make the correct strategic choices. The existence and structure of an organisation are determined by three characteristics: size, technology and the environment. Though this theory is limited by its assumptions to situations where ownership and control are separated, it provides a powerful analytical tool for strategists. This theory will be explored in greater detail below when we consider the approach of Mintzberg (1983).

The interactions between organisations and their environments are many and complex. Having an understanding of the different types of environments and their impact is interesting. In order to make this knowledge useful, however, an understanding of how organisations interact with and develop in different types of environments is essential. Because an enormous variety of organisations exist, it would be helpful to classify these organisations into types. The most widely known classification approach is Henry Mintzberg's "Structure in Fives" (Mintzberg,1983). Mintzberg's approach focuses on the structure of the organisation, rather than the processes in it or its mode of adaptation to its environment.

### 2.2.2. ORGANISATIONAL CONFIGURATION IN FIVES

Mintzberg defines five basic parts to any organisation: the strategic apex delegating through the middle line to the operating core, aided by a technostructure and support staff. At the base of the organisational "mushroom" lies the Porterian value chain, which forms the operating core of any organisation. In other words, this is where people do the work to add value in a production or service process. These work processes (grouped into clusters called business processes), must be coordinated and controlled.

The four basic ways in which work can be coordinated and controlled are: direct supervision (exercised by middle line management); standardisation of work processes and outputs (designed and controlled by the technostructure); standardisation of skills (which occurs in the operating core itself); and mutual adjustment (facilitated by support staff).

In a simple structure, the strategic apex (emphasising ideology/leadership) is dominant. In a machine bureaucracy, the technostructure (emphasising rationalisation) predominates, while in a professional bureaucracy the operating core (emphasising professionalisation) is primary. In the divisionalised form, the middle line (tending to balkanisation) predominates, and in adhocracies the support staff (emphasising collaboration) are primary.

**Factors Forming the 5 Types**

These five structural extremes emerge from situational factors such as age and size of the firm, the technical system required to operate and understand the firm, the environment, and the distribution of power in the organisation. The evolution of organisational forms and the design of new organisations depend upon parameters such as job specialisation, training/ indoctrination, formalization of behaviour, grouping, unit size, the extent of planning and control systems, the use of liaison devices and the degree of centralization/ decentralization present. Authority, decision, product/service and communication flows together with work constellations determine the nature of the functional processes in the firm.

**FORM & FUNCTION**

Mintzberg has formulated 11 hypotheses about organisational form, process and function, based on 3 main internal factors influencing organisational form & function: age & size, the technical system, and power.

**AGE & SIZE**

1. The older the organisation, the more formalized its behaviour.
2. Structure reflects the age and founding of the industry.
3. The larger the organisation, the more elaborate its structure - that is, the more specialised its tasks, the more differentiated its units, and the more developed its administrative component.
4. The larger the organisation, the larger the average size of its units.
5. The larger the organisation, the more formalized its behaviour.

**TECHNICAL SYSTEM**

6. The more regulating the technical system, the more formalized the operating work and the more bureaucratic the structure of the operating core.
7. The more complex the technical system, the more elaborate the non-operating structure - specifically, the larger and more professional the support staff, the greater the selective decentralization (to staff) and the greater the use of liaison devices (to coordinate the work of that staff).
8. The dissolution of the operating core transforms a bureaucratic administrative structure into an organic one.

**POWER**

9. The greater the external control of the organisation, the more centralized and formalized its structure.
10. The power needs of the members tend to generate structures that are excessively centralized.
11. Fashion favours the structure of the day (& culture), sometimes even when inappropriate.

Mintzberg's five basic organisational forms arise due to the nature of the tasks which organisations perform and the degree of specialisation required to perform those tasks. The form of an organisation can be partially explained by the type of environment it operates in, and the impact of this on the way in which tasks are performed, as explained in the following matrix:

| | | **RATE OF ENVIRONMENTAL CHANGE** | |
|---|---|---|---|
| | | **Stable** | **Dynamic** |
| **DEGREE OF ENVIRONMENTAL COMPLEXITY** | **Complex** | Decentralized Bureaucratic (Standardization of skills) | Decentralized Organic (Mutual Adjustment) |
| | **Simple** | Centralized Bureaucratic (Standardization of work processes) | Centralized Organic (Direct Supervision) |

**DIAGRAM 6: MINTZBERG'S MATRIX RELATING ORGANISATIONAL TYPE TO ENVIRONMENTAL CHANGE AND COMPLEXITY**

The five environmental hypotheses arising out of Mintzberg's research are:

a. The more dynamic the environment, the more organic the structure.
b. The more complex the environment, the more decentralized the structure.
c. The more diversified the organisation's markets, the greater the propensity for it to split into market-based units (given favourable economies of scale).
d. Extreme hostility in its environment drives any organisation to centralize its structure temporarily.
e. Stability in the environment encourages the organisation to decentralize selectively to differentiated work constellations.

Organisations at the bottom left of this matrix are typically "Fordist", applying "scientific management" to increase their efficiency and effectiveness, while the post-modern, "network-organisation" appears at the top right of this matrix, relying largely on mutual adjustment to adapt to complex dynamic environments.

Mintzberg does not explicitly state the implications of these principles for organisational performance. There is however, an implicit implication in contingency theory that organisations which fit their environment will tend to do better than those exhibiting poor fit.

### 2.2.3. COGNITIVE APPROACHES

Cultural and cognitive approaches to organisational behaviour are sufficiently different to other approaches to understanding organisational performance to merit a separate section. Such approaches focus on the process of cognitive structuring and its impact on and role in individual and organisational behaviour. "Information processing" is a key component of this approach, though such processing occurs through cognition as part of a reciprocal process involving cognition and action, occuring cyclically over time (Galbraith (1973).

Diagram 7 below illustrates the basic ideas that:

- organisations are open social systems which have to deal with uncertainty by processing information (Weick, 1969). Sources of uncertainty are both internal and external (March & Simon, 1958).
- organisational structures, processes and technologies facilitate the collection, processing, exchange and distribution of information. (Galbraith, 1977)

Diagram 8 illustrates those factors which might give rise to uncertainty for an organisation, (creating information processing needs), and those factors which enable an organisation to resolve such uncertainties (creating an information processing capacity).

The social constructionist approach focuses on the individual level of analysis, emphasising the creation of meanings and beliefs in an emergent, process-oriented approach to organisational analysis. This approach shares elements with the rational-individualistic approach- both emphasise the role of intention and purpose, and recognise the duality of structure as being both a product of human interaction and a constraint on that interaction. Both also emphasise the importance of cognition in organisational analysis. This approach complements the external constraint perspectives, by explaining where the norms, values and social pressures in an organisation come from.

**DIAGRAM 7: THE INFORMATION PROCESSING MODEL**

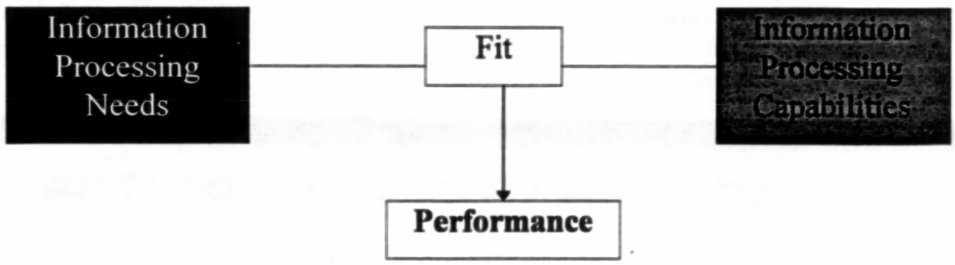
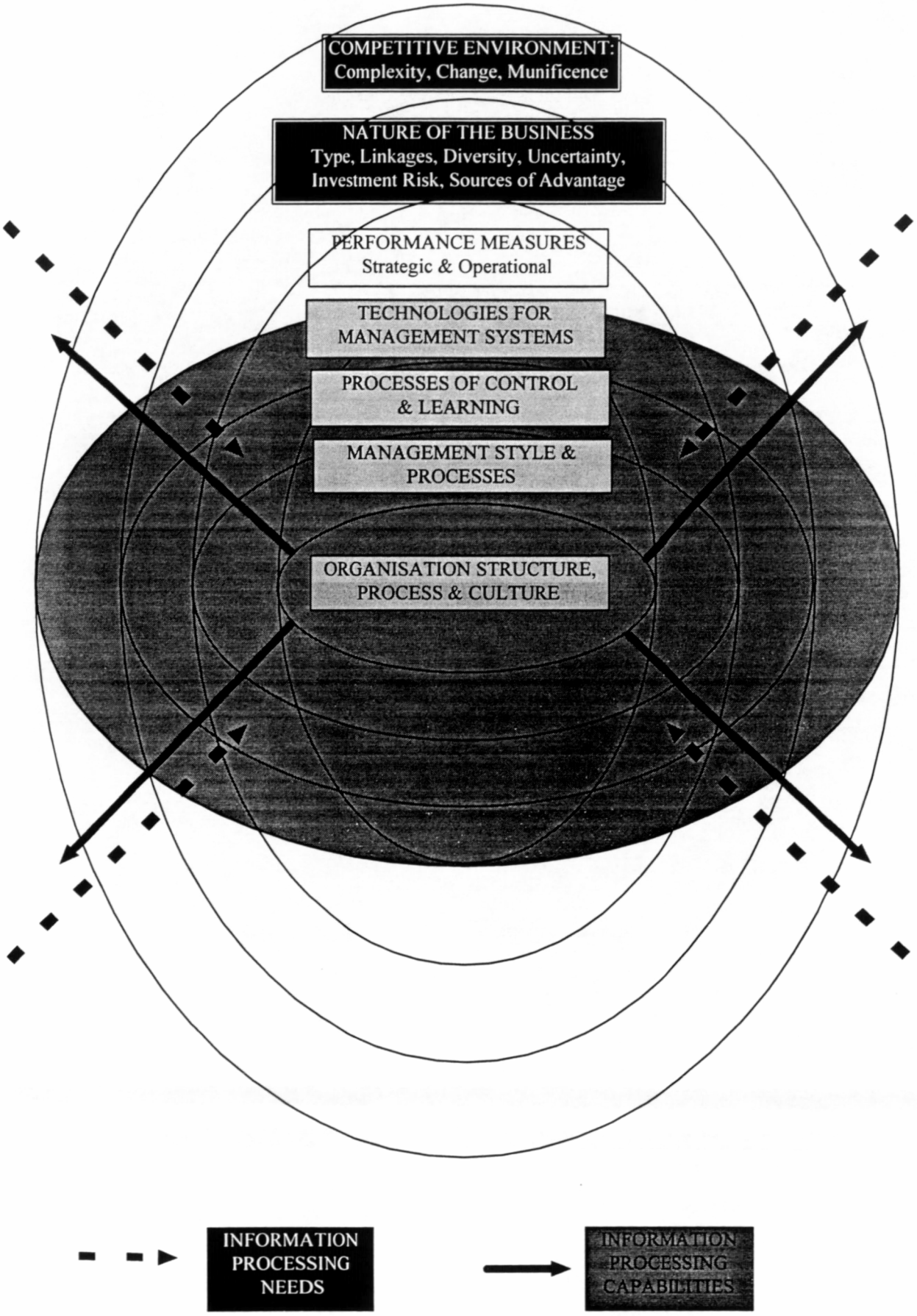


**DIAGRAM 8: INFORMATION PROCESSING NEEDS VS CAPABILITIES**



The view that organisations are paradigms and processes emphasises the idea that the members of an organisation share common beliefs about certain things, particularly the processes by which the organisation functions. The social nature of the organisation is paramount in this approach, and the emphasis on processes useful in conjunction with the static nature of the structural contingency approach. In the cognitive approach to organisations, control is exercised through cognitive schemas and scripts, which govern both action and information. Adaptation is a process of making sense of new experience, involving processes of social construction that people use to cope with change (including the construction of new schemas and scripts). This perspective adds a further layer to the economic and organisational approaches covered in the three previous sections.

Organisations not only come in different shapes and sizes, but they also operate differently. Part of this difference is due to the culture of the organisation, the symbolic aspect of life in the organisation, embodying rituals, myths, symbols and practises. Culture determines the meaning and value of objects, events, processes and people in an organisation. Communication between members of the organisation inter se and with outsiders is shaped by its culture- both in terms of what is communicated, and how. Culture amplifies some items of information, and attenuates others. In summary, culture defines what behaviour people in the organisation associate with success, and what they should do to be successful.

Organisations today are often thought of and studied as cultures (Pettigrew, 1979). Cultures are systems of enduring, socially agreed upon meanings that guide behaviour. Since cognitive processes determine meaning, it follows that organisations will exhibit behavioural norms that are determined by socially agreed upon meanings, which are in turn sanctioned as legitimate

by the social cognitive processes of those ind viduals and groups working in the organisation.

How is culture formed? The shared values and meanings of the organisations members are forged both by their collective shared experiences and knowledge. Culture defines who is "in", and who is an "outsider". Entrepreneurial founders with strong personalities such as Henry Ford or Thomas Watson often stamp their own mark on the organisation they create, as the popular saying goes: "An organ'sation is often the shadow of one man". People either "fit in" or "ship out", so that the firm's culture is reinforced, though occasionally a major external shock may change it- threat of bankruptcy or takeover, for example. As most firms start out as small businesses run by an entrepreneur, this is the most typical method of culture formation in business, though history plays an important role in national and government cultures.

The strength of an organisation's culture rests in its ability to control the behaviour of individuals and groups. Cultures do not emerge overnight- they have a history. They can also arise through a process of attrition. If the cognitive processes guiding behaviour were successful in the past, they will be repeated in the present and assumed to be successful in the future. The cognitive processes guiding organisational behaviour are not easily determined- they lie embedded within the thoughts and actions of those working in the organisation. The rationale behind the meaning of the cognitive processes may be lost in history and communicated by employees as "It's just the way we do things around here".

How is a culture maintained and changed? The obedience of the members of an organisation cannot be taken for granted- their allegiance to the organisation and its purposes relies upon an often complex set of motives which change as an individual matures. "The way we do things around here"

depends upon the standardisation of the behaviour and attitudes of a core group of people in the organisation who set standards and norms. This core group usually consists of senior management and those close to them. In a "tight" culture, almost all employees will conform to these norms, while in a "loose" culture there will be a wide dispersion around the mean of behaviour.

Cognitive schemas (interrelated knowledge structures such as categories, prototypes, implicit theories) provide frameworks for understanding social information and suggest implications for behaviour. Cognitive scripts (schematic knowledge structures in memory specifying behaviour or event sequences for specific situations) are associated with schemas, and are enacted when the appropriate cues are available to actors in any organisational setting. Scripts are situations where an individual or group acts out a scene in which the lines (behaviour) and climax (results) are fairly stable and predictable.

The script is enacted when the appropriate cues are available to actors in any organisational setting. Schemas and scripts allow room for differences in individual managerial and working styles, while retaining the same cues and results. For example, one person may produce a business plan (the result) on a cue from their boss by delegating much of the task to subordinates, while another may not involve his or her subordinates. Yet the result (from the boss' point of view) is the same.

Consensual schemas and scripts represent a relatively stable core of the meaning of information or events shared among organisation members (Smircich, 1983). Once understanding and action schemas become embedded in an organisation's culture, they can take on an unconscious nature, which makes it difficult for organisational decision-makers to perceive the difference between their espoused and enacted strategies.

Boisot (1987) asserts that organizational culture is formed around the way in which an organization handles information. In other words, people in organizations use transactional strategies which reflect the type of knowledge they possess and use to transact with their colleagues, clients and suppliers. Strategy-making and implementation revolve around the codification and diffusion of uncodified and undiffused information.

Boisot has classified organizational cultures into 4 types, according to the dominant transactional strategy used to handle information in the organization. These four types are fiefs, bureaucracies, clans and markets. A small, entrepreneurial organization is usually run like the personal fief of its founder, and information is usually personal, uncodified and undiffused- a start-up business is a good example, together with the strategy the founder has developed (but probably not shared too widely) to market a product based upon his entrepreneurial idea. A larger organization, perhaps structured along purely functional lines, (say production, sales, finance and engineering), may be operated like a clan. Information is handled oligopolistically- in other words, it is widely diffused, but not codified. The organization is run along the lines of a partnership, using standardised knowledge (rules, saws and rituals) to perform its tasks.

A large bureaucracy handles information in a monopolistic fashion- the monopoly may be based upon a patent (highly codified, but undiffused), or an Act of Parliament giving the exclusive right to a government to administer a particular aspect of the nation's welfare- say the NHS. A competitive, matrix-structured organization (such as one of the large multinational corporations) will handle information in a market based way. i.e. information will be traded between members of the organization as a commodity. Public knowledge also falls into this domain- say the purchase/use of an item from a videotex service or an online database.

The most diffused and codified information will be highly objective in character, while the least diffused and codified will be subjective in nature (other adjectives such as impersonal/personal can be substituted).

### 2.2.4. SUMMARY OF THE ORGANISATIONAL BEHAVIOUR & COGNITIVE APPROACHES

The organisational behaviour and cognitive approaches highlight the importance of the interaction between an organisation and its environment, and the way in which information is created and shared in that interaction. The two major influences over how an organisation develops and what kind of organisation it ultimately becomes which emerge from this are:

- the complexity and speed of change in its **environment** (from stable to dynamic), which influences the structure and culture of the organisation, according to organisational behaviour contingency theory as articulated by Mintzberg (1983)

- the way in which information is created and shared in an organisation , which influences the organisational culture and type of information systems which will emerge in the process of development of an organisation, as articulated by Boisot (1987).

An implication of these two points is that types of organisation and culture which are well suited to their environment types, will have a better chance of achieving superior performance than types which are ill-suited.

## 2.3. CONCLUSIONS ABOUT THE ORIGINS OF ORGANISATIONAL PERFORMANCE

The only conclusion one can reach from over a century of research into organisations, is that their performance is as unpredictable as the weather or stock markets- relatively easy to predict in the short term, but extremely difficult in the long run. All three of these phenomena share the same

attributes of complex systems: a large number of variables, all interacting in a relatively chaotic way. Although more order can be imposed upon organisations than the weather or stock markets, such order dissipates relatively quickly.

Much emphasis has also been placed over the past few decades on the role of strategic management in organisational performance and development. The strategic information systems ("SIS") literature has placed much emphasis on aligning business and information strategies to create competitive advantage (Ciborra, 1991). Yet, as Ciborra points out, this top-down approach does not explain the evolution of those strategic systems upon which much of the SIS literature is based.

There do appear to be some high level variables which can predict organisational performance in the longer term, at a very aggregate level- the rate of growth of their markets, their market share and relative quality, their ability to process information/learn, and so on. No causal model exists which can explain exactly how such high level attributes can be brought about with any assurance of success.

In order to improve our chances of finding any linkage between organisational performance and information systems, we will need to combine the economic and cognitive/behavioural models to create a more holistic picture of what is actually happening in organisations.

# CHAPTER 3: THE ROLE OF THE ENVIRONMENT IN ORGANISATIONAL PERFORMANCE

The success of businesses and information systems is influenced by how well the business and its systems are adapted to the environments in which they operate. Different organisational forms and decision and planning process types also influence how well businesses and their systems perform.

In order to develop a model of alignment of the key variables explaining the role of IS/IT in organisational performance, we need to first explore one of the main strategic factors in that performance: the environment. The other major strategic factor, the nature of the business, is explored in chapter 4.

The alignment of an organisation to its environment can be measured by the appropriateness of the way in which the organisation is adapting to or changing its environment to enhance its own performance.

Chapter 3 explores Hambrinck and Mason's (1984) and Pfeffer and Salancik's (1979) models of the interaction between the environment of a firm and the nature of its decision processes and management style. The strong linkages between these variables becomes apparent through these models. The impact of IT/IS may be that it supports or enables the management and decision processes in adapting to different environments. Mintzberg and Emery's models of the environment are then used to derive a way of measuring and categorising the environments of the organisations which are the subject of this research.

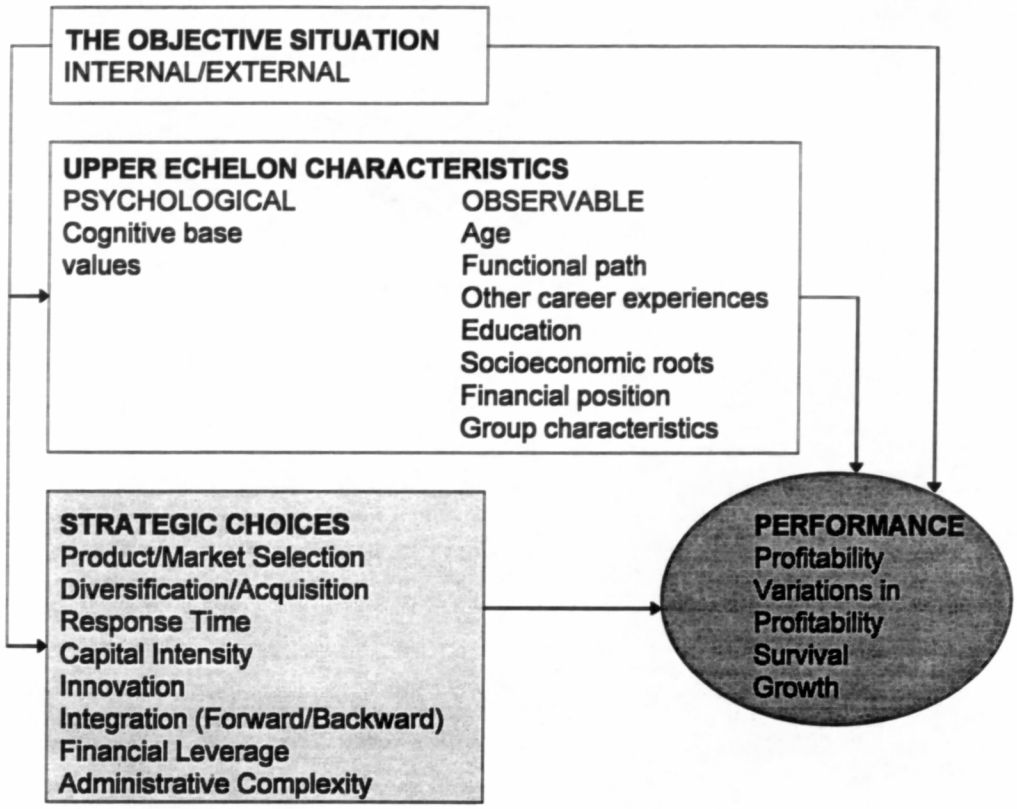
# CHAPTER 3: THE ROLE OF THE ENVIRONMENT IN ORGANISATIONAL PERFORMANCE

The environment of an organisation contains many variables which impact upon the processes, structure and performance of that organisation. Over time, however, firms also act upon and change their environment (for example, firms who negotiate with governments to change the rules of the game). It is crucial for an organisation to understand whether it operates in a stable, reactive, dynamic or turbulent environment, as this will determine the rate of change the organisation will have to adapt to. Internal structure and processes are critical in such adaptation. Information systems (including planning and control systems), provide the model or map used to guide the organisation through a changing environment. Such systems should fit the processes and structures which enable the organisation to change beneficially, and to build their distinctive capabilities.

Organisations not only interact with the external environment- they also have an internal environment of their own. The internal environment comprises the structure of the organisation, the processes operating within that structure and forces which change the structure and processes. Internal environments also change, leading to evolution of the organisational structure. The degree to which such internal variables align with external environmental variables (both statically and in terms of their direction and rate of change), may have significant implications for the role of IS/IT in organisational performance.

Hambrinck and Mason's (1984) model illustrates the way in which an organisation's performance is the outcome of the interaction of three sets of variables environmental, upper echelon characteristics and strategic choices:

**DIAGRAM 9: HAMBRINCK & MASON'S ORGANISATIONAL LIFE CYCLE**




This model highlights the combined role of the following variables in organisational performance:

- senior management, and their management style (the upper echelon characteristics which influence management style), with
- the strategic choices made by those managers (which link into the PIMS variables discussed above).

The environment, the nature of the business, the managerial mindset and its focus, management style, and the organisation type have all been demonstrated to play a significant role in organisational performance. What we now need to do is build a model which links these variables to the role of IS/IT in organisational performance.

The way in which we view the interaction between organisations and their environments will influence which factors we regard as important to measure. Pfeffer and Salancik (1979) provide a useful overview of two external control theories:

- External control theories of individual behaviour recognise the importance of phenomena such as social influence and learning, conditioning, role play, social context and retrospective rationality, but can only explain the behaviour of individuals or small groups.

- External control theories of organisational behaviour are twofold: population ecology and resource dependance. Population ecology treats the organisation as a black box, focussing on birth and death processes as these are impacted by environmental conditions. Resource dependance concerns itself more with the internal adaptations and politics that occur inside organisations. Population ecology studies the characteristics of populations of organisations, while resource dependance deals with issues from the perspective of individual organisations- the two perspectives are thus complementary: resource dependance provides the mechanisms and local decision making politics through which population dynamics operate.

## 3.1. ENVIRONMENT, STRATEGY, STRUCTURE & PERFORMANCE

Keats and Hitts (1988) argue that strategy emerges from the triad of environment, structure and process. They used munificence, instability and complexity as variables to describe the organisation's environment; diversification, size and divisionalisation to represent structure and process. Keats and Hitts' definitions of munificence, instability and complexity were as follows:

### 3.1.1.MUNIFICENCE

Munificence is a measure of environmental carrying capacity (Dess and Beard, 1984). Dess and Beard found that environmental munificence correlated positively with firm size. The measure refers to the availability of environmental resources to support growth. Indicators for this dimension

should thus reflect growth. Dess and Beard suggested that industry sales (or market growth) is the primary factor in environmental munificence. Following this reasoning, the indicators for this dimension have been designated as average growth in net sales and operating income in the dominant industry over a period.

### 3.1.2. INSTABILITY

Instability refers to volatility or difficult-to-predict discontinuities in a dominant industry (Aldrich 1979); (Dess and Beard, 1984). Dess and Beard found that environmental instability correlated positively with the market performance of firms and innovation in firms, but negatively with operating performance, divisionalisation and diversification. Indicators for this dimension should not primarily reflect steady growth or predictable cyclicality, although these may have some effect on volatility (Miles, Snow and Pfeffer , 1974). The focus is on discontinuities. Indicators for this construct were volatility of net sales and operating income over a 5 year period for the firms concerned. Uncertainty is defined as the rate of change and unpredictability in technology and in customer and competitor behaviour. An uncertain environment is dynamic and unpredictable, and hence unstable.

### 3.1.3. COMPLEXITY

The more complex the environment, the smaller the firms operating in that environment will tend to be. Complexity makes it difficult for one firm or a small group of firms to dominate, particularly through price competition, as the complex environment is composed of a number of niches. Environmental complexity (as measured by Grossack's dynamic measure of industry concentration, reflecting number, diversity and distribution of task-environment elements in an industry) therefore tends to be negatively correlated with firm size.

Keats and Hitts (1988) developed an integrative model of relationships among environmental dimensions, diversification strategy, firm size, structural divisionalisation and economic performance and tested their model using environmental and organisational data from 110 large manufacturing firms. The results suggested that among those organisations:

1. Higher levels of environmental instability were associated with lower levels of divisionalisation and diversification
2. Strategy followed structure
3. Size did not mediate the strategy-structure relationship
4. Environmental instability and diversification were positively related to market-determined performance
5. Instability was negatively related to operating performance.

Due to the small sample size and field study approach which will be used in this research, we will be focussing our attention on external control theories of individual behaviour, as modified by resource dependance theories. In other words, we will be dealing with the success and failure of individual organisations, viewed from the perspective of individual managers. This approach was selected due to the importance of individual and organisational learning in using and managing IS/IT successfully.

### 3.2. ENVIRONMENTAL TYPES

Environments can be defined in many different ways. The dimensions or features of environments which appear to be common to most classification systems and theories are complexity and uncertainty (or instability), which derive from a number of logically anterior features such as concentration, munificence, interconnectedness, conflict and interdependance.

The broadest classification of environments is that of Emery (1980), who defines four environmental types:

***Random/Placid***- no predictable pattern to this noncompetitive environment exists. Planning is not necessary or possible due to the stable nature of the environment. Firms would be isolated, and would only have infrequent contact with each other. (Here a strategy is as good as the best tactic- a resource rich, isolated environment such as a startup firm in a high growth market serves as the best example here).

***Clustered/Placid***- such an environment is noncompetitive, but sufficient causal consistency allows learning and planning to take place on a limited scale, enabling a niche to be discerned and protected. A monopoly industry represents such an environment.

***Disturbed/Reactive***- sufficient population density allows competition for the optimum niches to occur, creating some instability at a higher level. The niches themselves change only slowly, however. Planning now becomes essential for competitive purposes and survival. Organisations tend to become larger and more complex. Oligopolies and particular professional industries are a disturbed/reactive social field.

***Turbulent***- in such an environment, the niches themselves change frequently. Changes are multidimensional, creating catastrophe type situations. Planning is essential for survival, as the apparent stability of the environment may change dramatically, requiring sudden shifts in direction. Organisations become flatter, more modular and hence flexible to enable adaptation to occur more easily. The computer and electronics industries are a good example of a turbulent social field. The resulting matrix looks as follows:

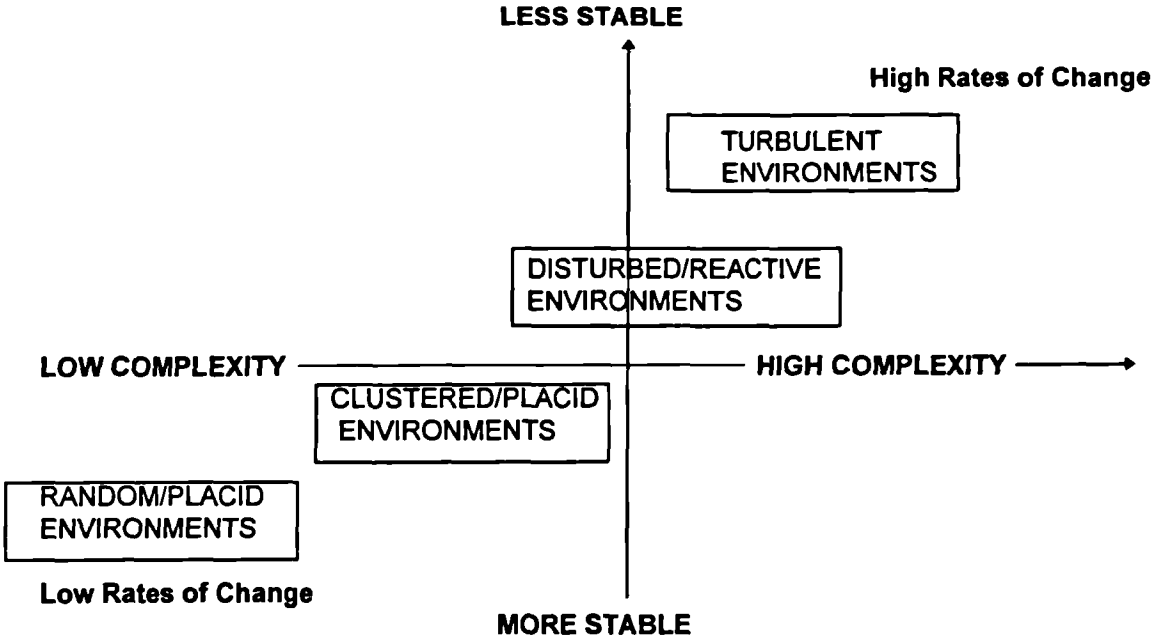



**DIAGRAM 10: EMERY'S 4 ENVIRONMENT TYPES**
**(Emery, 1980)**

Population ecology theory defines three dimensions in environments: uncertainty, the compatibility of different resource states and the frequency of changes in environmental states over time (the "grain"). This theory also distinguishes between specialists and generalists- the former operate over a narrow range of environmental conditions and have little excess capacity. Generalists survive over a wider range of environments but are not suited to any one in particular. The reduction of risk achieved by spreading into several environments by the generalist is traded off against the increased efficiency the specialist gains by exploiting a particular environment in great depth.

A course-grained environment is one in which there are relatively few (but often large) changes in environmental conditions, while a fine-grained environment contains many small, frequent changes. Rapid change in the environment requires an organisation to spend most of its time on adaptation, thus making specialisation a more viable strategy than generalism. Specialist organisations also dominate when uncertainty is low,

or the environment is fine-grained with large differences between environmental conditions.

The ecological approach seeks to understand the distribution of organisations across environmental conditions, and the limitations on organisational structures in different environments. Organisational form (a specific configuration of goals, boundaries and activities inferred from an organisation's structure, patterns of activity within the organisation or the normative order that characterises a particular organisation) is related to the particular type of environment in which the organisation operates. (This relationship is made very explicit by Mintzberg in the section on contingency theory above).

A population of organisations which can survive and reproduce itself better than other local populations within certain constraints (at a number of different resource levels for example), constitutes a "niche". Constraints are both external and internal: examples of internal constraints are sunk costs, internal political constraints which make the redistribution of resources difficult, constraints emanating from history and tradition and reduced/limited information received by decisionmakers due to present activities and structures.

External constraints include legal and financial barriers to market entry and exit, legitimacy considerations which delimit the organisations flexibility in changing form or activities, the problem of collective rationality (where the conflict between optimal "rational" strategies for individual buyers and sellers leads to disequilibrium at a collective level when enacted), and external constraints on the availability of information. The process of variation, selection and retention by which successful organisational forms survive and proliferate in particular environments is illustrated in diagram 11 below. The

following model represents the process of adaptation in organisations as represented by Pfeffer and Salancik (1978):

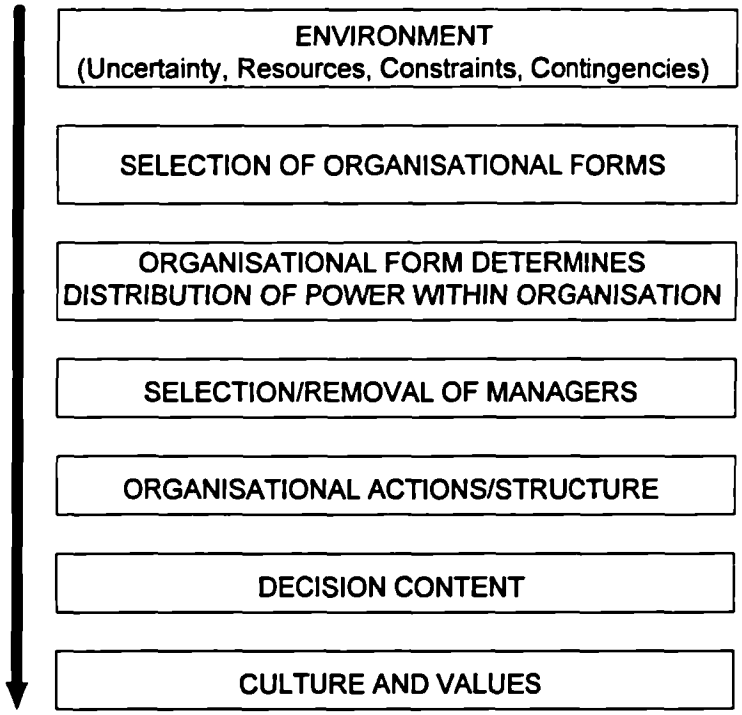



**DIAGRAM 11: PROCESS OF ADAPTATION TO ENVIRONMENTS BY ORGANISATIONS (Pfeffer & Salancik, 1978)**

The resource dependence perspective depicted above links environmental effects with internal political processes in organisations. Different environmental states affect the distribution of power in an organisation, which in turn affects who succeeds to administrative positions and what point of view comes to characterise the organisation's decision making. This in turn affects the actions and structure of the organisation. Provided this process works relatively quickly and smoothly such actions and structures should provide an appropriate response to the environmental challenges and constraints in that particular situation. This view of the organisation implies a looser coupling between organisations and their environments than would be implied by economics or population ecology, as power is seen to be an important intervening variable between environments and organisations.

### 3.3. CONCLUSION

There appear to be close links between the performance of an organisation, and the degree to which it is capable of satisfying the demands of its environment. The linkages between the environment, strategy, structure and performance of an organisation have been well demonstrated by a variety of researchers. Further linkages between the environment, senior management style, the distribution of power and decision processes are also adequately demonstrated.

The four types of environment which appear to be consistent across the strategy literature are (using first Mintzberg's, then Emery's terminology): simple stable (random/placid), complex stable (clustered/placid), simple dynamic (disturbed/ reactive) and complex dynamic (turbulent). In this research these four types will be used to benchmark the environments in which the participating organisations operate.

Attractive environments, in which one would expect performance to be superior, are simple, stable and munificent (growing). Unattractive environments, in which performance appears to suffer, are complex, unstable and exhibit low or no growth. There are always exceptions to the typical performance in different environmental conditions- these over or under-achievers may be better at adapting to their particular environment.

In this research we will be exploring the role which IT/IS plays in enabling organisations to adapt to and satisfy the demands of different environments, thereby improving organisational performance. The process of adaptation and change is complex, as it is intermediated by the other seven ENFMOPIT variables. We now need to explore the next strategic variable: the nature of the business, in the role of IS/IT in organisational performance.

# CHAPTER 4: THE NATURE OF THE BUSINESS

In this chapter the nature of the business and its relevance to the role of IT/IS in business performance is explored. The nature of the business has three components which we will investigate in this chapter:

- the way in which a business operates (called its "mode of operation and infrastructure", from systematic processor with hard infrastructure to versatile innovator with soft processes),
- the distinctive capabilities and core competences of the business and
- the number of criteria of good performance for a business, and their nature (called "good performance criteria").

A framework incorporating eight different kinds of businesses is developed from two axes::

- the level of new information being created (from the processor at the "low" end, through the selector and integrator to the innovator at the "high" end)
- the level of information intensivity in the output of the organisation (from the pure physical product at the low end, to the pure information product at the high end, with traditional personal services in between).

The theories of distinctive capability (Kay, 1993) and core competences (Hamel, 1989) are then briefly reviewed, to demonstrate the key role knowledge and learning play in developing competitive advantage in a business. The nature of different businesses requires different distinctive capabilities and competences, and influences the way in which IT/IS is used to improve business performance. The way in which an organisation goes about developing its distinctive capabilities to meet the changing demands of its environment is then related to its use of IT/IS as an enabler or constraint in this knowledge-gaining process. The fit between the number of good performance criteria and the different approaches to strategic control is then explored.

# CHAPTER 4. THE NATURE OF THE BUSINESS

Although it is evident to most laymen that different kinds of businesses have different characteristics, there is little evidence of research into the nature of these characteristics in the business, organisational and information systems literatures. It would appear obvious that a railway is different to a software company, and would have to be managed differently, yet this fact has only been studied recently by Prahalad and Bettis (1986), Hamel (1989) and Kay (1993), in the concepts of core competences, dominant mindset and distinctive capabilities. If the possession and development of core competences and distinctive capabilities are related to organisational performance, then the effective design and use of management and information systems should revolve around them- Ciborra (1991).

The nature of the business has three components which we will investigate in this chapter:

- the way in which a business operates (called its "mode of operation and infrastructure", from systematic processor with hard infrastructure to versatile innovator with soft processes),
- the distinctive capabilities and core competences of the business and
- the number of criteria of good performance for a business, and their nature (called "good performance criteria").

## 4.1. MODE OF OPERATION & INFRASTRUCTURE

The nature of the business reflects two key aspects of the way in which a business operates:

- whether the business tends to be a systematic processor (such as a petrochemical refinery, a compact disc production line or a global network provider) , at the one extreme, to a versatile innovator (such as a software, architectural or design business) at the other. Between these

extremes lie the selector (such as a professional firm of lawyers, accountants or doctors, or a restaurant) and the integrator (such as a large construction or systems integration firm). (Wood & Taylor, 1994)

- whether the business has a hard infrastructure (such as a railway or building materials business), or is comprised mainly of soft processes relying on human intelligence and services (such as a consultancy, a university, publisher or a hairdresser). Some of the latter have been termed "knowledge-based enterprises", (Zuboff, 1989), though many of them are also based predominantly on physical skills bundled in personal services, such as the hairdresser.

The following matrix demonstrates the implications of these two aspects of the nature of a business, for the creation and sharing of information:

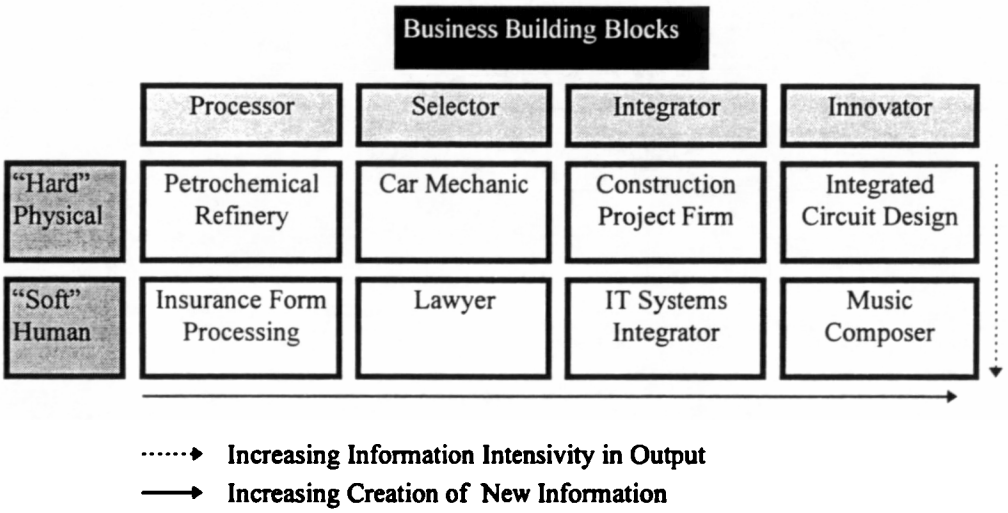



**Diagram 12: The Implications of the Nature of the Business for Information Intensivity & the Creation of New Information**

## 4.2. DISTINCTIVE CAPABILITIES & CORE COMPETENCES

Kay (1993) refers to distinctive capabilities, when applied in relevant markets, as the key to sustainable competitive advantage. Hamel (1989), refers to the core competences of the corporation as the key to competitive success. Clearly the distinctive capabilities and core competences of a "hard

processor" in the petrochemical industry will be different to those of a "soft innovator" in the music industry. Kay states that there are four types of distinctive capability:

- architecture (a network of relational contracts within or around the firm)
- strategic assets (natural monopolies or markets with restricted access)
- reputation (the commercial mechanism for conveying information to customers) and
- innovation (enhancing or creating new products and services).

Organisational knowledge which is the source of a distinctive capability, is:

- derived from some unique way in which the organisation creates, shares, holds and uses its stock of "trade knowledge"
- created through processes of learning in networks of people both inside and outside the organisation
- protected through legal (patents, licenses, regulations), relationship (customer or supplier power), and economic (barriers to entry) means.

Hamel 's "core competencies" are also knowledge-based (Hamel, 1990), and underpin the distinctive capabilities cited by Kay:

"Core competencies are the collective learning in the organisation, especially how to coordinate diverse production skills and integrate multiple streams of technologies...If core competence is about harmonizing streams of technology, it is also about the organisation of work and the delivery of value...Core competence is communication, involvement and deep commitment to working across organisational boundaries."

The logic of distinctive capabilities and core competences means that each organisation evolves particular core business characteristics in interaction with its environment. Each of these core business characteristics depends for its success on certain key success factors, which determine what the critical tasks for success in that organisation and industry are.

The role of IS/IT in developing capabilities and competences which are capable of contributing to superior organisational performance has been demonstrated in a wide variety of articles and case studies. For example, of Kay's four sources of distinctive capability, three in particular have been enhanced in specific cases through the effective use of IT/IS:

- **innovation:** in the design and manufacturing processes for jet engines (Rolls-Royce and General Electric), motor cars (manufacturers such as GM, Ford and Toyota), microchips (Intel), computers (IBM), telecommunications equipment (NEC), and knitware (Benetton)

- **architecture:** the development of a unique network of relationships with suppliers (Toyota and its Just-in-Time relationships with suppliers), employees (F-International, a UK-based software developer with 3 000 telecommuters), partners in a joint-venture (Rover and Honda), and franchisees (Benetton)

- **strategic assets:** the effective deployment and protection of strategic assets such as telecommunications systems (AT&T and BT), water and sewage systems (Southern Water), and airline networks (American-Airlines), through the use of IT/IS has been well documented.

## 4.3. BUSINESS CIRCUMSTANCES & NUMBER OF CRITERIA OF GOOD PERFORMANCE

Goold and Quinn (1990) linked the business circumstances a firm operates in to the strategic control approach which is most appropriate for those circumstances. The seven criteria they have used to define the circumstances a business is operating in comprise a variety of different factors, including the level of uncertainty in the environment, the diversity of the business portfolio and linkages between parts of the portfolio, the nature of investment decisions, and the number and complexity of sources of advantage in the business.

Different distinctive capabilities have implications for these factors- for example, a systematic processor with hard infrastructure such as a petrochemical processor, would tend to require large-scale, often risky investment decisions, and its competitive advantage would be derived from a large number of key success factors. A versatile innovator with soft processes such as a software company, would involve many small, fairly low risk investment decisions, and its competitive advantage would be derived from a small number of key success factors.

The mapping of business circumstances onto strategic control processes is illustrated in the seven 2 x 2 matrices in diagram 13 below. Each matrix has four quadrants derived from two axes: the number of performance criteria in a company, and the formality of its strategic control process.

The number of criteria of good performance on the y axis may be few to many. A few criteria of good performance may be suitable for companies with largely stand-alone businesses which do not face "bet your company" decisions and can build competitive advantage around a small number of key success factors. A larger number of criteria of good performance is appropriate if there are stronger linkages between businesses in the portfolio, the businesses face large risky investment decisions, the rate of change in the businesses is not too rapid, and the sources of competitive advantage are complex and numerous.

Relatively formal strategic control processes are indicated in diverse companies with few important linkages between businesses in their portfolios; in businesses that do not face high levels of uncertainty and rapid change; and in businesses where competitive advantage depends upon a relatively small number of identifiable and measurable variables. More informal strategic control processes are, however, suitable in less diverse

companies, especially if there are important linkages between businesses in the portfolio; in businesses that operate in unpredictable and fast-changing environments; and in businesses where the sources of competitive advantage are hard to identify and measure.

**DIAGRAM 13: MAPPING OF NUMBER OF CRITERIA OF GOOD PERFORMANCE TO STRATEGIC CONTROL APPROACH (Goold & Quinn, 1990)**

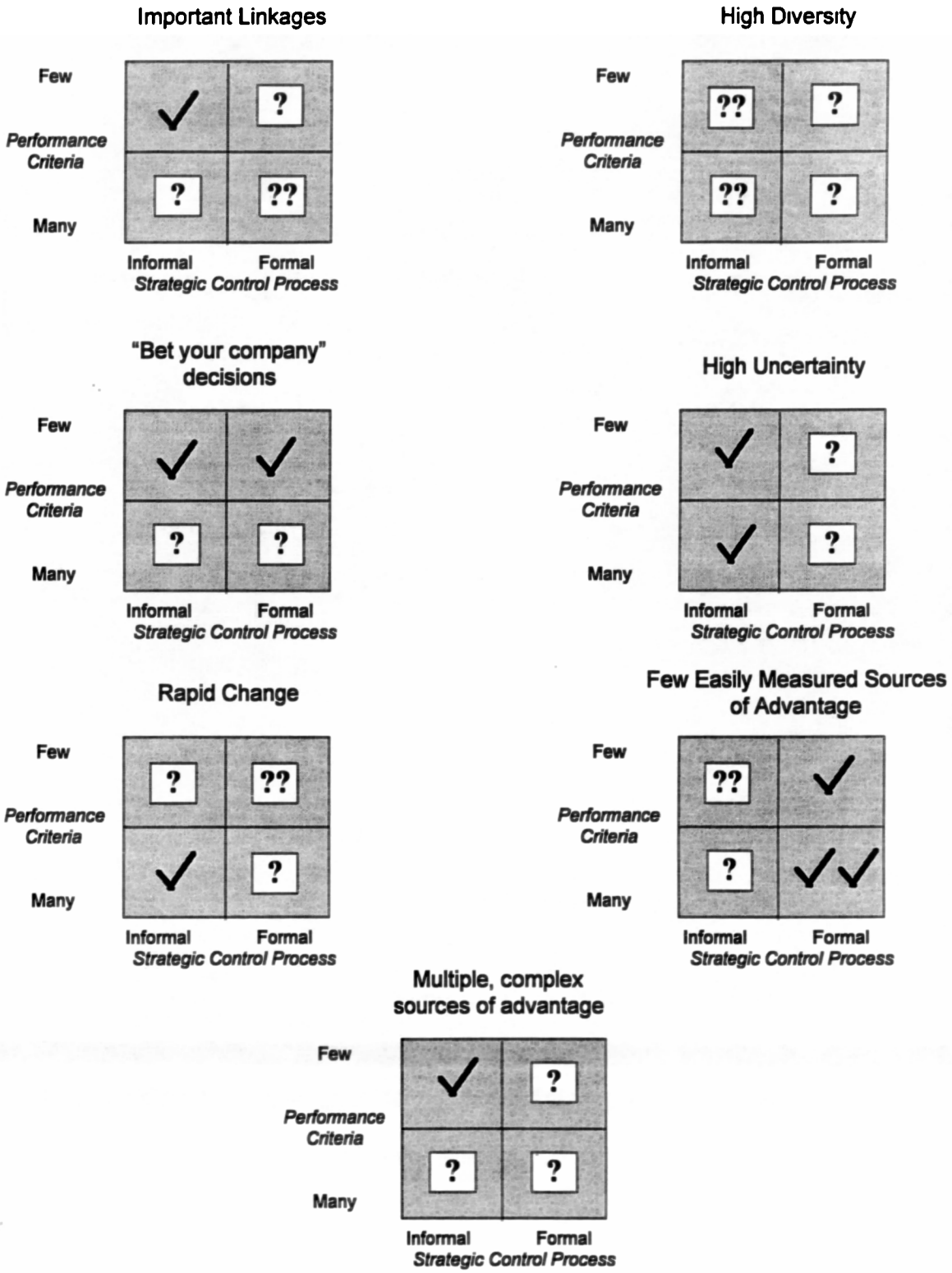


Diagram 13 illustrates the matching process between the seven key attributes of the circumstances of a business identified by Goold and Quinn, and the strategic control approach which is indicated in each set of circumstances. The rules made explicit in this series of matrices are:

a. Important linkages among businesses in a portfolio: many performance criteria and low formality in the strategic control process are suitable where there are important linkages among the businesses in a portfolio. Few performance criteria and a highly formal strategic control process would be highly questionable in this situation.

b. High diversity among business units: this circumstance causes problems for any strategic control process, but is particularly dangerous where informal strategic controls fail to identify the right strategic objectives.

c. Many "bet your company" investment decisions: many performance criteria are preferable in this situation as timely intervention is the key source of value-added from strategic control.

d. High uncertainty in the business and its environment: informal controls are most appropriate under conditions of high uncertainty, as flexibility (ability to adjust to changing circumstances) is the key source of value-added in high-change conditions. Formal strategic controls may be dangerous unless set in terms relative to the competition and flexibly administered to enable them to take changes in the environment into account.

e. Businesses facing rapid change in their environment: low formality in control processes and few performance criteria are essential in enabling rapid response to rapid change, allowing quick decisions on changes in strategy to respond to changing customer needs, technological innovation and competitor challenges. Interference, inflexibility and bureacracy result

from setting objectives which are too explicit and monitored formally, tying businesses down to antiquated objectives, strategies and programmes.

f. Businesses driven by a few simple sources of advantage: in this situation the benefits of a formal control process are possible to achieve without misdirected motivation (lack of cooperation between units) or high cost. More informal processes of control are liable to lose some of these benefits.

g. Businesses driven by multiple, complex and hard to measure sources of advantage: informal control processes using many performance criteria are appropriate in this situation. Formal controls with explicit objectives are difficult to define and run a significant risk of focussing attention on the wrong goals. Control approaches which focus on only a few criteria are also dangerous.

These seven criteria will be used to measure the third dimension of the nature of the business: the number of criteria of good performance.

### 4.4. THE LINK BETWEEN THE MODE OF OPERATION, DISTINCTIVE CAPABILITIES, & CRITERIA OF GOOD PERFORMANCE

It would appear to be common sense that having the right skills and competences for the nature of the business one is in, would be a prerequisite for success in that business- the skills and competences of a British Rail manager are unlikely to make him a success at running a hairdressing salon. Similarly, one would expect that the information systems used to run British Rail would also be unlikely to be appropriate for a chain of hairdressers.

Developing the right set of distinctive capabilities and corresponding core competences for the nature of the business one is in, may be enabled or constrained by IT/IS. Whether the IT/IS infrastructure and applications in an organisation are a driver or a brake on the process by which the organisation adapts to its environment and successfully develops its distinctive

capabilities, will also be influenced by the alignment between the nature of the business, its systems, and its environment.

It would also appear to be common sense that the ability to measure the requisite number of criteria of good performance in a business, and the ability to intervene appropriately based on that information, would be essential to superior performance in a business. The development of a set of such criteria would be derived from operational and strategic performance measures based upon the type of mode of operation and infrastructure, and the distinctive capabilities and competences inherent in that specific business. These good performance criteria can then be used together with the appropriate strategic controls to measure the effectiveness of the mode of operation and infrastructure and the development of distinctive capabilities and competences.

The way in which this process of adaptation to the environment occurs is strongly influenced by the mindset and actions of top management. There may or may not be a consistent way of thinking about the business amongst its top management, but it is likely that this "dominant mindset" exists in well-established and successful organisations. We shall explore this topic further in chapter 5.

# CHAPTER 5: THE FOCUS OF TOP MANAGEMENT'S MINDSET

Top management's mindset bridges the gap between the nature of the environment and the business sector an organisation operates in. The balance of the focus of this mindset between internal matters and the world outside the organisation, focuses the limited resources of the organisation on the tasks which are perceived to be critical to success by senior management. Chapter 5 explores how the dominant logic of top management's mindset is formed, and what effect it has on organisational performance, following the work of Prahalad and Bettis (1986).

A way of measuring the focus of top management's mindset is then established, using the success criteria described in chapter 2. The focus of these success criteria, or "mission critical variables", can be characterised as external, internal or neutral. The relationship between the dominant logic of the mindset, changes in the organisation and its environment, and the IT/IS infrastructure and applications in an organisation, are also explored. A way of gauging the influence of the dominant logic on IT/IS investment in specific areas in an organisation or external to it, is suggested.

# CHAPTER 5. THE FOCUS OF TOP MANAGEMENT MINDSET

In chapter 4 the core business characteristics of different types of organisation were set out. Each of these core business characteristics depends for its success on certain key success factors, which determine what the critical tasks for success in that organisation and industry are. In turn, the capability of certain individuals in an organisation to perform these critical tasks well will have selected them into the top management of the organisation. This then leads to the development of a top management mindset or dominant logic: "the way things get done around here". The following diagram represents this circular process of mindset formation (Prahalad and Bettis, 1986):

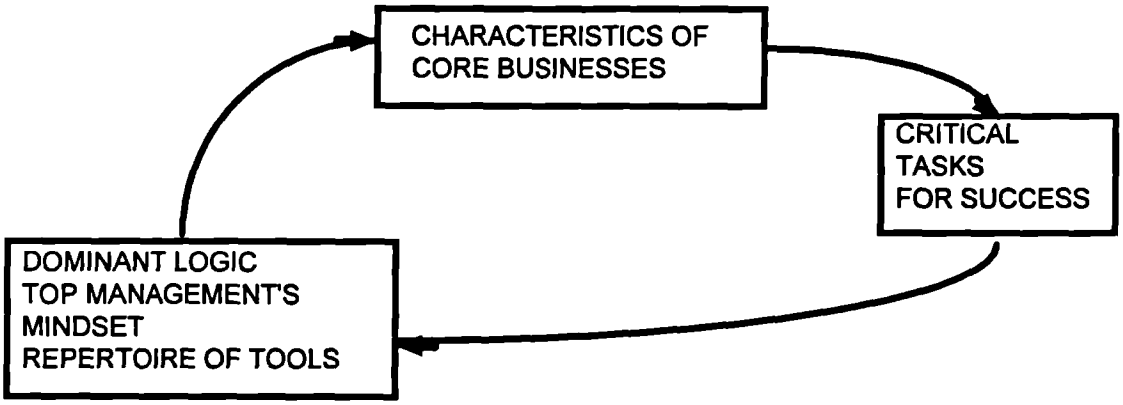



**DIAGRAM 14: DOMINANT LOGIC IN A FIRM AND CRITICAL TASKS FOR SUCCESS (Prahalad & Bettis, 1986)**

Prahalad and Bettis state that:

"Dominant logic..., is a mind set or world view or conceptualization of the business and the administrative tools to accomplish goals and make decisions in that business. It is stored as a shared cognitive map (or set of schemas) among the dominant coalition. It is expressed as a learned, problem-solving behavior. Sources of dominant logic include reinforcement of a world view by market success (operant conditioning), and complex problem solving behavior. The latter is in turn comprised of cognitive bias (available vs adequate information), and cognitive simplifications, which in turn comprise conventional wisdom (paradigms) and past experience and solution by analogy (pattern recognition)".

High performance in a firm requires the ability to respond fast as well as appropriately to competitor moves, customer needs and supplier changes.

The failure to respond adequately by top management to such things is ascribed by Prahalad and Bettis to the failure of the dominant logic, which was either not appropriate or non-existent. This may explain the poor track record of acquired firms over the past 30 years of available data on acquisitions. Limitations in the dominant logic therefore place limits on the strategic variety which a firm may develop in a particular environment.

How can something as abstract as a "mindset" be measured? For the purposes of this research, we will be using the statements by directors about what they believe to be important in making their business a success. These statements are based upon the list of desiderata set out above in chapter 2, which act as the "management success checklist", drawn from Grinyer, Mayes and McKiernan (1988) , Peters and Waterman,(1982), Goldsmith and Clutterbuck (1984) and Peters (1987).

A synthesis of the 31 "success attributes" together with the 15 PIMS variables predicting superior return-on-investment, form the 40 composite "mission critical variables" set out in Appendix F. By asking top managers to rank these variables to indicate which of the variables they believe to be most important in the success of their organisation, one can begin to build a model of the mindset amongst the top management in an organisation.

The 40 variables were grouped under six headings: people, organisational configuration, organisational characteristics, products/markets, operating structure and controls/systems. In each of these sections some of the variables are interna ly focussed on the organisation and its operations, while others are externally focussed on the environment around the organisation. Seven variables are internally focused, while eight are external- the remainder are neutral.

The internal variables are: good management, flatness of structure, core competence focus, high capacity utilisation, high productivity, tightly controlled costs and good information and control systems The external variables are: leadership, entrepreneurial qualities, service responsiveness, ability to innovate quickly, good marketing management, customer power, effective strategic controls and effective formal planning systems.

In large organisations which have survived for several decades, one would expect to find that successful top management teams share a dominant mindset aligned (at least to some degree), with their environment, the nature of their business and organisation type. This would be particularly true if the environment and the nature of the business and organisation had remained stable for some time. If, however, unexpected change in the environment or the nature of the business/organisation manifested itself suddenly, one might detect some variance between mindset and these variables.

One would also expect to find a relationship between the strategic or operational justification for IT/IS spend, the kind of benefits which were expected to accrue from IT/IS, and the focus of the dominant mindset. This relationship would exhibit itself in overall terms as a preference for IT/IS spending on areas/projects which focussed either on:

- new strategic opportunities, relationships with external stakeholders and customers, or
- operational necessities and relationships between internal stakeholders.

We will now examine the implications of the focus of the top management mindset in chapter 6, for the management process and style in an organisation,

# CHAPTER 6: MANAGEMENT PROCESS & STYLE

In chapter 6 we explore the links between management processes and styles, and the role of IT/IS in direction setting, measurement, control and learning. Control models by Scott-Morton (1991) and Ehrlemark (1984) are used to illustrate the role of single and double loop learning in the orientation, planning, programming and monitoring activities central to the management process. Three different kinds of learning are distinguished: imitative, adaptive and generative, which together create the ability to interpret, control and create past, present and future respectively.

The balancing of planning and opportunism in management processes required to align an organisation with a mixture of closed, contained and open change situations is discussed using Stacey's (1990) models. Goold and Campbell's (1987) financial control, strategic control and strategic planning management styles are contrasted, and the tensions in each of the six key mechanisms for influencing strategy examined.

The ways in which the evolution of strategy can be influenced and implemented through strategic management, strategic control and strategic planning are then discussed, using a variety of approaches including Goold and Quinn (1990), Schwaninger (1987) and Simons (1988). The difference between reactive/ proactive (diagnostic) and interactive (real-time/anticipatory) control, and the treatment of strategy as a knowledge gaining/learning process, is explored. Interactive controls are most suitable in predominantly complex dynamic environments, where open-ended change is happening, while reactive/ proactive (diagnostic) controls work best in simple stable environments in closed change situations. An appropriate management style is seen to resolve the tension between the

need to learn about and adapt to a changing environment, and the necessity of maintaining a stable operating core which can operate efficiently in a closed-ended change situation.

While reactive/proactive controls focus on the implementation of yesterday's strategies, interactive controls focus on the creation of tomorrow's strategies. The anticipatory nature of strategic planning is then discussed, together with the role of strategic planning in orienting an organisation toward the future.

While strategic control activities and systems focus primarily on the programming and monitoring of existing mission critical variables, strategic planning activities and systems should continually be questioning and, where appropriate, changing, the mission critical variables in the business. If the main forces shaping future direction are within the organisation's control, (in a high-tech pioneer with few competitors, for example), then an internally focused top management mindset may be appropriate, leading to a focus on internal mission critical variables and an interactive control approach for those variables.

If the main forces shaping future direction are outside the organisation's control, however, then an externally focused top management mindset may be appropriate, leading to a focus on external mission critical variables and an interactive control approach for those variables.

# CHAPTER 6. MANAGEMENT PROCESS & STYLE

The purpose of the next three chapters is to explore the implications of the relationship between three different aspects of organisational process: management process and style, organisation culture type and processes of control, for the performance of the firm. Management, strategy and planning processes mediate between the environment and the organisation, resolving some uncertainties and creating information to navigate others. The management process should ensure that the organisation is responding to changes in its markets, technologies and other environmental factors. IS/IT is one of the key tools in the management process, and may enable superior organisational performance if appropriate to the management process and style in use. Scott Morton (1991) places management processes at the centre of the "MIT 90's Framework":

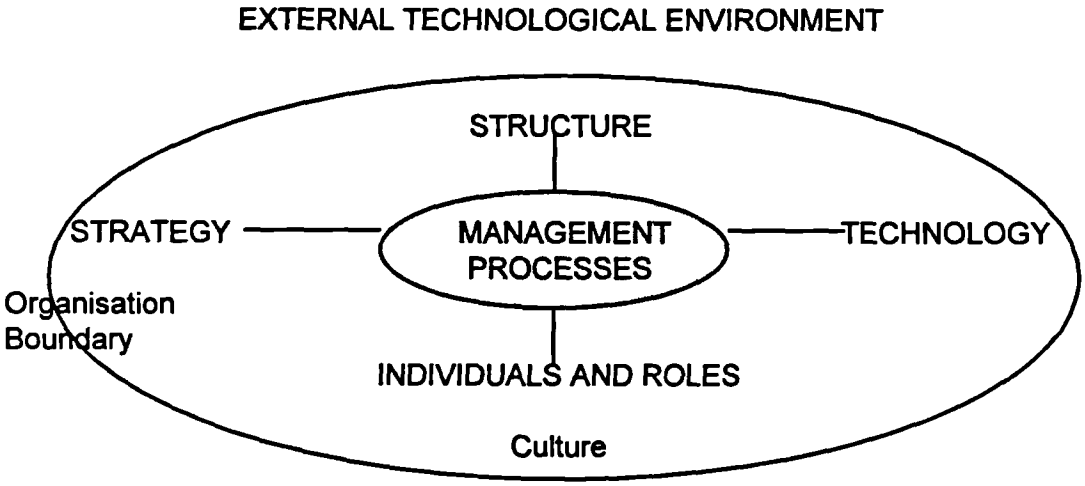



**DIAGRAM 15: THE MIT 90'S FRAMEWORK**

The framework is a static rather than a dynamic model of the process of alignment. A more dynamic model of the way in which the capabilities and strategy of an organisation align themselves with the forces in the environment is necessary to explain the role of IS/IT in organisational performance.

The following quote from Scott Morton (1991) illustrates the impact which IT has had on managerial work, and the centrality of orientation (direction setting), learning and control processes in such work:

"The third IT-enabled change in work is the work done by managers. The principal dimensions of management work that can be most affected are those of direction and control. Direction, as used here, is concerned with sensing changes in the external environment and also with staying in close touch with the organization, its members' ideas and reactions to their views of the environment. Relevant, timely information from these two sources can be crucial input to the organization's direction setting process. This is as true for a sophisticated strategic planning system as for an informal executive support system or customer feedback system.

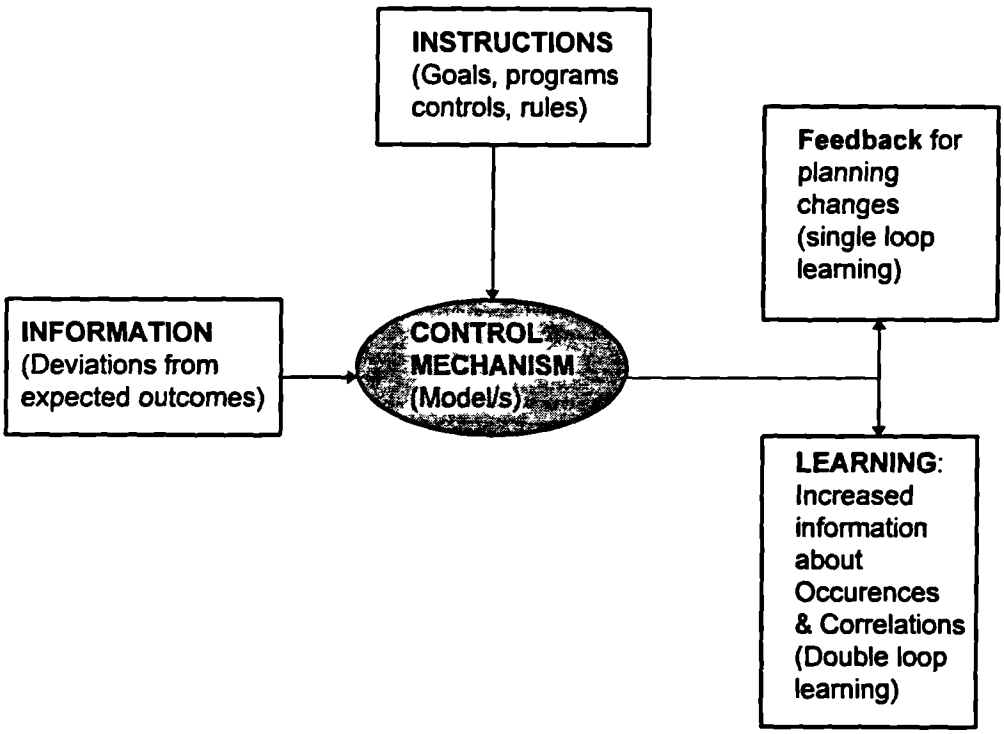
The control dimension of management work has two key aspects for our purposes here. The first is the measurement task, that is measuring the organization's performance along whatever set of critical success factors has been defined as relevant. The second aspect is to interpret such measures against the plan and to determine what actions to take. Effective control is a critical dimension of organizational learning as it feeds back to future direction setting, and both of these can be fundamentally changed by the increasing availability of IT".

## 6.1. DIMENSIONS OF THE MANAGEMENT PROCESS

The classic definition of management consists of three key activities: control, coordination and communication (Barnard, 1938). Later management theorists such as Mintzberg (1973) and Bennis (1990), also recognise other roles which are decisional, informational and authoritative in nature. Control involves both setting objectives and monitoring the outputs of the organization to ensure that they are in conformance with objectives. Coordination involves the scheduling of the actions pursuant to the strategies followed and plans made to achieve the objectives, together with the creation of the infrastructure and provision of the resources necessary to achieve the objectives. Communication of information ensures that plans are implemented; it is the means for management to motivate and direct the staff responsible for carrying out the plan.

Organisations must control the processes which enable them to survive, while adapting to, changing and influencing the dynamic environment. Change and adaptation require orientation by the organisation, while control of the stable operating system critical to the firm's survival requires planning and programming. It is the job of top management to ensure that they have an effective management process and appropriate management style to ensure both adaptation to tomorrow and survival today. Orientation, planning and programming all require information, as illustrated by the following diagram:

**DIAGRAM 16: PROGRAMMING AS A CONTROLLED EXPERIMENT (Ehrlemark, 1984)**




We can distinguish between control at the level of closed systems (which do not change and hence display "single loop learning"), and open systems (which adapt to their environment and hence display "double-loop learning" ) (Argyris, 1976). The evolution of control systems depends upon the ability of organisms and organisations to exhibit double loop learning and hence adapt the control system to the new demands placed on it by changes in the environment. Control systems also need to have greater variety than the

system (open or closed) which they seek to control, according to Ashby's Law of Requisite Variety. (Ashby, 1962). According to Ehrlemark (1984), control mechanisms ("management processes" in this research), have one main purpose:

"...to ensure people (and machines) in the organisation act, in one of three ways:

a. take decisions/actions in the organisation
b. respond appropriately to events/trends in the environment
c. manage the outcomes of the interactions between a and b.

Before or during action, people in organisations can select between particular actions or strategies according to their perception of events and trends in the environment, and what they desire as an outcome.

There is a dialectical process between instructions and information. Instructions indicate a purpose, while information is neutral. Instructions are necessary to provide a basis against which unexpected outcomes can be measured, analysed and used. In controlling programming processes, the alternatives are provided by the limits set by the various capacities of the parts of the organisation which are involved (for example, limits on a particular part of the production process). As such limits are reasonably known and certain, different outcomes can be evaluated according to well structured criteria. Negative feedback regulates such processes within the limits set by internal and external restrictions according to a fixed set of criteria."

Orientation and planning processes, however, are often unstructured. Alternatives are not given, but must be generated; different aspects of the environment must be 'selected'; responses to actions can seldom be predicted with much precision; and outcomes and the criteria by which they are evaluated are unknown and difficult to define.

The control system must therefore be capable of positive or anticipatory feedback- increasing the variety in the system, by creating strategy options out of random disturbances. Such a control system must also be adaptive so that it reduces the uncertainty in the organisation and its environment, while creating sufficient flexibility in the organisation to enable it to preadapt to unpredictable future conditions.

Not all information systems are control systems, but all control systems are information systems, in their purest sense. Although they may be mechanical analog devices, digital software programs or human cognition and action processes, the principle remains the same. Such control systems can be expressed as an algorithm, or reduced to a set or rules for human conduct and decision- making.

Gleick (1987) states that control has three elements, all of which must be present in some form if control is to mean anything in a change situation. These control elements are:

a. goal (or purpose) and path selection; ("instructions" in diagram 16)

b. progress checks; ("information" in diagram 16)

c. corrective action; ("single and double loop learning" in diagram 16).

Information systems can operationalise the mental models of the world we use to control our environment and ourselves, and provide the feedback we get from the environment and ourselves as to the reference levels of key parameters in those models. We also get feedback on the results of the actions we take to alter our environment and ourselves in this way.

Information plays a critical role in both the construction of models and their use. We need accurate information about the behaviour of the system we wish to model, in order to construct a model. Once such a model is constructed, we feed selected information about the external world into the model in order to observe the behaviour which the model "predicts". Imagination and dreams work roughly in the same way, though their raw material is imagery and feelings rather than facts or figures. Our subconscious minds process such intuitive information and reorganise it, so that our "global model" is continuously updated, as it is fed by the information of first-hand experience.

In this research we will be using these definitions of control processes to evaluate the management processes in each of the participating organisations. Management processes and control systems are the outcome of the double loop learning process illustrated in diagram 16 above.

## 6.2. LEARNING ENABLES CONTROL

Models are created through learning: first, the elements of the model are acquired, then the relationships between the elements are established. Control of the system which has been modelled is then possible, providing the system elements and relationships do not change substantially. Learning operates at three levels:

- imitative learning is based upon repetition and reinforcement- just slightly more sophisticated than conditioning. At its this level, managers "model" themselves on the behaviour of role models, or assimilate their models and understanding of the world. Much of management's formal education takes place at this level.

- at a higher level, adaptive learning takes place- managers learn through experience, trial and error. Handy's (1990) wheel of learning contains four stages: question, theory, test and reflection. Changes in behaviour and physical form are possible through either trial and error learning (real world experience or "heuristics") or formal learning (an understanding of the known world gained through the codified experience of others). Handy's (1990) definition of the learning organisation as both an organisation which learns and which encourages learning in its people, operates at this level.

- in generative learning, managers continually expand their capacity to create their future, (Senge, 1990) and (Hodgson, 1988). Creativity and

systems thinking are emphasised in this approach, which identifies five disciplines central to a learning organisation: personal mastery, mental modelling, shared vision, team learning and systems thinking (the "fifth discipline"). Such an approach creates new knowledge using both analysis and synthesis. "Provocative operations" enable us to go beyond trial and error and formal learning: we can "try something out", experiment, "see what happens if", and so on. Such behaviour is natural in good managers, and tests the validity of the models they use to explain and act upon the world. When managerial model/s of the world cease to explain it, they can adapt or change their models, which in turn leads to a change in behaviour.

The primary role of an organisation's management process and style is to bring about alignment between the organisation's strategic situation and its organisational processes of learning and control. In a complex, dynamic situation, adaptive and generative learning by the management team are more important than imitative learning, while the reverse may be true in simple, stable situations.

## 6.3. MANAGEMENT PROCESSES: BALANCING PLANNING WITH OPPORTUNISM

The management process should be aligned to the situation an organisation finds itself in. Stacey (1990) differentiates between three different change situations: closed, contained and open. As illustrated in diagram 17, these three situations are present in most organisations to varying degrees. Pure control systems involve single loop learning (or feedback), while adaptive systems require double loop learning (Argyris, 1965) The implications of each of these situations for control is as follows:

**Closed Situations**

In closed change situations constant variable sets and parameters mean that all the elements of control have precise meanings. Goals become precise objectives which are comprehensive and clear cut. The paths to be taken to acheive those objectives can take the form of detailed action plans with reliably predicted outcomes. Precise objectives and reliable forecasts become a plan. Checking on progress is a precise, quantitative comparison of actual events against outcomes, yielding variances. Corrective action is simply a response to the variance to get back on to the predicted outcome path. The prime requirement of this form of control is attention to detailed and precise planning using regular monitoring.

**Contained Situations**

The nature of the contained change situation, with its higher degree of variable and parameter volatility, means that the elements of control cannot be so precisely defined. Goals may still be firm, fixed and quantitative, but these are likely to be far less detailed and supplemented by more qualitative missions. The paths which are to be taken to achieve the goals and missions become more uncertain, because forecasting is less reliable and it is somewhat harder to specify the causal connection between any action and its outcome. Less detailed goals, qualitative mission statements and generalized actions constitute a strategic plan, a grand design to be followed by the business.

The difficulty in specifying causal connections creates real problems for the control element of checking on progress. Does an unforeseen outcome mean that we are no longer on path to the objective? We cannot be sure- there is some confusion about what action is appropriate in this situation. The form of control in this situation can be characterised as control by grand design, based upon planning and goal/mission setting, although the rest of the control activity is more vague due to uncertainty in the environment.

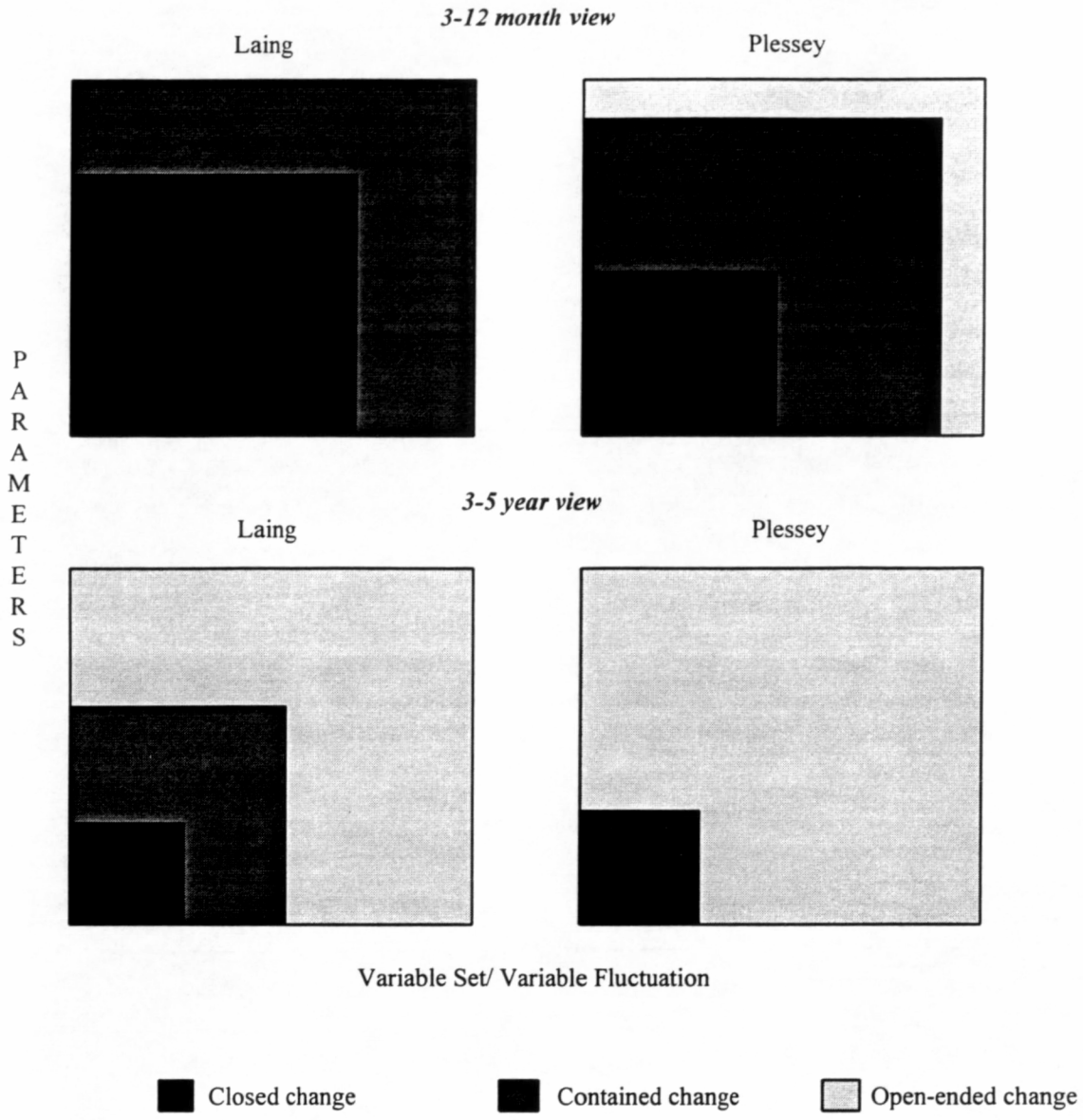
**Open-ended Situations**

The problems of control in open-ended situations are compounded- it is difficult to identify the issues; the variable set is highly volatile. One cannot forecast with any degree of reliability- the parameters are highly volatile. There is thus not much point in setting fixed objectives, or overall goals and future missions. Purpose becomes tentative, and may have to be changed as we go along. The path to the goal cannot be specified in advance; it must be clarified by experimentation, trial and error.

Monitoring, in the sense of detecting, understanding and paying attention to change becomes the most difficult yet most important part of the whole control process. The detection of change and identification of single issues which can be monitored, becomes the key monitoring activity- progress checking has limited meaning as one cannot create a reliable template against which progress can be checked.

Planning in the sense of predicting change and setting clear objectives and paths to them, becomes impossible. Planning as learning becomes essential- responses to single issues and scenarios must be tried out experimentally; the focus turns to agreeing areas of competence and operation, sets of values and senses of direction within which experimentation can take place.

**DIAGRAM 17: CLOSED, CONTAINED AND OPEN-ENDED CHANGE SITUATIONS (Stacey, 1990)**




Yet control by experimentation is not a contradiction: there is purpose, though tentative; there is an approach to achieving the objective, though experimental; there is a check on progress, though it may only be a judgement on the outcome of the experiment so far. And there is corrective action, though it may only be a decision to continue with the experiment, try another one, or abandon the whole thing.

It must be stressed that the form of control appropriate to closed change situations is diametrically opposite to that appropriate to open-ended change situations: the latter is about intuitive opportunism (Stacey, 1990), the former

about analytical planning or determinism. Yet most businesses must deal with a spectrum of change situations from closed to open-ended. Control thus becomes, in the words of Stacey:

" a balancing act between planning and opportunism, a continuing attempt to to resolve the tension created by the need to apply two diametrically opposed forms of control simultaneously".

A central question in this research is: would the nature of the information systems which would be appropriate across the spectrum from closed to open-ended change clearly have to be different to optimise organisational performance? For example, would closed change situations favour formal, centralised systems which could utilise advantages of scale; would open-ended change situations favour a variety of small, "skunkworks" type systems which could be easily adapted and experimented with? We need to explore in greater depth the implications of the different change situations for IS/IT and its influence on organisational performance, particularly as most organisations are faced with a combination of closed, contained and open-ended change situations. It is also essential to examine the implications of such a combination for the management of the internal and external environments in an organisation, as some core infrastructure and operating systems in large organisations requires stability, while responses to events at the periphery may require flexibility.

Most organisations have to strike a balance between controlling the stable operating system upon which they depend for their survival, and adapting to, changing and/or influencing the dynamic environment which surrounds them. Management takes primary responsibility for the control of the stable operating system, and this is the sense in which the word is traditionally used, particularly in relation to continuous, batch and bespoke production processes, where control is paramount to productivity. Management must also ensure that the organisation is adapting to changing circumstances,

however. Such adaptation requires the loosening of management control systems and the models upon which they are based, so that the models and processes can be changed.

This presents us with a "paradox of control" (a corollary of the principle of requisite variety): the more elaborate the control system, the more effort it requires to change it. One would also expect control systems to be elaborate if the processes which they control are themselves highly complex. Complex organisational structures would also tend to make control systems more complex. So, ultimately, a great degree of control may mean an inability to adapt, learn or innovate fast enough.

## 6.4. MANAGEMENT CONTROL STYLE

Goold and Campbell (1987) devised a way of demonstrating the tensions between different management control styles, using five criteria, as set out below, to which this author has added a sixth: objectives (short and long term). Stacey (1991) used the basic form of this method to develop a much wider framework within which the nature of the political and method tensions in an organisation could be identified, to which we will return later in the section on processes of control.

Goold and Campbell focus more on the top management style, as the high-level nature of their interviews in the 16 organisations they researched suggests. This is the focus which we will use for this management style section, where we will be investigating the style of the top 20 to 50 managers in the participating organisations. Goold and Campbell's management style criteria are as follows:

a. Management of Overlap: Clear Responsibilities vs Multiple Perspectives- are objectives and activities assigned to specific individuals according to their function and/or speciality, or are all senior managers encouraged to look at

and take responsibility for groups of objectives and activities on a cross functional basis?

b. Nature of Planning Processes: Detailed Reviews vs Entrepreneurial Decisionmaking- are planning processes characterised by a high level of detailed review, or are individual managers encouraged to make many entrepreneurial decisions within an agreed framework?

c. Leadership Style (Themes, Thrusts and Suggestions): Strong Leadership vs Business Autonomy- does senior management exercise much influence in direction setting through, for example, group themes, thrusts and suggestions about quality or specific product/market areas, or are individual business units encouraged to develop their own directions within an agreed framework? What level of involvement does senior management prefer in operating company strategic decisionmaking?

d. Objectives: Long-Term vs Short-Term- are the objectives of the business set several years into the future (for example, five years and longer), or do you operate largely on shorter-term objectives (for example, one to two years).

e. Controls: Tight Controls vs Flexible Strategies- does senior management emphasise tight control over more flexible strategies for the organisation and its operating units?

f. Resource Allocation: Long-Term Strategies vs Short-Term Payback- is the bulk of the resource of the firm being allocated to a few long-term, large projects/areas, or is it being allocated to many small, short- payback projects?

The tensions between these criteria are resolved in different ways in the strategic planning, strategic control and financial control styles. What matters is the achievement of the right balance between these tensions in a particular set of business circumstances. For example, a financial control style is suitable in a relatively mature, low technology business where high market share and entry barriers are typical. In this situation a few simple measures may enable management to pursue short term financial objectives in an entrepreneurial way with clear responsibilities for each manager, a high level of business autonomy and tight controls for those particular measures.

In a strategic planning style, however, the response to a highly dynamic and complex environment and competitive game is to use many measures with detailed planning reviews, strong leadership, long term strategic objectives and flexible strategies. This complexity requires multiple perspectives and coordination rather than the clear responsibilities in a financial control business. The strategic control style is a mix of these two extremes, as illustrated in diagram 18. Due to the tensions described above, each style adds value in some ways and subtracts it in others- none of them is inherently the best. Whatever the advantages and disadvantages of a particular style, it must enable the centre to add more value than the capital markets could. Diagram 19 illustrates the correspondence between the different mechanisms for influencing strategy and the types of tensions between different management styles.

The implications of management style for information systems and technology in a business are significant in their own right. Of the five MOPIT variables, management style is perhaps the most dominant. Management style is a major driver of organisation type, processes of control, information and performance measures and technologies for information management. It should therefore be in the vanguard of change in an organisation, moving in the direction management wish the rest of the organisation to be heading.

Goold and Campbell's management style measures will be used to provide the "hard" measure for the M variable in MOPIT.

**DIAGRAM 18: MANAGEMENT STYLES & TENSIONS- (GOOLD & CAMPBELL, 1987)**

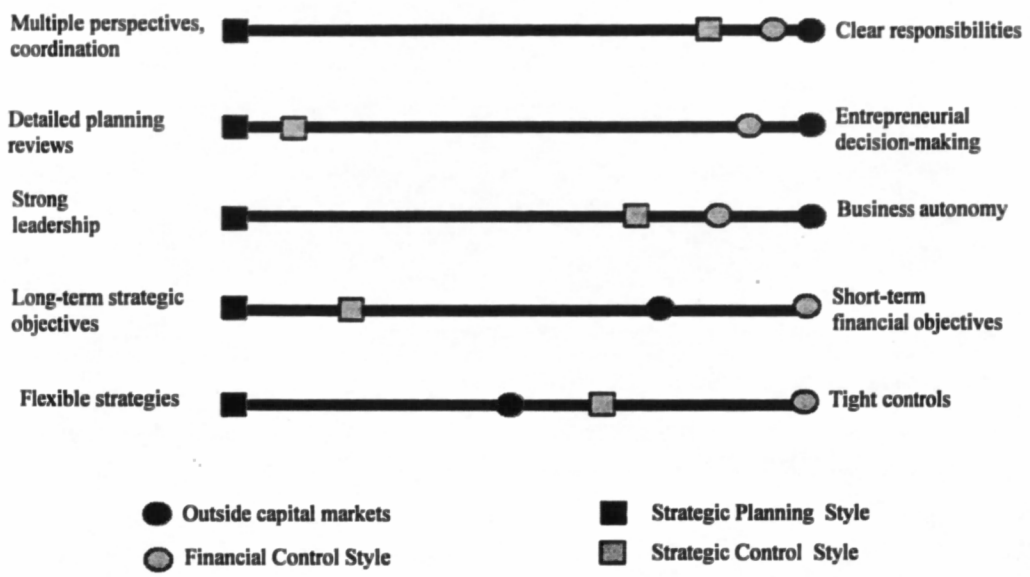



**DIAGRAM 19: MECHANISMS FOR INFLUENCING STRATEGY AND CORRESPONDING MANAGEMENT STYLE TENSIONS**

| Mechanisms for influencing strategy | Corresponding tensions |
|---|---|
| 1 Organisation structure & management of overlaps | Multiple perspectives & coordination vs clear responsibilities |
| 2. Planning process | Detailed planning reviews vs Entrepreneurial decision-making |
| 3 Central themes, thrusts & suggestions | Strong leadership vs business autonomy |
| 4. Resource allocation & objective setting | Long-term strategic vs short-term financial objectives |
| 5. Monitoring of progress, incentives and functions | Flexible strategies vs tight controls |

## 6.5. STRATEGIC MANAGEMENT, CONTROL & PLANNING PROCESSES

We need to understand the process of strategic management, planning and control in the organisations participating in this research to appreciate the role of IS/IT in making such processes beneficial or harmful to the organisation, together with the effect of these processes on organisational performance. As Mintzberg points out (personal communication, 1990), "strategic planning" is an oxymoron: strategies are typically fluid, emerging out of rapidly changing situations. Planning processes and systems are usually alot more cumbersome and formal: the five-year plan produced by the annual planning exercise can often look very out of date by mid-year.

"Top-down" and "bottom-up" planning processes traditionally take a long time, though networking and IT are reducing the cycle times of such processes. It is increasingly likely in many firms, however, that planning and strategy are far removed from one another, due to the slow reaction times of large planning systems. Nonetheless, long range planning is still essential, as the increasingly large sums invested and risks taken in global marketplaces require ever longer term commitments by firms to particular technologies, countries and business areas.

Some ways of making strategy are more flexible than others. The structure of an organization and the nature of its internal processes determine just how flexible the process for making strategy can be. A large, highly formalised bureaucracy is much less flexible and adaptive than a small entrepreneurial firm. Over time, those firms which are flexible enough to adapt to rapidly changing, dynamic environments, will outlive those which fail to adapt due to their inflexibility.

Some ways of making strategy are better adapted than others to dynamic environments. Because the exchange of information between an organization and its environment, and between the various parts of the

organization are crucial to the survival of the organization, the rate of exchange, quality, diversity and comprehensiveness of the information being exchanged must be appropriate to the context in which that organization operates. In a stable environment, a steady, average quality, narrow range of information may be sufficient. In a dynamic environment however, rapid exchange of high quality, comprehensive information becomes essential in order to anticipate and respond quickly to competitor, client and regulatory threats and demands.

The fields of strategic management, strategic planning and strategic control evolved in response to the tension between the need for effective management of an organisation in the present, and adaptation by organisations to changes in their environments in the future. IS/IT plays a role in:

- enabling an organisation's operations to be managed more effectively, and in facilitating the adaptation of organisations to changes in their environments
- the processes of control and learning/adaptation which are implied in strategic management, planning and control.

### 6.5.1. STRATEGY & STRATEGIC MANAGEMENT

Strategy is:

"the logic which guides the process by which an organization adapts to its external environment... The key to developing organizations is to drive both strategy and capability together, and the degree to which this can be successfully done relies upon achieving simultaneous progress on the following fronts:

1. The drive and skills of key managers
2. The aspirations of the other influential stakeholders in the firm.
3. The power structure within which they interact.
4. The culture of the organization.
5. The problem-solving competence of the organization, which in turn, is embodied in the systems and structure" (Ansoff, 1987).

Makridakis et al (1983) point out that strategy is concerned with two simultaneous and seemingly contradictory types of behaviour: (a) dominance over existing competitors and (b) ability to deal with environmental changes. The former requires specialisation, the latter generalism: differentiation (niche) and low cost (scale) strategies respectively.

Strategic management describes:

"The overall process of formulating and implementing goals, policies and plans of organizational strategy" (Quinn, Mintzberg and James, 1988).

The strategic management, planning and control processes mediate between the external and internal environments of the firm. A firm may have great aspirations (based upon the grand ideas of a visionary founder, for example), but it will be limited to what it can actually do by its inherent capability, the capabilities of its rivals, and other constraints on it. Such capability is enhanced by the driving forces in an organisation, and limited by the inertial forces which exist in all organisations and social systems.

External stakeholders such as shareholders, financiers and governments can set the agenda for an organisation's strategy. Simple goals will tend to characterise such an agenda (such as profitability, return on investment, or other qualitative criteria such as value-for-money or achievement of a specific mission). Strategic managers juggle the requirements of their external stakeholders, the aspirations of their internal stakeholders and the threats/opportunities/legitimizing forces in the environment.

A strategic agenda is formed in either a formal or informal fashion, which clarifies goals and the means of achieving them, sets priorities, and possibly, makes breakthroughs in the way the business is perceived and managed. Strategy evolves as a result of the perception of needs and formation of aspirations shaped by the driving forces and environmental forces operating

on strategic managers. The pace of evolution of the capability in an organisation will set the pace at which such a strategy can be implemented.

Suppliers, customers, competitors, industry and business trends, technologies and materials, economics and politics (at global, regional, national and local levels) all play a role in the evolution of both threats and opportunities and legitimizing forces in the firm's external environment.

It is clear that strategies are mental maps/models of the organisation, its environment and future, and the way in which they interrelate, while plans are a method of scheduling the way in which the action components of strategies are implemented. Strategies as described by Mintzberg (1984) can also be maps/models of patterns of past behaviour as interpreted in the present. Such strategies are historic in nature, even though they may still be in operation in the present or extend into the future.

In this sense there is much to learn from history, in order to avoid making the same mistakes with future strategies as we did with past strategies. For this to occur, we must be able to correctly identify past situations as similar to those we encounter in the present and future. Having done this, we must also be able to define the elements in past behaviour and the situation in which such behaviour occurred, which led to desirable or undesirable outcomes. Such causal reasoning depends upon knowledge gained through experience, logic and intuition.

Information systems (both formal and informal) are essential providers of information which enable the clarification of our current situation ("where we are now"), our past situation ("where we have come from") and the future situation ("where we are going to"). We can only define future desirable situations and outcomes with reference to past or present desirable states or extrapolations of those states. We then require proof/evidence that a

particular set/sequence of behaviours ("a strategy") is likely to continue a present desirable state and or improve upon this state, or lead us out of an undesirable situation to a more desirable state.

Once we have selected the strategy/ies (whether consciously or subconsciously, formally or informally) which will lead us to the future desirable state, we then create a plan which schedules the behaviour called for by the strategy. Such a plan must be controlled- in other words, we must not only ensure that it is implemented, but that it is implemented in the way we intended it to be, with the desired results. So planning implies the control of future behaviour and outcomes. Information systems are used predominantly to measure the past, however, though computers can be used to simulate and schedule actions (behaviour) in the future, as well as to monitor behaviour in real-time.

Mintzberg and Waters (1983) asked the question: "How do strategies form in organizations?", and developed the terms `emergent' and `deliberate' strategies to describe different patterns in a stream of decisions. Planning creates deliberate strategies, which are therefore intended. Not all intended plans are realised, however. Emergent strategies emerge in the absence of specific intentions, and can often only be recognised once they have been realised.

### 6.5.2. STRATEGIC CONTROL

Strategic control (Goold and Quinn, 1990) , has emerged as a method of controlling the key factors which influence the performance of a business. Strategic control systems impose extensive and often complex information requirements in a business. Many of these information requirements are carried out by computer-based systems. Goold and Quinn emphasise that the nature of the optimal control systems for a company is dependant upon the underlying nature of the businesses of that company. Strategic control

systems form a natural extension to financial control and strategic planning systems. Such control systems can either be formal (capable of expression in symbolic form), or informal. Formal systems again split into computer-based systems and paper-based systems.

All organisations must control those variables which are essential to their survival. Such variables can be grouped into six categories: people, value-chain configuration, organisational structure, organisational characteristics, products/ markets and controls/systems.

Some control variables are not critical to survival- for example, managers may have to decide what colour carpets they have in the office, but such a variable is not "mission-critical". A few of the variables, however, will probably be critical, such as market share, relative quality or organisational responsiveness. Such external ("critical success factors") and internal ("mission critical variables") factors make the difference between success and failure, and are often sources of advantage in an industry, improving strategic position and earnings potential.

Control systems measure and influence many of the variables in an organisation, though never all. Whether the organisation's control systems actually measure those variables which are mission critical will determine how effective such control systems are in aiding the viability of the firm. Such systems can be reactive, real-time or anticipatory in nature. The strategy, capability and operations behaviour of a firm all influence which variables will be considered mission critical in a firm. Which variables are mission critical may also be debatable, and differ between the various parts of an organisation.

Strategic control forms the key to strategic management, based upon control systems which measure and influence the mission critical control variables in

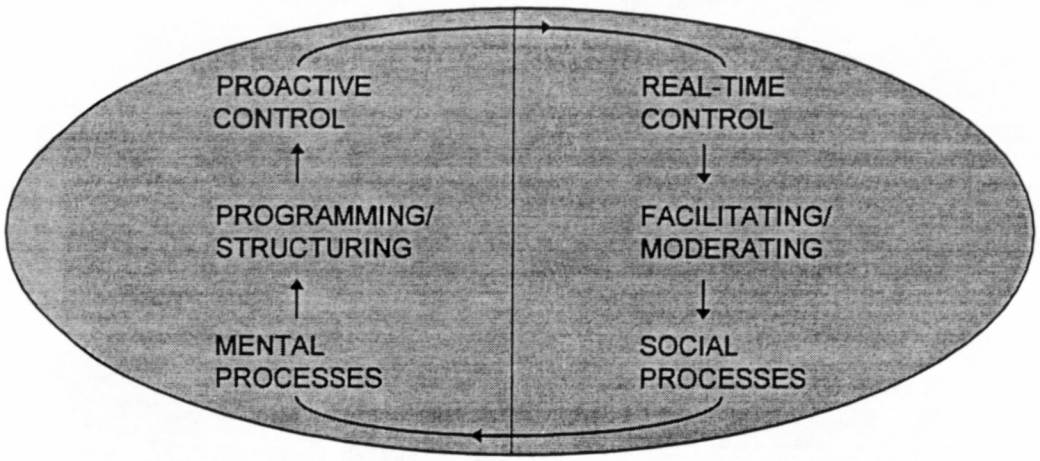
a company. Control variables and systems monitor and regulate the value-chain configuration, the organisational structure and processes and the strategic control process according to the goals of the firm's strategy. The organisation's internal environment comprises not only the economic processes represented by the value-chain configuration, but also the political/social processes which codify and diffuse information and knowledge in the organisation, regulating the interaction of organisational members.

The organisation can only control entities and processes within its control space. The limits of the control space are often represented by the organisation's boundary. (Though IT can sometimes extend the boundary to include aspects of other firms- the SABRE airline system, or the Marks & Spencer ordering and delivery system). New control variables may be introduced if the firm can expand its control space- for example, by acquiring a competitor or by successful lobbying of a regulatory government agency for freedom to expand its activities into areas which were previously prohibited to it.

Progress (beneficial change), in an organisation is driven by strategic managers who interact with other internal stakeholders (such as other managers, directors, executive/employee shareholders, employees and unions) in a power structure. Managers control the resources and processes of a firm through culture and systems, which make use of particular skills and technologies. Each manager or group of managers have a management control style, which is a function of their role and individual cognitive style. This control style will be influenced by the type of systems and the culture in operation in a firm, and will be effective if appropriate to such systems and culture.

Schwaninger (1987) deals with the principles of laying out effective methods for strategy development, demonstrating the interconnections between different methods such as proactive and real-time control systems:

**DIAGRAM 20: THE FUNCTION OF PROACTIVE & REAL-TIME CONTROL IN STRATEGY (SCHWANINGER)**




Simons (1987) equates control with strategy formation and planning with strategy implementation. (This fits with Mintzberg's learning and programming functions of strategy. In other words, strategy formation is a learning process, while strategy implementation is a programming process). As diagram 21 shows, this inverts the traditional relationship between strategy formation and planning.Simons says:

"Control systems, in setting boundaries and fostering daily interactions around business problems, have as much to do with strategy formation as they do with strategy implementation. The challenge for managers is to choose from the control system "menu" and use these systems to harness organisational attention".

In making his observations on the relationship between strategy and planning and control, Simons differentiates between two types of control: diagnostic and interactive. These categories are similar to Schwaninger's real-time and proactive functions. The real-time and diagnostic functions are driven by feedback as illustrated in diagram 22, which is analogous to

Schwaninger's strategy development process in diagram 20, if one includes learning and mental processes as part of the feedback process.

DIAGRAM 21: STRATEGIC CONTROL AS A FEEDBACK PROCESS (SIMONS)

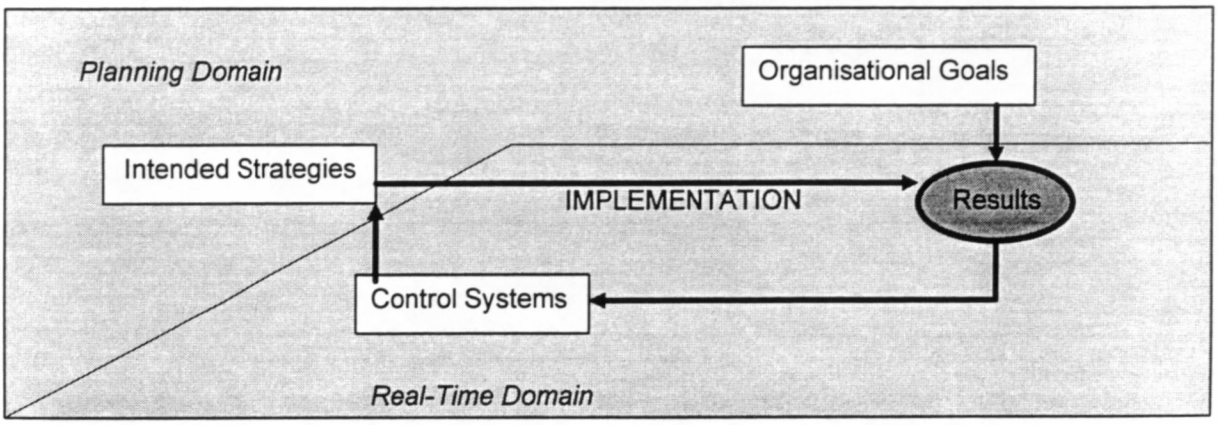
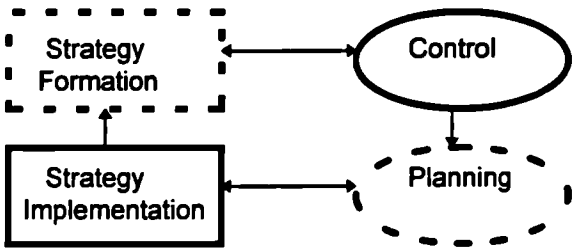
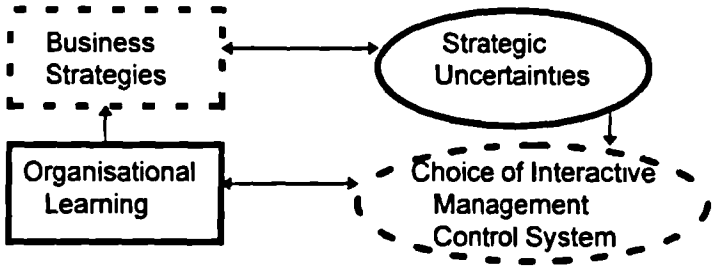



DIAGRAM 22: SIMONS' MODEL OF THE RELATIONSHIP BETWEEN STRATEGY AND PLANNING AND CONTROL




In diagram 23, Simons demonstrates how the inclusion of learning turns the traditional control model on its head: interactive controls allow learning to take place, rather than simply acting as diagnostic tools in a static system. The choice of the interactive control system will therefore be a function of the nature of the strategic uncertainties facing the organisation, and the organisation's business strategies. This has important implications for information systems, which can be set up both as diagnostic and interactive control systems, the former emphasising control, the latter emphasising learning.

DIAGRAM 23: INTERACTIVE CONTROL AND LEARNING (Simons)




Simons contrasts the diagnostic control model with the interactive control model, which he illustrates in a similar fashion as Mintzberg's learning model. Interactive controls focus on the formation of tomorrow's strategies while diagnostic controls focus on the implementation of yesterday's strategies. Schwaninger emphasises that: "Strategy development is the management of knowledge-gaining processes", echoing Argyris and Schon (1976). Controls are both the product of and processors of information. The model which exercises control is itself learned, while the information about the environment and system interacting with it is acquired, processed, but not necessarily retained. Information acquisition and processing may trigger a change in a model, resulting in learning and adaptation. Information is thus central to both control, planning, change and adaptation.

Stacey (1991) applies recent discoveries about dynamic systems centred around chaos and self-organisation, to management. Stacey challenges the mental models managers use to design their actions, which are based upon assumptions of stability and predictability in the world. He suggests that a creative learning model of strategic control, based upon scientific chaos theory, is more relevant to the turbulent conditions prevalent in many businesses today. In such conditions innovation and change management are crucial. Stacey focusses on the importance of conflict, creative tension and contradiction in fostering the flexibility, responsiveness and requisite variety needed in fast changing conditions. Such a creative model provides

a perspective from which goals and strategies are seen to emerge from political interaction and organisational learning.

Interactive controls are most suitable in a complex, dynamic environment, where patterns of change are emergent rather than predictable. Goals and strategies emerge from political interaction and organisational learning, in a process which is unpredictable, creative and spontaneous, depending as much on chance as on management initiative. Chaotic dynamics provide a framework for creatively controlling an organisation in turbulent environments.In such turbulent environments, organisations and their information systems should:

- "control the short-term future using rational control models
- respond to an unknowable long-term future by recognising qualitatively similar patterns in the environment and organisation, and use these to develop new mental models which enable creative/innovative responses
- recognise that small changes can escalate into both vicious and virtuous circles, and that much of this process may be influenced by chance. To survive through such processes, the organisation must be capable of dealing creatively with whatever happens
- recognise that as a result, there are few clear cause and effect links in what happens in the business, but that this is the reason creativity and innovation are both necessary and possible". (Stacey, 1991)

Unpredictable environments require open organic organisations to learn by experimentation and innovation, with constantly changing managerial paradigms amd models. Learning and controlling feedback loops handle open-ended change, so that the organisation can learn about what, why and how simultaneously, enabling it to learn how to discover, choose and act. In such open-ended situations, learning is about questioning the retained memory of the organisation.

The implications of this open-ended process for control and the importance of process versus outcomes is that businesses must simultaneously combine

planning for the closed-ended short term and opportunistic experimentation and learning for the open-ended longer term (Stacey,1990). Since these modes of behaviour are so different and place diametrically opposed requirements on organisations and individuals, combining them creates a fundamental strategic problem. The choice an organisation makes to resolve this problem is its control style. Style is a set of hard choices which have to be made continuously to sustain effective behaviour, balancing the right levels of control and learning in a situation. This implies choices about structures, systems, roles, behaviours and processes.

Tension arises in organisations between the need to control and the need to learn- both require different control styles and forms. Organisations need to strike a balance between these needs, in the full knowledge that improvement in one form of control exacts a price in terms of the diminished effectiveness of the other. Strategic issues generated by open-ended change situations also tend to disrupt any balance which management has struck between the extremes of the control tensions, requiring a new balance to be struck. The role of the management process is to resolve tensions between the sets of forces at work in all organisations between the ideal requirements of control in closed situations and in open-ended situations. (Stacey, 1990).

### 6.5.3. STRATEGIC PLANNING

As we have seen, control systems can be either reactive or proactive (anticipatory)- reactive control systems measure the past and present, such as financial control systems. Planning systems are the proactive (anticipatory) subset of control systems which are in turn a subset of information systems, which provide both real-time information and feedback and anticipatory information and feedforward about the immediate and known worlds. Planning systems generate and refine strategies, and

strategies are then implemented using specific plans which are generated by the planning system.

Planning is a deliberate attempt to anticipate and control distant events, actions and outcomes. Such distance is due to time (the events, actions and/or outcomes are in the future), and (possibly), space- events, actions and/or outcomes need to be anticipated and controlled in a distant location. This should be contrasted with management, which is an attempt to control events, actions and outcomes at a distance in real-time. Bennis (1968) expresses his idea of the future as:

"An exercise of the imagination which allows us to compete with and outwit future events. Controlling the anticipated future is, in addition, a social invention that legitimizes the process of forward planning...most importantly, the future is a conscious dream, a set of imaginative hypotheses".

Sims and Eden (1984) devised a map of planning to illustrate the different approaches to the future. Sims and Eden's approach aims to surface the assumptions we all have about the future, using cognitive maps or rational learning models to do so. The key difference between the linear and non-linear planning approaches is that the former relies more upon the left brain while the latter relies upon the right brain.

How do planning systems contribute to strategic control and organisational performance? And what type of information systems are associated with superior strategic control and performance? In order to answer these questions, we need to understand the nature, context and characteristics of planning systems as they operate in different organisations with different characteristics.

We have suggested that action and information systems intermediate between the economic, organisational and personal variables which influence success or failure according to specific performance measures.

Such systems can either be reactive (based upon feedback) or anticipatory (based upon feedforward). Organisational planning and financial systems contain the performance measures worked out in feedforward mode. Such anticipatory control systems should be designed in accordance with conclusions reached by strategic thinking in the organisation.

The really vital information in an organisation relates to the orientation of the organisation to the future. Such information may be non-obvious and often difficult to obtain. Orientating information must be interpreted against the background of the deep experience of managers and workers in a firm and industry. Knowledge and assumptions about the world in which the firm operates and the way in which it operates must be challenged. The processes of planning and strategy development take place against a background of uncertainty, incomplete information and ex-post rationalisation. Intuition and rationality are equally important in such processes. Both 'hard' and 'soft' information play a role in orientating behaviour. The highest information payoff is often one where a surprising outcome is reached through a combination of guesswork, imagination and hard analysis.

Information is thus simultaneously unpredictable and plannable. Information about systematic elements of an organisation can itself be systematised and planned for. The control of the stable operating system in an organisation is one example. Unpredictable events generate unexpected information, which must be captured by unorthodox means. Such information cannot itself be planned for, but an infrastructure capable of recognising it can be created.

Such an information infrastructure includes both the planning systems and information systems in an organisation. This infrastructure provides the control mechanism which maintains stability in the operational core while allowing or even generating variety at other levels in the organisation.

Strategy formation processes are one of the ways in which such variety can be created. Information and control systems play a vital role in both successful planning and strategy-making processes.

## 6.6. SUMMARY

The management process and style approaches set out above are a major step forward in thinking about organisational behaviour and performance, particularly in the recognition that management can have as great an influence on performance and structure as external variables. These approaches also explain how management styles evolve from contextual variables such as the size, number and diversity of businesses in a company, the nature of the markets in which they operate, the size and time horizons of the capital invesments made by the businesses, and the personalities of the senior management.

IS contributes to organisational performance by enabling value to be added in human activity systems. Such value-added is created and experienced within a consensual domain at social and organisational levels, through the creation of shared mental models. The consensual domain and mental models can be represented, modelled/ simulated and communicated using formal information systems. In the ideal world, IS enables the consensual domain to be focussed around the natural agenda in an organisation, which addresses the real issues, concerns and intent of dominant coalitions or situational leaders.

Provided such concerns and intent deal with the key challenges facing an organisation in both its current and future environments, IS then forms an essential component of the management and change processes which enable the organisation to adapt to changes in its environment. Of course the reverse may be true, and IS may be part of the straitjacket preventing organisational change- this is more likely to occur where the concerns and

intent reflected in and communicated by the IS bear little resemblance to the key challenges the organisation faces in its current and future environments.

In this model, management processes and styles mediate between four different types of control systems:

1. orientation (which creates models/maps of the organisation and its context, enabling organisational vision, mission and objectives to be established and monitored);
2. planning systems (which anticipate future states of the organisation and its environment, prescribing goals and strategies/actions to achieve organisational objectives);
3. programming systems (which schedule and coordinate the actions and resources required to achieve the objectives);
4. monitoring systems (which monitor the state of the operations process).

One of the primary functions of the management process is to constructively manage the tension between the:

- high-control/low learning management style required in some parts of the organisation for relatively simple/stable situations to maintain a stable operating core, and the
- high-learning/low control management style required for more turbulent parts of the environment and the processes of strategic adaptation to environmental changes.

There are three types of situation which require different management process and style approaches in an organisation:

a. the closed (little change, simple, stable) situation where change is largely random and reactive behaviour is sufficient for viability; the dominant mindset

reflects the emphasis on programming the organisation as a machine; the organisation is characterised by reflexive systems, machine bureaucratic structure and control by variance;

b. the contained change (simple dynamic and complex stable) situations where change is systematic/predictable and proactive behaviour is required for viability; the dominant mindset reflects the emphasis on planning for the future design of the organisation; such an organisation is characterised by planning approaches, simple/professional bureaucratic structure and control by design;

c. the open change (complex, dynamic (or turbulent)) situation where change is emergent/unpredictable, and creative behaviour is required for viability; the dominant mindset reflects the emphasis on orientation of the organisation in unfamiliar, often new surroundings; such an organisation is characterised by innovation/expeditionary marketing approaches, adhocracies and network structures and control by experiment.

Most organisations operate in more than one of these situation types. In other words, some parts of an organisation may be operating in simple stable situations, while others may be in turbulent situations. This clearly creates tensions in such an organisation, particularly in the management style. An organisation may, however, be characterised by the dominant situation it finds itself in, in which case one could typify its situation as one of the three mentioned above.

The financial control management style tends to be characterised by reactive behaviour and control by variance, while strategic control and planning management styles are associated with proactive behaviour. The management style literature does not deal with the creative behaviour model. The organisation type most closely associated with the reactive approach is

mechanistic closed, while the proactive approach would be associated more often with mechanistic open and organic closed organisations. A close association between the creative approach and the open organic organisation type appears to exist, due to the openness and flexibility required for creativity and innovation.

If the way in which information is managed is aligned to the dominant situation, management process/style, organisation type and processes of control in and around an organisation, then the organisation should experience superior performance in the longer term. The key to this superior performance would then lie in the hands of management, the way in which they establish and maintain their management process and style, and the appropriateness of the IT/IS used in the control systems they create and use.

Let us now examine the role which organisational culture, structure and process play in performance, and the links between IT/IS, performance, and these three aspects of the organisation.

# 7. ORGANISATION STRUCTURE, CULTURE, & PROCESS

In chapter 7 we start by reviewing the four Mintzberg organisational forms, and the way in which work is regulated in each of them. We then explore the way in which Boisot's (1987) information handling strategies give rise to different organisational cultures, through the processes of information codification and diffusion. Each of these cultures (fiefdoms, bureacracies, markets and clans) is then linked to Mintzberg's organisational structures (simple structure, machine bureaucracy, adhocracy/divisionalised form and professional bureaucracy). The evolution of organisations around specific technologies from innovators, to processors, to integrators, and the way in which this process creates selectors, is explored for its IT/IS implications using the codification/diffusion processes.

A way of measuring organisational structure, culture and process for its alignment with the other ENFMOPIT variables is then suggested.

# 7. ORGANISATION STRUCTURE, CULTURE & PROCESS

Organisational structure, culture and process evolve together following the principles explained in chapter 2. What we will explore in this chapter is how we can measure these variables to establish a reference point for alignment with the other seven ENFMOPIT variables.

Let us first briefly review the different aspects of organisational culture, structure and process, starting with Mintzberg's classic organisational theory.

## 7.1. STRUCTURE: THE FOUR CORE ORGANISATIONAL FORMS

According to Mintzberg (1983), in the centralized organic form, we have the entrepreneur, who directly supervises his employees, in a relatively simple but dynamic environment. As the organisation grows the environment may become more stable (centralized bureaucratic). This is often due to the effect of the organisation's own size and success, such as in an oligopolistic or monopolistic situation. This leads to a codification of the way in which the organisation operates, enabling rules and regulations to be formulated, with a bureaucracy emerging. A machine bureaucracy, run by technocrats, often emerges in this context.

As the bureaucracy expands and diversifies into many niches, however, its environment may again become highly complex, and this leads to a more decentralised structure in which people's skills rather than their work processes are standardised (decentralised bureaucratic). If the bureaucracy professionalises its skills and knowledge, a professional bureaucracy may result.

In a complex, dynamic environment, however, the rate of change increases to the point where bureaucratic procedures inhibit development of the organisation. The decentralized organic form evolves out of the ashes of the

decentralised bureaucracy, based upon teamwork and networking rather than hierarchy and regulations. Mutual adjustment is the only process flexible enough to allow constant adaptation to change in this type of organisation. Both work processes and skills are constantly changed and renewed to suit the situation. In this situation, information must be shared by all, creating a "market" economy in information in the organisation. This is also essential in order to hold such a diverse system together.

## 7.2. CULTURE: THE CREATION & SHARING OF INFORMATION & MEANING IN THE FOUR CORE ORGANISATIONAL FORMS

Boisot's (1987) framework describes organisational structures, cultures and processes as a function of the way in which information is created and shared in organisations. His "political economy" of information is demonstrated in diagram 24. Each of the quadrants in Boisot's framework corresponds to an organisational type in Mintzberg's five-fold structure. Boisot provides a framework for the evolution of organisational structure, culture and process. There are three dimensions to the information which is being created and shared in a particular organisation:

- CONTEXT: the situation in which the processes of an organisation unfold, while consuming, creating and sharing information. Context corresponds to the "E" (environment), "N" (nature of the business) and "F" (focus of top management's mindset) variables in the ENFMOPIT model. The mission/ purpose of the organisation are also implicit in the context.

- PROCESS: the sequences/patterns of activities which the people in the organisation carry out to add value and adapt to the changing environment. This sequence/pattern of activities both absorbs and creates information as content. Process corresponds to the "M" (management process & style), "O" (organisation structure, culture and process) and "P" (processes of operational control) variables in the ENFMOPIT model, describing the modus operandi of the organisation.

- CONTENT: the detailed information involved in the way in which the organisation is going about adding value and adapting to its environment. i.e. its strategy and the contents of that strategy and associated plans, including specific organisational knowledge such as production skills and know-how, core competences, and models of its environment. Content corresponds to the "I" (information and performance measures), and "T" (technologies for management systems) variables in the ENFMOPIT model.

Codification and diffusion are therefore processes which take place recursively, at several levels. Boisot's framework, although only dealing with "information" (and not making the distinction between context, process and content), does provide the correct sequence of the way in which organisations evolve:

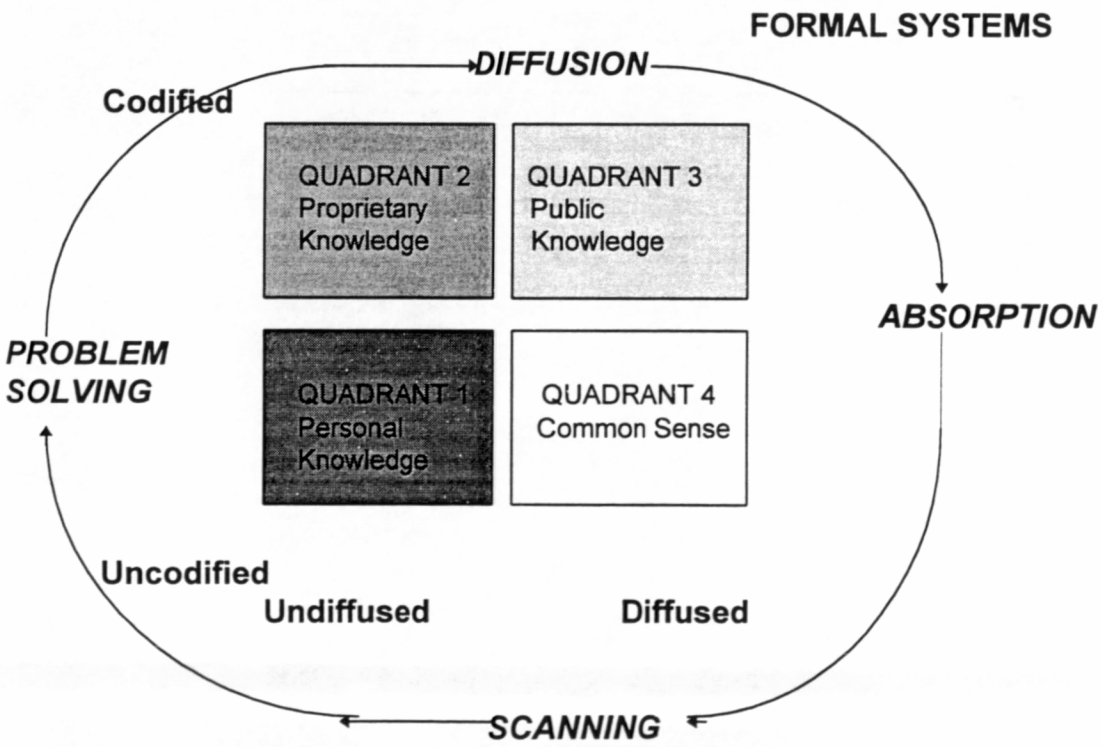



**DIAGRAM 24 : THE POLITICAL ECONOMY OF INFORMATION (BOISOT, 1987)**

We can now integrate the theories of Mintzberg (1983), Pettigrew (1988), Boisot (1987) and Wood and Taylor (1994), to illustrate the process of organisational evolution, and the way in which information codification and diffusion are implicit in this evolutionary process.

## QUADRANT 1: THE INNOVATOR- UNCODIFIED AND UNDIFFUSED CONTENT & PROCESS: INTRA/ENTREPRENEURIAL FORMS

This quadrant corresponds to Mintzberg's simple structure. Such organisations are founded by entrepreneurs and hence usually small and young. The founder tends to hold on to the reins of power, creating an undifferentiated simple structure of people reporting to him. The knowledge base in such a business resides largely in the mind of the entrepreneur or founder, consisting of information about his business idea/vision, network of contacts, knowledge about production, people and so on. Very little of the information is codified or diffused, and many of these organisations disappear after the demise of their founders if they have not succeeded in codifying their knowledge and transferring it to their successors.

## QUADRANT 2: THE PROCESSOR- CODIFIED AND UNDIFFUSED CONTENT & PROCESS- MACHINE BUREAUCRACY

This quadrant corresponds to Mintzberg's machine bureaucracy. Such bureaucracies are founded upon a knowledge base (content) which is largely proprietary- for example, the patents of a pharmaceutical company, the designs and manufacturing processes of a car manufacturer, the source code in Microsoft's Windows or the nature and contents of confidential files in a government department. Information is codified (i.e. standardised and formalised) in algorithms, forms, diagrams, models, manuals, books and any other form of codification. Such codified information is not, however, widely diffused outside the organisation, as it forms the basis for the exclusivity of the organisation's business and core competences. The leverage of the processor is its ability to generate high value-added for customer at a cost which cannot be replicated by competitors without the necessary knowledge base. Even if the "success formula" content does become widely known

(such as happened with the leak of Coca-Cola's formula), the processor still possesses formidable advantages of scale and reputation, as well as the proprietary, undiffused process know-how and efficiency it has accumulated.

### QUADRANT 3: THE INTEGRATOR- CODIFIED AND DIFFUSED CONTENT, CODIFIED BUT UNDIFFUSED PROCESS- INTERNAL MARKETS & NETWORKS

This quadrant corresponds to Mintzberg's divisionalised form, and in extreme cases, the adhocratic form. Such organisations codify and diffuse information widely amongst their internal and external networks, as they operate in rapidly changing markets where the trading of information and innovation are essential for survival; (large Silicon Valley and financial trading firms for example). The structure of such an organisation revolves around internal markets and networks with other stakeholders such as suppliers and external experts and information providers. As these innovative organisations usually render their own products and services obsolete before their competitors can, the value of such information to competitors is minimal. There is, however, protection of the modus operandi (process) of the organisation, particularly its innovative methods and culture. The Rover/Honda alliance illustrates the way in which specific technological know-how content can be widely diffused between organisations and suppliers, while the process or modus operandi is itself largely undiffused though highly codified. The matrix organisation with profit and cost centres was also an attempt to create internal markets, though little real choice of supplier existed in reality. The integrator manages primarily through mixing and matching people to projects, using a variety of contracting and subcontracting techniques. While setting very specific performance goals for "project contractors", the integrator leaves the mode of achieving those goals largely up to the contractor.

## QUADRANT 4: THE SELECTOR- UNCODIFIED & DIFFUSED CONTENT, CODIFIED & DIFFUSED PROCESS: PROFESSIONAL BUREACRACIES & SERVICE ORGANISATIONS

This quadrant corresponds to Mintzberg's professional bureaucracy. Such organisations build upon a largely codified and diffused body of process knowledge about the practising arts of a particular profession, underpinned by a set of professional skills learned through apprenticeship and training. Due to the institution of apprenticeship, this body of process knowledge is diffused through word of mouth and learning in action. Lawyers, doctors, accountants, consultants, architects and other professions all rely upon such apprenticeships to teach trainees how to practice their professions, and professional organisations all perpetuate themselves in this way.

The "common sense" knowledge which Boisot refers to in this quadrant, relates to the content of each case which a professional works on. The diagnostic skills of a professional rely largely upon observation and intuition, aided by an occasional diagnostic tool. The "what" of the case is therefore more intuitive than the "how" of treatment, which may be quite elaborate and machine-like (cancer treatment in hospitals, for example).

Diagram 25 illustrates the relationship between the four core organisation building blocks, and six of the most important aspects of organisational structure, culture and process:

- the nature of the environment in the which the organisation operates and work is done, as defined by Emery and Mintzberg
- the nature of the work content- the "know-that" aspect of work
- the nature of the work process- the "know-how" aspect of work
- the organisational structure as described by Boisot and Mintzberg
- the work control process, as defined by Mintzberg
- the information handling strategy of the organisation, as defined by Boisot.

**Diagram 25: Context/Content/Process Dimensions of Organisational Work & Knowledge: Associated Organisation Structures, Work Control Processes and Information Handling Strategies for the Four Core Organisation Building Blocks (Wood, 1994)**

| | Business Building Blocks | | | |
|---|---|---|---|---|
| | Innovator | Processor | Integrator | Selector |
| Environment Context | simple dynamic | complex stable | complex dynamic | complex stable |
| Work Content | uncodified & undiffused | codified & undiffused | codified & diffused | uncodified & undiffused |
| Work Process | uncodified & undiffused | codified & undiffused | codified & undiffused | codified & diffused |
| Organisation structure | fiefdom-centralised organic | bureaucracy-centralised bureaucractic | market-decentralised organic | clan-decentralised bureaucratic |
| Work Control Process | direct supervision | standardisation of process & output | mutual adjustment | standardisation of skills |
| Information handling | closed organic | closed mechanistic | open organic | open mechanistic |

## 7.3. MEASURING ORGANISATIONAL STRUCTURE, CULTURE & PROCESS

In order to measure these different aspects of the organisations participating in this research, a framework has been created by the author which appears in diagram 26. The underlying structure of the framework comprises four quadrants which relate to four different kinds of organisations:

- the organic closed organisation (bottom left- innovator in simple dynamic environment)
- the mechanistic closed organisation (top left- processor in complex stable environment)
- the organic open organisation (top right- integrator in complex dynamic environment)

- the mechanistic open organisation (bottom right- selector in complex stable environment)

The underlying logic of the four quadrants is used for the purposes of the researcher only, and not disclosed to respondents. The logic of the four quadrants follows Boisot's (1987) processes of knowledge codification and diffusion. At the bottom left, information is uncodified and undiffused- most of the key knowledge required for the success of the business is in the head/s of the intra/entrepreneur. At top left, codification of the key business knowledge has taken place- the knowledge is institutionalised in the "technocracy of engineers", people who know how to design the operational business processes. But this knowledge is not diffused outside of the technocracy- quite the opposite: it is jealously guarded.

At top right diffusion of the knowledge takes place through internal markets, some of it even in the public domain- much like the point at which a proprietary drug becomes generic after the patent has expired: everyone has access to the formula. At the bottom right knowledge which is in the public domain becomes standardised and incorporated into a set of skills which can be acquired by those seeking to join a "profession". Business and professional services, together with healthcare services, follow this model. Knowledge is absorbed by the professions and structured into a useful set of value-adding services.

In addition to the four quadrants, the framework has five layers, structured like an onion, each of which is used to trigger and capture the information generated in interviews with senior executives in the participating organisations:

- Environment- this inner layer enables the respondent to start thinking about the kind of environment the organisation is operating in, and what

the effect of that environment is on the organisation's culture, structure, and process.

- Knowledge type- the four different types of knowledge described by Boisot (1987) are set out in the next layer: personal, proprietary, public and common sense.

- Work coordination and control process- the four ways of controlling and coordinating work according to Mintzberg, are set out in the third layer: direct supervision, mutual adjustment, standard sation of work processes/outputs and standardisation of skills.

- Organisation type and culture- the four different descriptions of organisation culture used are: centralised organic (fiefdom), centralised bureaucratic (classic bureaucracy), decentralised organic (market), and decentralised bureaucratic (a "clan").

- Organisation structure- the four classic Mintzberg structures are then set out in the final layer: simple structure (entrepreneur in the middle of a circle), machine bureacracy (large, steep pyramid), adhocracies and divisionalised forms (network topology) and professional bureaucracy (very flat pyramid with long, wide base split into different disciplines).

Organisations evolve through four distinct phases, depending upon the pressures their environment and the nature of their business create. In each phase of evolution, a particular type of building block will predominate in the organisation and its mindset/management style. The natural building blocks for different kinds of businesses at their origin will also tend to be different:

- firms based around specific technologies (whether product or service), will start as innovators- their primary focus is on the creation of **new technologies and ways of doing things**;

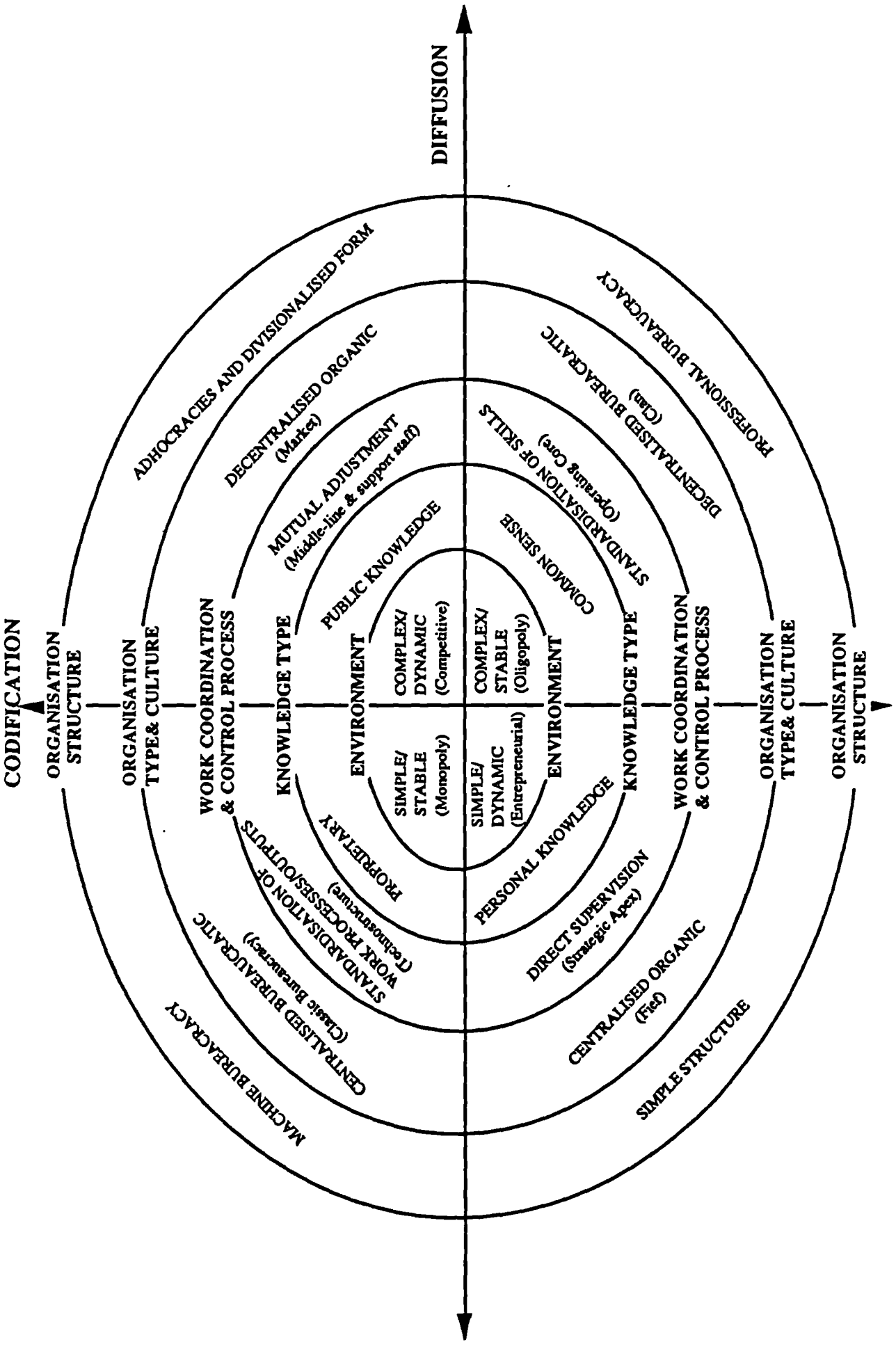
- organisations which seek to exploit specific technologies through specific manufacturing/production/operations technologies to create large quantities of output will start as processors- their primary focus is on **better ways of producing specific outputs at lowest cost**;

- organisations which seek to add value to specific markets through the integration of products and services based upon specific market expertise, will start life as integrators- their focus is on **exploiting specific market opportunities for which they have relevant expertise**;

- those organisations which add value primarily through the application of a particular knowledge-base to provide tailored solutions to specific problems or challenges, such as the professions, will start life as selectors- their focus is on **tailoring a particular solution to the needs of their client on a case-by-case basis**.

Industrial history is full of examples of innovators (Ford, Jobs), who then created processors (Ford Motors, Apple), which then evolved into integrators (Ford's marketing response to Sloan's GM attack on the US market, Sculley's development of Apple into the business computing marketplace). Each of these technologies (the car, the PC), also created professional service opportunities for selectors such as motor mechanics/insurers for cars, and personal computing service/software companies for PC's.

**Diagram 26: Organisational Structure, Culture & Work Control Process Measurement Chart (Wood, 1991)**



### 7.4. Conclusion

In a specific business environment "**E**", given a particular type of business and management mindset/process/style "**NFM**", we would expect organisational structure, culture and process "**OP**" to reflect the nature of the environment and business, and the management mindset and style. Culture defines what behaviour people in an organisation associate with success, based upon shared cognitive schemas and scripts. In chapter 7 we have put forward the argument that culture is a product of the information handling strategy of an organisation, and that organisational structure and process reflect culture i.e. the structure and process will institutionalise culture over time once the "core" culture has been articulated.

Should changes in the environment or organisation bend the organisation out of shape, it is quote possible that the ENFMOP variables may become misaligned, creating an inertial force or "drag" on the organisation, making progress and superior performance difficult to achieve. IT/IS investments in this context would fail to deliver upon their promise, particularly if they themselves were misaligned with the ENFMOP variables.

In chapter 7 we have also put forward an argument that organisations evolve through four distinct phases, depending upon the pressures their environment and the nature of their business create. In each phase of evolution, a particular type of building block will predominate in the organisation and its mindset/management style. The IT/IS strategy and investment required to enable and support each of these distinctly different types of organisations, would also clearly have to be different to create superior performance. Let us now explore how the ENFMO variables are reflected in the processes of operational control in an organisation, and how IS/IT would have to align with the forces in operations at this level.

# 8. PROCESSES OF OPERATIONAL CONTROL

In this chapter we consider the relationship between the way in which work is regulated in an organisation through processes of operational control, and the role of IT/IS in organisational performance. The twelve variables used to measure different processes of operational control are described. The link between closed, contained and open business environments, and the twelve variables, is also set out for each of the variables.

Processes of operational control vary from those used in mechanistic closed bureaucracies ("vertical") to those used in organic open adhocracies ("horizontal"). One would expect formal, centralised IT/IS to predominate in vertical processes of operational control, and informal, decentralised IT/IS to predominate in horizontal processes of operational control. Management style would also tend to vary with the nature of the processes of operational control, from the centralised formal style necessary to impose a vertical set of processes of operational control, to the decentralised informal style required to empower people in the organisation to make horizontal processes of operational control work well.

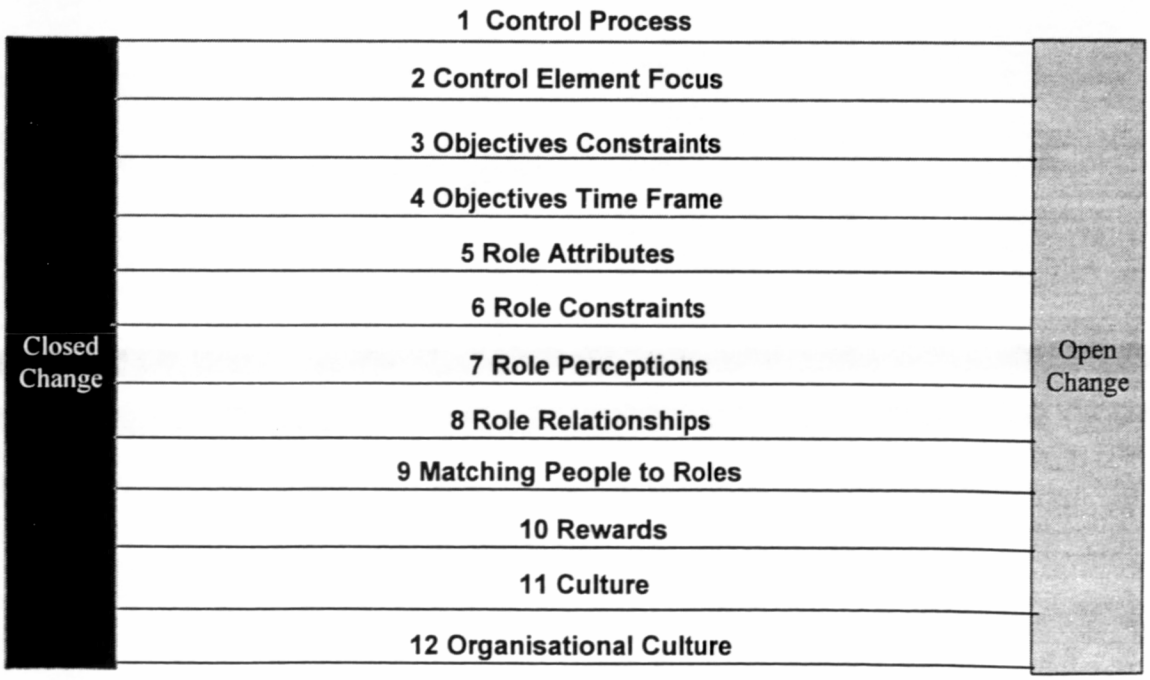
Vertical forms of control would also be associated with organisations operating in closed or contained change situations, while horizontal forms of control would be more characteristic of organisations operating in open change situations. One would expect that IT/IS would focus primarily on formal control of a rigid number of variables in the vertical control situation, while more informal, often "skunkworks" IT/IS would enable rapid learning in the horizontal control situation, enabling the organisation to adapt to the rapidly changing conditions in an open change situation.

# 8. PROCESSES OF OPERATIONAL CONTROL

Given a specific business in a particular environment, run by a management team with an identifiable mindset and style, and a recognisable organisational structure and culture, how can the majority of people employed in the organisation be enabled to add value for customers? How can their work processes and outputs be controlled to clear standards which meet the customer's needs and wants? And how can IT/IS facilitate the adding of value in these work/business processes and management processes?

Stacey's (1990) framework proposes twelve "control style descriptors" which describe the operational control processes in an organisation. Control processes apply to all employees, as opposed to management style, which applies only to the 50-100 most senior managers in an organisation. Each variable can be described on a spectrum from those which are required in closed change situations (on the left), to those which are required in open change situations (on the right). This framework is illustrated in diagram 27 below.

Diagram 27: The Twelve Descriptors of Operational Control Processes (Stacey, 1990)



## 8.1. FRAMEWORK FOR OPERATIONAL PROCESSES OF CONTROL

The first three descriptors create **method tensions**- choices must be made about control process, control element focus and objectives constraints, determining the method of control which is applied.

Descriptors five to eleven create **behavioural tensions**- the way people are matched to roles; the manner in which roles are defined and determined; the perception people have of their roles; the relationships between people in their roles; and the culture which conditions the conduct of those roles. The manner in which the behavioural tensions are resolved determines the nature of the political system to be found in the business.

The twelve variable sets, together with a description of each, are as follows:

**1. Cognitive Nature of Control Process-**

**ANALYTICAL FORMAL VS INTUITIVE**

Are the control processes in your organisation characterised more by analytical/formal methods (eg. many formal reports with numbers and measurements required before a decision can be made), or intuitive methods (relying on individual judgement and intuitive processes)?

Closed change situations require the application of formal, analytical, instructing processes to the elements of control. Open change situations require the application to the elements of control, of individual intervention based upon intuition and judgement, as well as the use of informal rules, procedures and modes of communication.

**2. Control Element Focus**

**PLANNING VS MONITORING**

Do the control elements in your organisation focus mainly on planning ahead in detail, or are they predominantly focussed on monitoring events and their implications?

Closed change situations require the primary emphasis to be placed upon the planning element of control- monitoring and corrective action are made much easier with comprehensive planning processes. Open change situations require the focussing of attention on the detection of small changes occurring now and having important long-term consequences. This is a form of monitoring and becomes far more important than planning.

**3. Objectives Constraints**

**TIGHT/FIXED VS LOOSE/TENTATIVE**

Are the constraints on the objectives set by individuals in the organisation tightly fixed for them, or are they more of a loose and tentative nature?

Closed change situations require the setting of fixed objectives, which are tightly constrained in that they are to be taken precisely and literally. Open change situations require the setting of objectives which are tentative, changeable and loosely defined, as the future is unknowable.

**4. Objectives Time Frame**

**SHORT-TERM VS LONG-TERM**

Is the behaviour of people in the organisation being driven by short-term goals, or are they set in terms of a longer-term context?

Closed change situations enable the future to be more easily predicted, and allow individual goals to be set according to shorter control cycle intervals. Open ended change requires individuals to have longer term goals as the

future is unknowable and short-interval controls will not reflect the shifting range of options open to individuals and the organisation.

**5. Role Attributes**

**AUTHORITY/RESPONSIBILITY VS INITIATIVE/COLLABORATION**

Are roles in your organisation defined formally by responsibility and authority (eg. the sergeant-major in the army), or informally by the way in which individual initiative and collaboration are coordinated through group processes (eg. as in an innovative software company)?

Closed change situations require the definition of the roles of people carrying out the control tasks primarily in terms of responsibility and authority. Open change situations require the definition of roles in terms of attributes of collaboration and initiative to allow opportunistic experimentation.

**6. Role Constraints**

**POSITION/RESOURCES VS POWER/PERSONALITY**

Are the constraints on the roles in your organisation defined by the formal position and responsibility of the holder of the role, or by power, individual personalities and organisational culture?

Closed change situations require the constraining of those roles by their formal positions in the hierarchy as well as by resource availability. Open change situations require the constraining of roles through power, personality and organisational culture rather than formal position, to encourage experimentation.

**7. Role Perceptions**

**PAROCHIAL VS HOLISTIC**

Do people perceive their roles in terms of the interests of themselves and their units, or do they consider the widest possible interest of the organisation?

Closed change situations require the development of role perceptions which are parochial in that people see their roles in terms of the part of the organisation in which they are operating. Open change situations require the development of role perceptions which are holistic in the sense that they are more concerned with the good of the organisation as a whole rather than with the good of one part alone. This encourages synergy and new ways of doing things, rather than more efficient ways of doing old things.

**8. Role Relationships**

**DIRECTING VS FACILITATING**

Are relationships between roles in your organisation based more upon direction or facilitation?

Closed change situations require relationships of a primarily directing nature to be fostered between on role and another. People are given objectives and instructed to take corrective action. Open change situations require the fostering of relationships between roles which are facilitating, to allow the surfacing of whatever inadequate information is available and to allow the experimentation and innovation which is central to learning in open-ended situations.

**9. Matching People to Roles**

**SPECIFIC SKILLS/KNOWLEDGE VS WIDE COMPETENCES**

Does your organisation look more for people with specific skills, knowledge and expertise when filling most jobs, or are you more interested in the wider competences of individuals?

Closed change situations require the matching of people to roles using selection criteria to do with specific expertise, bodies of knowledge and a limited number of personal skills. Training and development programmes are tailored to such specific areas. Open change situations require the matching of people to roles using selection instruments where the criteria are personal competences rather than specific skills and knowledge. Management development instruments in this case seek to develop intuitive, team working competences above specific analytical and instructional skills.

**10. Rewards**

**PERSONAL PERFORMANCE VS TEAM RELATED**

Are people rewarded in your organisation for personal performance on the whole, or do they tend to be rewarded for team results?

Closed change situations require the use of instruments of reward which closely relate individual short-term performance to rewards. Open change situations require reward instruments which are related to team performance and willingness to experiment.

**11. Culture**

**CONSERVATIVE VS RADICAL**

Do the majority of people in your organisation desire frequent change in the organisation, or are they more concerned with the avoidance of change and the maintenance of the status quo?

Closed change situations require developing cultures which are conservative with relatively unquestioning acceptance of objectives and instructions. Open change situations require radical cultures which foster the questioning of objectives, perceptions and actions.

**12. Organisation Structure**

**SIMPLE/DECENTRALISED VS COMPLEX/CENTRALIST**

Is your organisation structured in a simple, decentralised way, or is the structure more complex and centralist?

Closed change situations require the design of organisational structures which are decentralised into market-related profit centres. Open change situations require organisational structures which reflect centralist tendencies. Complex structures are needed to bring issues and perspectives to the centre, to get people to take the holistic view and to provide a mechanism for directing the whole organisation's attention and energy into important issues.

## 8.2. SUMMARY

While the "O" variable (organisational culture, structure and process) describes the way in which information is created and shared in an organisation through business/work processes, the "P" variable (processes of operational control) describes how the management infrastructure controls those business/work processes and their outputs. IT/IS is at the heart of the way in which these processes of operational control happen, as IT/IS can accelerate or retard learning and control processes in individuals, teams and organisations. This acceleration or retardation will depend upon whether the nature and use of IT/IS is aligned to the processes of operational control. IT/IS will therefore be a key factor in determining how well an organisation is adapting to or shaping its environment, and, as a result, how well the organisation performs over time.

# 9. INFORMATION & PERFORMANCE MEASURES

This chapter deals with what is measured in an organisation (the content)- chapter ten deals with how it is measured (the processes, tools and techniques). What is measured is, to a large extent, that which gets managed. There are many ways in which the information and performance measures in a company can be described: they can be externally or internally focussed (as illustrated in chapter 4); or they can be strategic and flexible (relating to the competitive game) or operational fixed (relating to the maintenance of the stable operating core processes). The latter dimension is measured by the "I" variable in the ENFMOPIT framework.

Some measures (or "variables"), are more critical to the success of an organisation than others- these are termed the organisation's "mission critical variables" or "MCV's". The different types of MCV's are described in chapter nine, from the vertical (or functional) to the horizontal (or cross functional). The link between the type of IT/IS used to measure and manage different kinds of MCV's is discussed. The expectation is that strategic flexible MCV's are better managed by informal, decentralised IT/IS, while operational fixed MCV's are better managed by formal, centralised IT/IS.

The same logic applies to management systems and planning processes, which together with IT/IS, comprise the "T" variable: Technologies for Management Systems described in chapter ten- in other words, informal decentralised management and planning processes will be better at managing strategic flexible MCV's, while formal centralised management and planning processes will enable the organisation to control operational, fixed MCV's better.

# 9. INFORMATION & PERFORMANCE MEASURES

There is an old saying that: "What you measure is what you get". One might also add that how you measure it is also important. It is clear that there are many different "scorecards" at many different levels in organisations, for many different groups of stakeholders. While "net profit per share" or "price/earnings ratios" may be of interest to investors and shareholders, "customer satisfaction" and "product/service quality" measures may be of greater interest to middle and senior management. Particular measures are of interest to functional areas such as "relative market share" and logistical complexity" for marketing, "sales conversion levels" for sales, "incentives" and "training and development" for human resources, "capacity utilisation" and "productivity" for manufacturing/operations, and "investment intensity", "cash flow" and "fixed vs liquid assets" for finance. Employees may be measuring their "job satisfaction" and "relative earnings", while suppliers will be measuring "payment on time" and "customer loyalty". Customers are usually measuring their "personal satisfaction" and "product/service value-added (cost/benefit)"

Traditional information and performance measures which appear in published company annual reports include turnover, profit, value-added, productivity and asset performance measures. Most company annual reports now also include a mission statement. For example, the mission of Federal Express is to deliver parcels to customers by 10h00 the next day, otherwise the customer does not pay. For this mission to be accomplished, many processes must operate reliably within their state boundaries; for such reliable operations, specific process variables must operate within particular limits. Such processes include not only the business processes in the operations of the organisation itself, but also the management/control, learning and adaptation processes in the organisation. Those generic process attribute and state variables which are critical to the successful

accomplishment of an organisation's mission are defined by the author as its "mission critical variables".

Every organisation will have a different view of its "mission critical variables" ("MCV's") which they believe are most important to the viability and success of their business and organisation. This will stem partly from the dominant mindset in the organisation, which will be a reflection of the top management team and style. An MCV is a variable the absolute value of which is critical to the achievement of the mission of an organisation, and differs from a critical success factor which is a relative competitive measure.

Several categories of MCV were selected from the business literature of the past decade, as described in chapter two above on business performance. The full list of MCV's which respondents were asked to select from is attached as Appendix F: Mission Critical Variable Listing. The MCV's are grouped under several headings: people, organisational configuration, organisational characteristics, products/markets, operating structure, and controls/systems. Several MCV's are listed under each heading, to enable them to be ranked as to their importance for specific organisations. MCV's can vary from being irrelevant to performance to critical to performance.

Critical MCV's represent the information and performance measures which senior management of the organisation believes they should be measuring- they also indicate whether an organisation is focused on internal or external variables.

Some organisations can be diagnosed as externally focussed through their emphasis on external MCV's, while others can be diagnosed as internally focussed through their emphasis on internal MCV's, as described in chapter five. One would expect some correlation between information and performance measures which are externally focussed, and an organisation

which is open and organic in character. Equally, one would expect some correlation between information and performance measures which are internally focussed, and an organisation which is mechanistic and closed in character.

This particular "strategic flexible vs operational fixed" dimension is the one which we will be measuring for the "I" information and performance measure in the ENFMOPIT framework. One would expect that:

- formal, centralised IT/IS would be more suitable for managing operational fixed measures, while informal, decentralised IS/IT would be better suited to managing strategic flexible measures.
- operational fixed measures are more suitable to simple stable/closed environments, while strategic flexible measures enable organisations to adapt faster in complex dynamic/open environments.

# 10. TECHNOLOGIES FOR MANAGEMENT PROCESSES & SYSTEMS

In this chapter we deal with the tools and techniques of the "how" of management. Planning and management processes and systems, together with IS/IT infrastructures and systems, form the core capability for control and learning in an organisation. We look first at the traditional measures for assessing IT/IS efficiency, and then move on to explore the need for a more comprehensive maesure of IS/IT effectiveness, building on the strategic alignment model of Scott-Morton (1991).

The five key components of the "T" measure are then set out and discussed:

- IS/IT Infrastructure (Hardware Platform)
- Applications Portfolio Scale and Package vs In-house Development
- Business Planning Effectiveness Rating
- Information Systems Planning Effectiveness Rating
- IS/IT Benefit Assessment.

The significance of the "T" score for an organisation is then discussed, with particular reference to the concept of alignment within the ENFMOPIT framework. The conclusion is drawn that:

- a mature (possibly hi-tech), decentralised/informal set of technologies for management systems would be better aligned with a versatile innovator/soft process business, an open organic organisation, and decentralised informal management style using strategic flexible performance measures in an open change/complex dynamic environment.
- an emerging (possibly lo-tech) centralised and set of formal technologies for management systems would be better aligned with with a systematic processor/hard infrastructure business, a mechanistic closed organisation and centralised formal management style using operational fixed performance measures in a closed/simple stable environment.

# 10. TECHNOLOGIES FOR MANAGEMENT PROCESSES & SYSTEMS

The world of management and information processes and systems contains many assumptions about what constitutes a better management or information system. Some objective criteria are available, such as whether the systems provide better customer service or are able to deliver new products to market faster than competitors. Those who advocate that the information systems strategy must align with the business strategy (such as the authors of the MIT Corporation of the '90s report, Scott -Morton (1991)), would agree that successful management and information systems deliver business benefits in accordance with the business strategy.

In addition to the stage of the life-cycle the systems of an organisation are in, we need to know whether they work efficiently. Martin (1989 and 1990) derived an IT efficiency index based upon three key measures:

- resources (including personnel, expense, capital expenditure and CPU capacity),
- applications development (including key project status, defects discovered, and applications function delivered) and
- services/operations (including transaction volumes, CPU utilisation, network utilisation, SLA commitments met, system availability and service availability).

The "T" measure used in this research is not as detailed from the technical perspective as Martin's measure, as it is designed to provide a wider perspective on the total techniques, infrastructure and level of relative scale/maturity/sophistication of such techniques and infrastructure, providing a comprehensive framework and set of measures enabling the IS/IT and management systems in an organisation to be evaluated as to their contribution to organisational performance. Using our common sense and

experience of many different management systems and computer and telecommunication systems in different organisations, we might be able to express an opinion that "the management systems and computer and telecommunication systems in organisation X are better than those in organisation Y" i.e. faster, more modern, reliable, easier to use and so on. Again, common sense would tell us that such superior systems might deliver better business results, if used intelligently- but how can we measure this? To this author's knowledge, the measurement of the comprehensive range of variables required to do this has not previously been attempted in any survey or research.

During the past decade suppliers of IT hardware, software and computing services, supported by consultants and academics, have made lavish claims on behalf of IT and its ability to improve business performance. The hypotheses in this research contend that what matters most in the improvement of business performance through IT is not just IT spend/scale/sophistication supported by effective business and information systems planning systems, but the alignment between the ENFMOPIT variables including IS/IT. We would thus expect to see some evidence to demonstrate that great emphasis on IT and formal systems in an organisation did not necessarily result in superior performance in all or even most cases.

In order to measure whether or not this is in fact true, we need to be able to measure the extent of the money and time organisations have put into their IS/IT and supporting formal systems, relative to the scale of their business. We also need to be able to measure how effectively such systems are operating in each organisation, to see whether or not this might influence performance. In order to do this, we need to measure both the scale of the IT/IS infrastructures and formal planning systems in the sample, as well as the scope of such systems and the effectiveness with which they are run.

We also need to be able to appreciate how "formal" or "informal" the technologies for management systems in each organisation are, to test the alignment between the strategic control approaches used in each organisation and the nature of the IT/IS infrastructure and supporting business and information systems planning systems.

Of the ENFMOPIT variables, the "T" is the most comprehensive. Technologies for management processes and systems represent the processes, infrastructure, tools and systems available to management and employees to run the business, including both information systems and infrastructures, and planning systems. Five key variables are measured in order to arrive at a single score for each organisation, which represents the relative scale, power, sophistication, and efficiency of the formal information and planning processes and systems in each organisation. The "T" measure is a composite of the measures set out below and detailed in Appendix "H": Listing of Sub-Variables Incorporated in "Technologies for Management Systems".

The five key groups of variables are:

- IS/IT Infrastructure (Hardware Platform)
- Applications Portfolio Scale and Package to In-house
- Business Planning Effectiveness Rating
- Information Systems Planning Effectiveness Rating
- IS Benefit Assessment.

**1. IS/IT Infrastructure (Hardware Platform)**- this is a measure of relative IS/IT infrastructure scale, centralisation and maturity. It is assumed (following Nolan and Galliers below) that a decentralised, widespread, technically sophisticated, powerful IT infrastructure based upon modern hardware is more desirable than a centralised, limited, unsophisticated, low-powered IT

infrastructure based on out-of-date hardware. Nolan (1979) and Galliers and Sutherland (1991) contend that an organisation which has reached the sixth stage in both their models ("maturity" and "interactive planning" respectively), would be more likely to achieve better performance through IS/IT than an organisation in an earlier stage of evolution.

Both lifecycle descriptions imply certain measurable characteristics of IS technologies and infrastructures, though Nolan does not suggest how such a measure could be quantified in his published work. Nolan's six stages are: initiation, contagion, control, integration, technology assimilation and maturity. Galliers and Sutherland (1991) six stages are: obfuscation, confusion, senior management concern/DP defence, cooperation, opportunistic entrepreneurial/intrapreneurial and interactive planning. Galliers and Sutherland also offer descriptive criteria by which one may determine the likely stage of growth an organisation is in, providing a qualitative check on the quantitative measures developed in this research.

**2. Applications Portfolio Scale and Package vs In-house Development-** this is a measure of the relative scale of the applications portfolio in each respondent, and the ratio of package software to in-house development in each portfolio. It is assumed that a large applications portfolio relative to the size of the business, and a high ratio of package software to in-house developments, would be superior to an insignificant applications portfolio developed competely in-house. (Unless the latter offered some rare competitive advantage).

**3. Business Planning Effectiveness Rating-** this is a measure of the effectiveness of the planning process in each respondent, using manager's own assessments of their planning system effectiveness. Decentralised, frequent, deep and comprehensive planning efforts are assumed to be superior to centralised, infrequent, shallow, narrow planning efforts. Various

measures were developed to guage these attributes in each respondent, based upon Glueck & Jauch (1984), Rhyne (1986) and the author's experience as head of marketing and planning in the BIS Group (a worldwide information services organisation, part of the NYNEX Corporation until 1993).

**4. Information Systems Planning Effectiveness Rating-** this measures managerial perceptions of ISP effectiveness in each respondent, the frequency of ISP and review, and the level of integration between ISP and business planning. The findings of Galliers (1986) as to the successful characteristics of effective ISP efforts were applied to define effective versus ineffective ISP efforts.

**5. IS Benefit Assessment-** this measures management's assessment of the benefits of IS in marketing, production, administration and organisational characteristics. IS benefits were defined by synthesising the benefits described in several books on IT/IS, such as Earl (1987), Kaye (1989) and others. The IS benefits are listed in Appendix C.

The "T" measure should be relatively well aligned with the other ENFMOPIT variables. For example, it is unlikely that a centralised, mechanistic closed bureacracy would make effective use of a mature, decentralised and flexible systems infrastructure. On the converse, it is improbable that a decentralised, open organic adhocracy would be able to make effective use of a centralised, technically immature and inflexible systems infrastructure. Individual components of the "T" measure such as IS/IT centralisation, IS/IT infrastructure relative scale, applications portfolio coverage and IS benefits assessment will also provide interesting insights into the role of IS in organisational performance in their own right.

A high T score (characterised as "mature (possibly hi-tech), decentralised and informal technologies for management systems"), would indicate that an

organisation is making reasonably extensive and effective use of both IS/IT and formal management systems in their organisation, relative to their size and the nature of their operations. A low T measure (characterised as "emerging (possibly lo-tech) centralised and formal technologies for management systems"), would indicate that an organisation is still in the early stages of IT/IS and planning system growth, and may not be making full use of the technology throughout the organisation.

With regard to the alignment of the "T" variable within the ENFMOPIT framework, we would expect that:

- a mature (possibly hi-tech), decentralised/informal set of technologies for management systems would be better aligned with a versatile innovator/soft process business, an open organic organisation, and decentralised informal management style using strategic flexible performance measures in an open change/complex dynamic environment.

- an emerging (possibly lo-tech) centralised and set of formal technologies for management systems would be better aligned with a systematic processor/hard infrastructure business, mechanistic closed organisation and centralised formal management style using operational fixed performance measures in a closed/simple stable environment.

We now move on to chapter eleven, where the way in which the ENFMOPIT variables are operationalised in the research approach and methods is described.

# 11. RESEARCH APPROACH

The purpose of chapter 11 is to describe the way in which the research model developed in chapters 1 to 10 has been operationalised through a variety of different research methods. This research process was designed using a framework drawn from the available literature on IT/IS research.

After summarising the key points arising from chapters 1 to 10 in 11.1, the 'wheel' framework for measuring ENFMOPIT alignment is outlined in 11.2. The dynamic nature of alignment is explained in 11.3, together with the link between organisational change and alignment. The theoretical and practical research objectives are set out in 11.4, which involve the testing of a research model of ENFMOPIT alignment and organisational performance, and the development of a prototype diiagnostic tool for managers.

In 11.5 and 11.6 respectively, the 21 research questions and 17 research hypotheses are posed, grouped into five topics: the link between ENFMOPIT alignment and performance; the role of different organisation types, and planning and control processes, in alignment and performance; the link between the ENFMOPIT variables and beneficial organisational change; and the specific role of IT/IS in performance.

The background to and arguments for the four research methods used in this research are then set out in 11.7, together with a description of the field research process. 11.8 contains a description of each research measure comprising the ENFMOPIT variables, together with the questions asked and scales used to measure responses. 11.9 explains the statistical procedures used to calculate alignment from the data gathered through the questionnaire, interview and database modelling methods.

# 11. RESEARCH APPROACH

## 11.1. SUMMARY OF DESK-RESEARCH FINDINGS

In order to generate a clear set of research questions and hypotheses, and develop an appropriate research approach, we need to summarise our findings about the role of information systems in organisational performance so far:

a. Organisations, their business processes and information systems are simultaneously physical and informatic in nature. Processing systems in organisations process flows of materials and information using energy and systemic information according to a set of control rules which specify the resource transformation (or value-adding) process, and constitutive/ autotelic information (change rules) which enables the resource transformation process to operate effectively and be restructured/ reorganised as and when appropriate.

b. The cognitive aspect of organisations comprises a consensual domain created by the interactions of organisational members with other members and outsiders. Such a consensual domain is an aggregate of the mental models in the minds of organisation stakeholders, and as such subject to the limitations of human cognition and information systems. IS/IT models this consensual domain and enables latent information to be converted into more valuable forms, or to trigger value-adding processes involving the use of instrumental information.

c. Organisational control is a value neutral concept which describes the way in which an organisation regulates the basic processes which are essential to its viability. Such control is exercised through information activities and systems which can be reactive, proactive or creative in nature. Organisational learning is a precondition for organisational control, and an

essential feature of the way in which organisations satisfy the changing demands of their environments. Control is also essential to ma ntain the stable operating system which enables the organisation to operate on a day-to-day basis, while learning equips the organisation with the knowledge and expertise which it needs to adapt to or create its future. Such knowledge and expertise is essential for the organisation to develop its distinctive competences to meet future challenges.

d. The resource transformation processes in an organisation are linked together in a value-chain, which produces a value-added unit of output in a specific time (the cycle-time of the value chain). The way in which such activities are initially linked together into a stable operating system and set of business processes will shape the social processes necessary for these activities to be carried out successfully. Such social processes process information about the stable operating system, its environment and track changes in both the stable operating system and the environment, as well as providing the medium through which learning occurs and control/empowerment is exercised.

e. Organisational information systems carry out such information processing activities in two ways: informally (through systems such as human communication between organisation members inter se and with outsiders), and formally (through systems represented by artefacts such as reports and machines like telephones, computers, faxes, videos, and teleconferencing for example, collectively known as "information technology").

f. The nature of the business, the environment and the circumstances in which an organisation operates will shape the way in which knowledge is created in an organisation. For example, in a simple but dynamic environment entrepreneurs who rely on personal knowledge will tend to build organisations through direct supervision. Such an organisation will operate

with little codification or diffusion of information, but by example and informal instruction.

h. The level and method of codification and diffusion of knowledge/ information in an organisation influences the level of formality of the social processes in an organisation which in turn shapes the structure and nature of the organisation.

i. In order to plan effectively for information in a business, the level of formality of the organisational control system must be taken into account. For example, a machine bureaucracy will tend to rely upon highly formalised systems and procedures. Information processing in such an organisation occurs through highly parameterised formats which are the result of the standardisation of work processes and outputs used to regulate work. The quality of information processing will thus tend to be highly codified, formal and precise (but rather slow and costly as a result). Such "processors" work best in simple, stable environments.

In an adhocracy, however, information will be handled in a much more flexible, informal manner, in order to facilitate the mutual adjustment process which individuals use to interact in adhocracies. Such market-like, decentralised organic "innovators" operate best in complex, dynamic environments, where rapid, frequent communication is required.

j. Standalone, distributed and centralised information processing will be more or less appropriate in different kinds of organisations. The level of centralisation of the stable operating system is less important than the nature and structure of the organisation, the way information is codified and diffused (its culture) and its decision processes.

For example, a retail bank or supermarket chain is highly decentralised in operational terms, but yet may benefit from a centralised information system for its stable operating system. Some supermarket or retail bank operations will be more formal than others however, due to their underlying culture and level/methods of codifying information. Formal control and information systems may thus be more appropriate in one retail bank or supermarket chain than another. An adhocratic retail bank operating in a complex, dynamic environment will require more flexible, informal systems than a monopoly retail bank structured as a centralised bureaucracy.

k. The design of information systems must therefore take into account both the nature of an organisation's stable operating system and the social processes which regulate that operating system and its environment.

l. Information strategies and information systems plans will thus be made and implemented in different ways depending upon the nature and structure of an organisation, its operating system and environment.

m. Management processes are central to the role of IS/IT in organisational performance. Aspects of the management process such as management style, organisation type, and processes of control must align with the nature of the information and performance measures and technological infrastructure for information management, in order to facilitate the strategic alignment of a firm to its changing environment.

n. Organisational alignment, as measured by the ENFMOPIT variables, may partially explain strategic alignment, as measured by the PIMS method, and organisational performance, as measured by a number of financial and strategic variables.

We now move on to discuss how such insights enable a programme of research to provide us with an explanation of the role of information systems in organisational performance.

## 11.2. MEASURING ALIGNMENT AND PERFORMANCE USING THE ENFMOPIT FRAMEWORK

To measure and track the relationship between organisational alignment, IS/IT and firm performance, we will be using the ENFMOPIT framework developed in chapters one to ten. This framework should enable us to measure both the impact of IS/IT on strategic, operational and cognitive factors in firms, and the implications of such factors for the role of IS in organisational performance.

### 11.2.1. OVERVIEW OF THE ENFMOPIT FRAMEWORK

The following summary of the ENFMOPIT variables should remind us of the elements of the framework we will be using to develop the research approach:

Environment- this describes the arena the organisation operates in, comprising its stakeholders, (e.g. customers, employees, shareholders, suppliers), its competitors and other external agencies such as regulators. Social and technological change have a major influence on the relationship between these groups. For the purposes of this research, environments were classified on a spectrum from simple stable, simple dynamic, complex stable to complex dynamic.

Nature of the Business- reflects several aspects of the kind of markets served, products and services offered and resources and technologies applied by the organisation. This varies from systematic processor with a hard infrastructure (like a railway) to versatile innovator with soft process (like a theatre company).

Focus of top management's attention (or mindset)- is reflected in the extent to which top management are focused outwards to the environment, or inwards to the organisation. The focus of the organisation's top manageent attention thus varies from internal to external.

Management Style- is a reflection of how senior management manage the organisation. Decision making, coordination, resource allocation, objective setting, control and leadership styles form the basis for our conclusions about management style, which has a significant influence on the other ENFMOPIT variables. The management style should be compatible with the nature of the business being managed, which we measure using Goold and Campbell's "Strategies & Styles" framework (Goold & Campbell, 1987). The management style varies from centralised formal to decentralised informal.

Organisation Factors and Type- measures several important aspects of the organisation such as its knowledge base, work processes, culture and structure. These variables are then used to classify the organisation as one of four basic types: mechanistic closed, mechanistic open, organic closed and organic open, which draw upon Mintzberg's "Structure in Fives" approach.

The four archetypes are:

Organic open organisations tend to operate in complex dynamic environments, with decentralised informal management styles and pluralistic flexible processes of control. Information and performance measures tend to be strategic flexible with decentralised informal tools, techniques and IT platforms.

Organic closed organisations tend to operate in simple dynamic environments, with decentralised formal management style and

oligarchic flexible processes of control. Information and performance measures tend to be strategic fixed with decentralised formal tools, techniques and IT platforms.

Mechanistic open organisations tend to operate in complex stable environments, with centralised informal management styles and oligarchic fixed processes of control. Information and performance measures tend to be operational and flexible with centralised informal tools, techniques and IT platforms.

Mechanistic closed organisations tend to operate in simple stable environments, have centralised formal management styles, with monarchic fixed processes of control. Information and performance measures tend to be operational and fixed with centralised formal tools, techniques and IT platforms.

Of course in reality very few pure archetypes exist- most organisations are a mixture of types, with one type of being more dominant than the others.

Processes of Control- measure both the political/behavioural and method tensions in the organisation which are imbedded in control elements and processes, objectives, roles, reward systems, culture and structure of the organisation. Particular control process types are more compatible than others with specific management styles and organisation types. Stacey's control process classification system is used as our benchmark for these types (Stacey, 1990). Control processes vary from monarchic fixed (where power is held by a few and controls are rigid), to pluralistic flexible (where power is widely distributed and controls are adaptable).

Information and Performance Measures- comprise the information required to manage the business effectively, They include critical success factors,

mission critical variables, functional/departmental variables and process control variables. We measure to what extent this information is being provided to management by the current information systems, and what type of systems are in use and how flexible those systems are. These vary in nature from operational fixed to strategic flexible.

Technologies for management systems- represent the formal systems available to management and employees to run the business, including information technology infrastructures, planning and budgeting systems. The applications and planning techniques in use, and how effective they are, are also measured. We also look at how information and planning system benefits are measured in the organisation, and draw some conclusions about the nature of the information systems in use and their fit with the other ENFMOPIT variables. These vary from low-tech, centralised formal to high-tech, decentralised informal.

These eight variables can be represented graphically as spokes on a wheel, grouped into three types:

Strategic spokes (context): the environment and the nature of the business tend to lead the other spokes, though there are some exceptions.

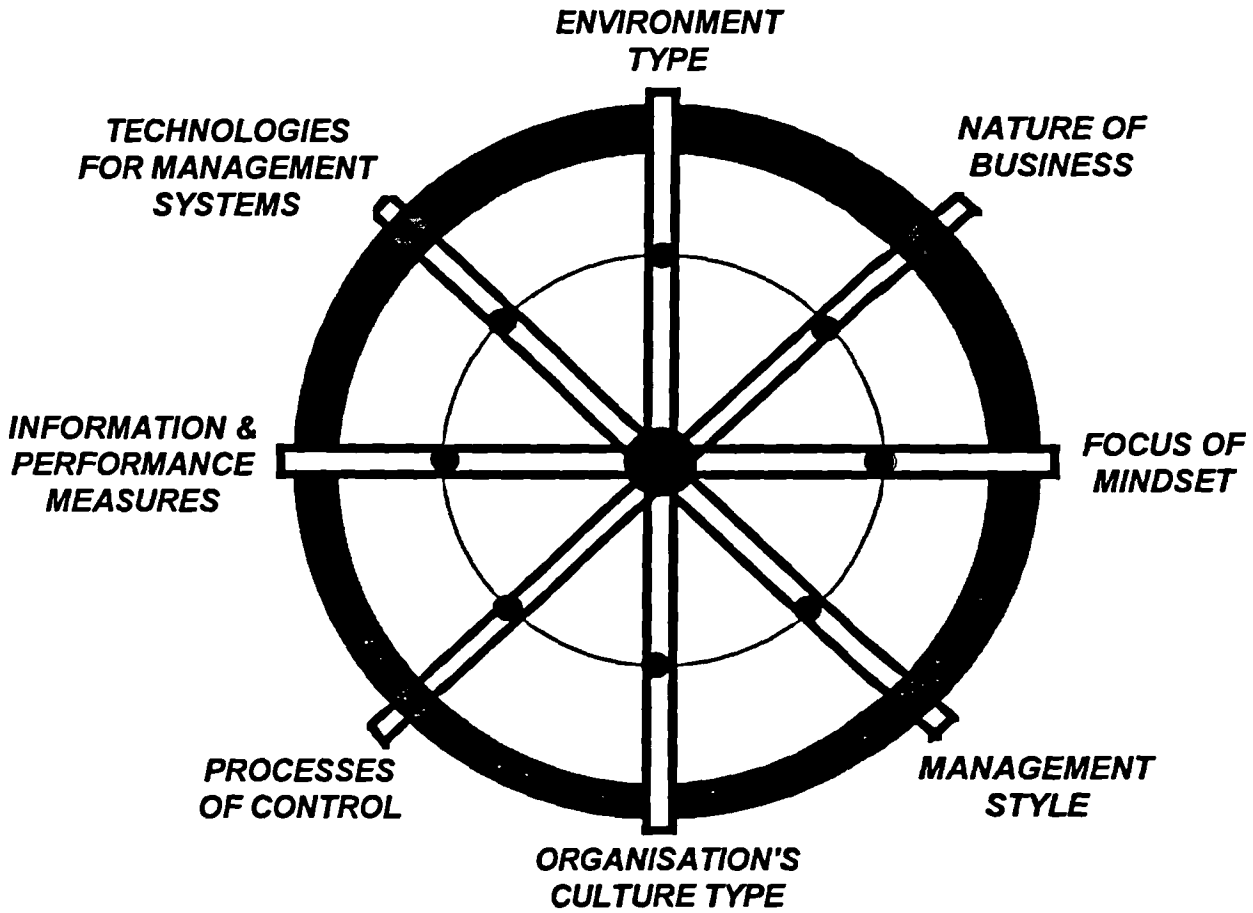
Organisational spokes (process): the focus of top management's attention, their management style, and the organisational type and processes of control reflect the nature of the organisation and the way it will tend to "behave" in a particular strategic situation.

Management systems spokes (content): reflect the nature of the organisation's management systems through the information and performance measures and technologies for management systems in use.

An organisation is aligned when its strategic intent and management and business processes are appropriate to the challenges of its environment and the nature of its business. Due to the fact that for most organisations their environment and the nature of their business are given and difficult to change, these two spokes tend to set the level to which the other variables should align. This level is referred to as the "indicative alignment level".

A pro forma wheel is illustrated in diagram 28 below.

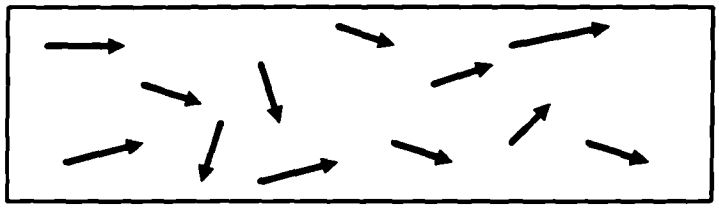
Diagram 28: The Wheel- A Pro Forma (Wood, 1993)



### 11.2.2. THE CONCEPT OF ALIGNMENT

The concept of alignment can be represented graphically as a simple example of vectors of forces heading more or less in the same direction:

Diagram 29: Alignment of Forces in an Organisation (Wood, 1993)



Alignment is measured statistically as the degree of covariance between the direction of these forces on a series of normalised scales. The four levels of alignment are:

- **cognitive alignment**- the mental models of members of the management team can be aligned in a variety of ways. They may share a common view on trends in the environment, but differ on the strategic response to those trends. They may agree on the business strategy, but might differ on how that should be reflected in operational terms. Or, they might all be in agreement about the environmental, business and operational strategy content, but differ on the process by which the organisation should be changed to reflect that strategy content. The three ENFMOPIT variables which measure the level of cognitive alignment are: "**F**"- focus of the top management mindset; "**M**"- management style; and "**I**"- information and performance measures (those variables considered "mission critical").

- **operational alignment**- organisation structure, culture and process ("**O**") may or may not be aligned with the processes of operational control ("**P**") and the technologies for management systems ("**T**") in an organisation. How the operations of the organisation work in practical, day-to-day terms is measured by these three variables. Lack of alignment will be highlighted

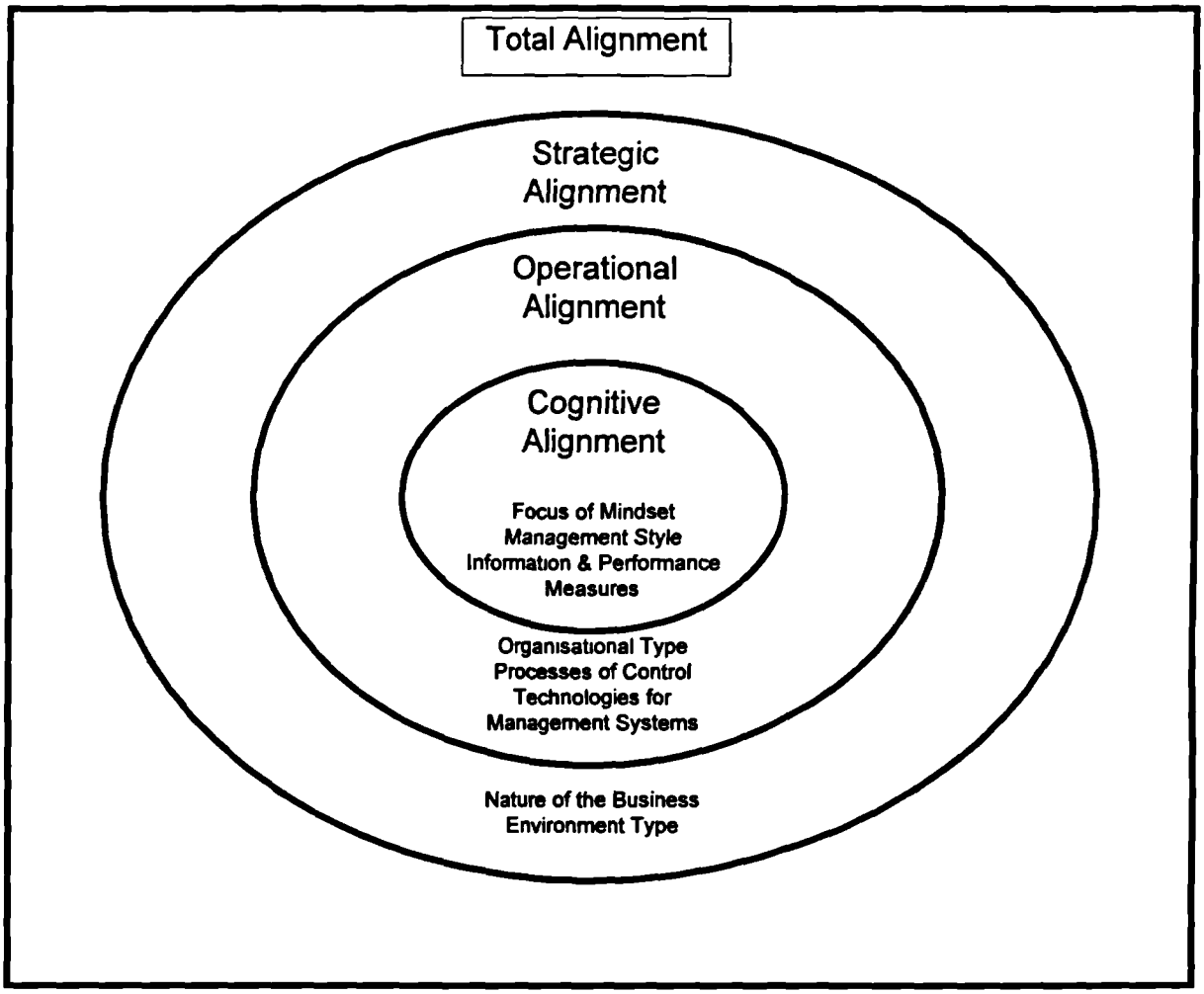
by political and methods tensions in the organisation, together with inappropriate and ineffective management and information systems.

- **strategic alignment**- the nature of the business ("N") and trends in the environment ("E"), may or may not be mutually supportive. If the environment is, for example, demanding a greater emphasis on service, and the nature of the business does not change to enable that service to be delivered, then that misalignment will be reflected in poor organisational performance. Equally, if the regulatory regime in an industry is changing, but the way in which a particular business adapts to those changes is dysfunctional, then there will also be misalignment. If, however, an organisation is continually adapting to and shaping its environment so as to satisfy the demands of that environment, then it can be said to be strategically well aligned.

- **total ENFMOPIT alignment**- the degree to which the ENFMOPIT variables are all aligned with each other is a reflection of the capability of an organisation to learn how to create its future and control its present. In other words, in an aligned organisation the interaction between the ENFMOPIT variables results in the creation of knowledge and expertise which enable the organisation to operate in a more effective way. On the other hand, where the ENFMOPIT variables are significantly out of alignment, the organisation will become irrelevant to and unable to satisfy the needs of its environment, and will fail to understand why it has become irrelevant.

These four levels of alignment are represented in diagram 30 below.

Diagram 30: The Four Levels of Alignment (Wood, 1994)




## 11.3. ORGANISATIONAL CHANGE & ALIGNMENT

Information and management systems reflect both the stable characteristics of an organisation, and its transient nature. Managers are coming to rely much more heavily on IS/IT for an accurate picture of what is happening in the business, particularly with newer, decentralised, network management styles. In addition, business reengineering (particularly where IS is the "factory", such as in service/information businesses), is creating major changes in many organisations using IS as a change agent.

All of this IS-related change must be managed effectively. This research seeks to understand whether alignment between the ENFMOPIT variables is

an indicator of effective change management and strategic control, and how misalignment can be rectified or managed if not rectifiable.

Both formal and informal information systems can be used in the role of an agent of change and as an integral part of strategic control. In order to do this however, senior management must be in agreement as to what the mission critical variables in the business are, and what the desirable level and range of each variable should be. Once this happens, the senior management team can begin to enhance, augment or scrap existing management information systems which do not provide such mission critical information.

Information systems can be coupled to the change drivers in the organisation to provide the framework within which new ways of working can be created, and control over the direction and success of the change process enhanced. An organisation's information systems may limit the capability of the organisation and its processes to deliver management's strategic agenda, due to their character being mismatched with the ENFMOPIT variables and environment, despite the operational excellence of such systems.

Management in some businesses may also be constrained by fixed measures of performance- they can, however, innovate in process, organisational and technological terms to outperform these measures. Such innovation requires individuals who are capable of leveraging both personal and corporate knowledge and expertise, enabled by effective information systems.

We need to explore whether organisations undergoing major change can realise their full potential through alignment between the ENFMOPIT variables. Will this enable them to transform information into value-adding knowledge and expertise faster than competitors & peers? Does this process

of knowledge creation build organisational & competitive advantage leading to superior performance? How?

## 11.4. RESEARCH OBJECTIVES

The research objectives have both theoretical and practical implications.

### THEORY

The research objectives are to highlight links between:

- performance (both financial and strategic)
- information systems infrastructures, technologies and management methods
- organisation types and processes of control
- management styles,
- the nature of different environment and business types

by asking:

- what is the nature of the impact of IS/IT on business performance?
- do management style, control processes, organisation type, IS and performance influence each other, and how?
- which variables impact performance most strongly?
- what is the nature of the relationship between the alignment of the ENFMOPIT variables and business performance?

This is done by testing a research model of the role of IS/IT in organisational performance, against empirical data gathered from a sample of large UK organisations described below. This model is based upon the hypothesis that alignment between the key aspects of an organisation (represented by the ENFMOPIT variables) and its environment improves organisational performance while enhancing the payoff on information systems.

Although the research does not address competitive strategy specifically, we have accounted for its impact using the Profit Impact of Market Strategy ("PIMS") database. PIMS allows us to smooth out the impact of the competitive position and strategic potential of an organisation on its performance over a three to five year period, leaving us with a truer reflection of the impact of organisational factors on the organisation's performance. A good fit should show in two ways: it will improve the strategic potential of the organisation, and result in better actual financial performance over time.

**PRACTICE**

The research aims to develop a prototype diagnostic tool which managers can use to:

- identify and select strategies and actions which will enhance the performance of their organisation by improving the alignment between those of the ENFMOPIT variables having a major impact upon performance
- improve information management in their organisations, with a corresponding improvement in their return on IS/IT.
- select the appropriate management and control style/processes for their organisation
- help prioritise change management and business reengineering programmes
- develop executive strategy, performance management and information systems which help to measure and control the mission critical variables in the business.

## 11.5. RESEARCH QUESTIONS

In generating the hypotheses which will guide the research process, we need to consider a number of questions about the factors we intend to measure. The nature and dimensions of these factors and their interrelationships provide the background against which to perceive the answers we seek to

the question: "What is the role of information systems in organisational performance?" The hypotheses related to each research question are shown in brackets.

### 11.5.1. THE LINK BETWEEN THE PERFORMANCE OF LARGE UK FIRMS, & THE ENFMOPIT VARIABLES

Q1. (H1.1. & 1.2.) Is there a relationship between the level of complexity and dynamism in an environment, the type of organisations which survive in that environment, their management style, processes of control, information and performance measures and technologies/ systems? (i.e. the "ENFMOPIT" variables)

Q2. (H1.1. & 1.2.) If so, what is the nature of that relationship, and what are its implications for business performance?

Q3. (H2) What are the implications of an increasingly complex and dynamic business environment for some large UK firms for their organisational structures, information systems and corporate control?

Q4. (H3) What role does organisational learning play in supporting the adaptation of the organisations surveyed to changes in their environments, and how do IT/IS support these processes of learning and adaptation?

### 11.5.2. ORGANISATIONAL TYPES

Q5. (H4) What is the nature of the links between the four different organisational types, and the other ENFMOPIT variables? How do these links affect alignment and performance?

Q6. Do the different organisational types exhibit different ways of learning and adapting to change in their environments, and what role does IT/IS play in the process of learning and adaptation?

### 11.5.3. PLANNING AND CONTROL SYSTEMS

Q7. (H7) In addition to financial control systems, what is the nature of the major information and management systems including planning and control systems in large UK firms?

Q8. (H8 & H17) How closely are these planning and control systems linked to information systems in such organisations?

Q9. How successful is the planning process in each firm, and does this have any implications for performance?

Q10. (H6) Are different organisation types and management styles reflected in different planning/control process and information system types?

Q11. (H9) Given the mission and/or objectives of an organisation, which variables in the organisation are considered critical for monitoring progress towards the
mission/objectives?

Q12. (H9) How well are information systems perceived to be enabling and supporting these mission critical variables?

Q13. (H10) What role does ISP play, if any, in developing systems which contribute to superior organisational performance?

Q14. (H11) What are the characteristics of the ISP processes in large UK firms, and have they advanced in the past five years?

### 11.5.3 ORGANISATIONAL CHANGE

Q15. (H12) Have the planning, control and information systems in large UK firms enabled/supported beneficial change in those organisations?

Q16. Does the degree of alignment between management style, organisational type, processes of control, information and performance measures and information systems have any effect on the ability of an organisation to achieve beneficial change?

Q17. Can the goals and direction of organisational change in large UK firms be articulated and progress towards their achievement measured?

Q18. (H12) How can IT and IS help a firm be more flexible and responsive to change?

### 11.5.4. THE ROLE OF IT & IS IN ORGANISATIONAL PERFORMANCE

Q19. (H14) In the sample of large UK organisations selected, did those who exhibited a better degree of alignment between their ENFMOPIT variables realise greater levels of benefit from their IT/IS than those organisations which were poorly aligned?

Q20. (H15) Were specific information technologies and systems mentioned as playing an important role in the performance of the research sample of large UK organisations?

Q21. (H16) How important was IT/IS perceived to be in creating organisational capability or competitive advantage in the sample of organisations?

## 11.6. HYPOTHESES

### 11.6.1. THE LINK BETWEEN THE PERFORMANCE OF LARGE UK FIRMS, & THE ENFMOPIT VARIABLES

H1.1. (Q1) The degree to which a firm's ENFMOPIT variables align with each other and the environment in which the firm operates, will be reflected in its performance.

H1.2. (Q1) Environments can be classified into four basic types, arising from the level of complexity and dynamism inherent in them :

i. a simple, stable environment, containing only one or two "players" (characterised by a monopoly or government department), with little or no change.

ii. a less simple, more dynamic environment, containing several players, with some competition between a relatively stable group of players.

iii. a complex but relatively stable environment, characterised by professional organisations such as universities, hospitals, law firms and so on. Professional and government entry barriers maintain a stable group of many hundreds or thousands of players.

iv. a complex, dynamic environment, characterised by large multinational organisations operating in global markets against a large number of competitors with rapid shifts in technologies and consumer preferences.

H2. The business environment for large UK firms is growing increasingly complex and dynamic across most industries and types of organisations, due to increasing competition, changes in technologies (particularly IT) and increasing consumer, supplier, regulatory and global competitive pressures.

H3. (Q4) The implications of this for organisations, information systems and corporate control are that, over a number of years:
i. the ENFMOPIT variables will tend to show leads and lags in relation to the environment, due to the impact of events on the organisation, particularly in rapidly changing environments;
ii. the organisation and its management will attempt to reduce the degree of misalignment between the ENFMOPIT variables through a variety of means
iii. the degree to which they have succeeded in this will be reflected in organisational performance.

### 11.6.2. ORGANISATION TYPES

H4. (Q5) Organisations can be classified into four archetypes (following the traditional distinction between organic and mechanistic organisations (described in Robey, 1991), and the author's distinction between organisations which are "closed" or "open" for information. Actual organisations comprise a mix of these archetypes , which will tend to align with their environments and the other ENFMOPIT variables if they are performing well:

i. Organic open organisations tend to operate in complex dynamic environments, with decentralised informal management styles and pluralistic flexible processes of control. Information and performance measures tend to be strategic flexible with decentralised informal tools, techiques and IT platforms.

ii. Organic closed organisations tend to operate in simple dynamic environments, with decentralised formal management style and oligarchic flexible processes of control. Information and performance measures tend to be strategic fixed with decentralised formal tools, techniques and IT platforms.

iii. Mechanistic open organisations tend to operate in complex stable environments, with centralised informal management styles and oligarchic fixed processes of control. Information and performance measures tend to be operational and flexible with centralised informal tools, techniques and IT platforms.

iv. Mechanistic closed organisations tend to operate in simple stable environments, have centralised formal management styles, with monarchic fixed processes of control. Information and performance measures tend to be operational and fixed with centralised formal tools, techniques and IT platforms.

H5. The degree of misalignment between the ENFMOPIT variables will highlight significant political and method tensions in an organisation. Severe internal misalignment will lead to a poor payoff on IS investment.

### 11.6.3. PLANNING AND CONTROL SYSTEMS

H6. (Q10) Strategic control theories (Goold and Campbell, 1987; Goold and Quinn, 1990) are useful in explaining the role of IS in organisational performance, in that organisations operating in simple, stable environments will emphasise operational controls, while those operating in complex, dynamic environments will emphasise strategic controls.

H7. (Q7) Judging by the estimated £3 million annual IT spend for medium to large UK firms estimated by Grindley (Price Waterhouse IT Review 1990),

the planning and control systems in large UK firms will tend to be sophisticated. The effectiveness of such systems in supporting organisational performance and change, will however, vary dramatically.

H8. (Q8) The closeness of the links between such planning and control systems and information systems in such organisations will vary.

H9. (Q11 & Q12) Information systems will be perceived by top management to be enabling and supporting a variety of mission critical variables in all firms, though the perceived benefits will differ from the actual benefits in many cases.

H10. (Q13) That though information systems planning success is not directly related to organisational performance, ISP plays a useful role in developing systems which contribute to superior organisational performance when ENFMOPIT alignment exists.

H11. (Q14) That the links between information systems planning and corporate planning are tenuous at best in a substantial proportion of cases, reinforcing a lack of alignment between the ENFMOPIT variables where such misalignment exists.

### 11.6.4. ORGANISATIONAL CHANGE

H12. (Q15 & Q18) Over a period of five years those organisations which use IS as a substantial part of a major change process will dramatically improve their performance if alignment between the key organisational variables is maintained.

### 11.6.5. THE ROLE OF IT & IS IN ORGANISATIONAL PERFORMANCE

H13. Despite high levels of expenditure on IS, those organisations with poor organisational and management system/environment alignment will fare as badly if not worse than those with substantially lower levels of IS spend.

H14. (Q19) In the sample of large UK organisations selected, those which exhibit a better degree of alignment between their ENFMOPIT variables will state that they have realised greater levels of benefit from their IT/IS than those organisations which are poorly aligned.

H15. (Q20) Most organisations in the research sample will be able to identify one or more applications which have played an important role in their performance over the five year period under observation.

H16. (Q21) IT/IS will be perceived by the directors interviewed to be essential in creating organisational capability or competitive advantage in the sample of organisations.

H17. (Q8) IS infrastructures and applications portfolios will tend to reflect the operational or strategic control emphasis in various ways. Some firms will opt for centralisation/ formalisation of both strategic and operational controls, while others will opt for decentralised/informal controls or use a mixed approach somewhere between these two. From the perspective of organisational performance, what matters is the degree of alignment between the organisational variables rather than the level of management system and IT/IS centralisation/formalisation in itself.

## 11.7. RESEARCH METHOD

The aim of this section is to develop an argument for an appropriate research programme which takes into account:

- existing research and current thinking about information systems, strategic management and planning
- the range of possible research methods which could be applied in this context and
- their appropriateness to the goals of a research programme into the role of information systems in control, learning and organisational performance, flowing from their strengths and weaknesses.

The taxonomy of information systems research methods developed by Galliers and Land (1987) is drawn upon, together with models of the information systems research process developed by various authors. A case is then made for the use of particular research methods appropriate to understanding the role of information systems in control and adaptation, based upon the taxonomy and models described. The research programme designed to optimise this enquiry is then proposed. The programme has at its core several research hypotheses and questions, which are developed initially in the theory development phase above. The survey phase of the research is used to validate and explore each of these hypotheses, as well as to contribute to an overall model of the role of information systems in control and adaptation in organisations and their role in organisational performance.

### 11.7.1. INFORMATION SYSTEMS RESEARCH PROCESS MODELS AND A TAXONOMY OF RESEARCH METHODS

#### THE RESEARCH PROCESS

Jenkins (1986) has suggested the following model of the information systems research process:

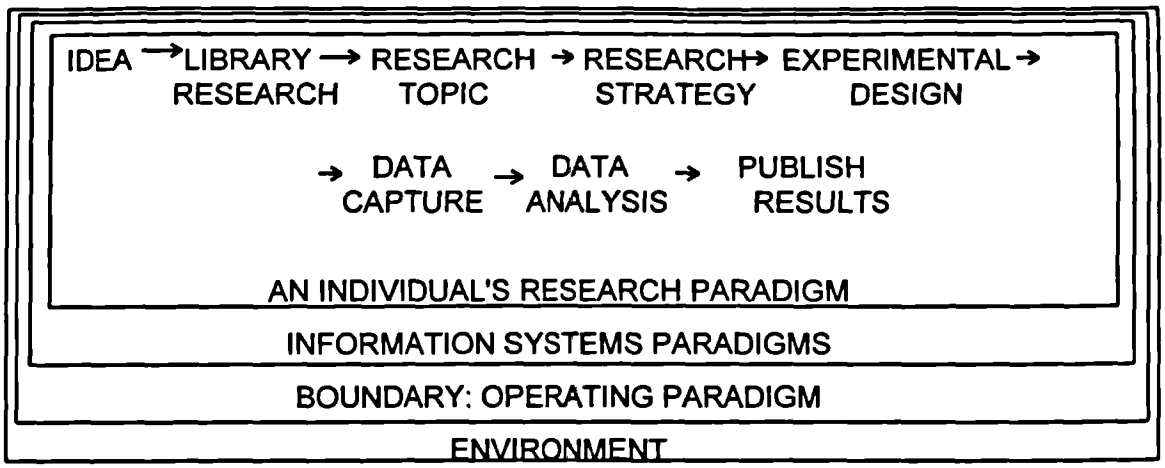



**DIAGRAM 31: MILTON JENKINS' MODEL OF THE INFORMATION SYSTEMS RESEARCH PROCESS**

Once the initial research idea is generated and library research done, the research topic must be formulated: a clear, unambiguous statement of the research objective flows from this step. The selection of an appropriate research methodology through the evaluation of the way in which the various methodologies support the research objective is the key output of the research strategy phase. The selection of a formal experimental design then follows, together with the analysis, examination and selection of research procedures.

The data capture phase focuses on both method and procedure. Method includes tradeoffs such as survey versus sample, while procedure involves tradeoffs such as questionnaire versus interview, observation versus self-reporting and so on. Data analysis requires the researcher to think about and interpret the findings both quantitatively and qualitatively. The choice and application of appropriate statistical techniques is also relevant at this stage. Finally, the publication of results is the most essential phase, in which the researcher must explain clearly what he did in each of the seven preceding phases, and detail the findings of the research and their implications.

### 11.7.2. A TAXONOMY OF RESEARCH METHODS

The work of Van Horn (1973), Ein-Dor and Segev (1981), Ives et al (1980) and Vitalari (1984) develops a five-fold IS research classification revolving around:

- laboratory experiments
- field experiments
- surveys
- case studies and
- conceptual or non-data research.

Galliers and Land (1987) have summarised the eleven basic information systems research modes into a taxonomy which focuses on the subject of the research as the determining factor in deciding upon the appropriateness of a particular research mode:

TABLE 2: A TAXONOMY OF INFORMATION SYSTEMS APPROACHES (Galliers & Land, 1987)

| *SUBJECT* / *MODE* | Society | Organisa-tion/Group | Individual | Technology | Method |
|---|---|---|---|---|---|
| Theorem Proof | No | No | Yes | No | No |
| Laboratory Experiment | No | Possibly (small groups) | Yes | Yes | No |
| Field Experiment | Possibly | Yes | Yes | Yes | Yes |
| Case Study | Possibly | Yes | Possibly | No | Yes |
| Survey | Yes | Yes | Possibly | Possibly | Yes |
| Forecasting | Yes | Yes | Possibly | Yes | No |
| Simulation/ Game/Role Playing | Possibly | Yes | Yes | Yes | Yes |
| Subjective/ Argumentative | Yes | Yes | Yes | Yes | Yes |
| Descriptive/ Interpretive | Yes | Yes | Yes | Possibly | Yes |
| Action Research | Possibly | Yes | Possibly | No | Yes |

Orlikowski and Baroudi (1991) examined 155 information systems research articles published between 1983 and 1988. They found that although the research is not rooted in a single overarching theoretical perspective, it does

exhibit a single set of philosophical assumptions regarding the nature of the phenomena studied, and what constitutes valid knowledge about those phenomena. The authors argue that much can be gained if a plurality of research perspectives is effectively employed to investigate information systems phenomena. Of the three major research epistemologies (positivist, interpretive and critical studies), they found that 96.8% of the 155 articles were based upon the positivistic approach, using survey or laboratory oriented research methods within a single cross section or slice of time.

This research uses a combination of survey, case study and mixed method with multiple snapshots of the respondents. The objective is not only to describe the respondents, their businesses and information systems, but also to trace the development of their organisations, systems and performance through time. An interpretive approach to the questionnaires and interviews is used, taking the view that the world is not a fixed constitution of objects, but an emergent social process- "an extension of human consciousness and subjective experience" (Burrell and Morgan, 1979). The aim is to understand how the members of a social group (i.e. directors and managers), through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions of the members help to constitute their social action.

The interpretive approach is based upon the epistemological belief that:

"Social process is not captured in hypothetical deductions, covariances and degrees of freedom. Instead, understanding social process involves getting into the world of those generating it." (Rosen 1991).

Interpretive techniques allow participants to use their own words and images, and to draw on their own concepts and experiences. As Daft and Wiginton (1979) point out:

"If complex organizational behaviours are modelled as if they are simple, well understood deterministic systems, or even as stochastic systems, then the resulting models will tend to be insignificant. We propose that languages of high variety are useful tools for developing models of organizations because they have sufficient scope and richness of meaning to describe organizational processes."

### 11.7.3. RESEARCH METHOD & PROCESS

This research uses four methods:

**a. Theoretical work**- the fields of strategic management, organisational behaviour, control, planning and IS/IT were thoroughly surveyed in order to understand the role of information and IS/IT in organisational performance according to the current state of knowledge in those fields.

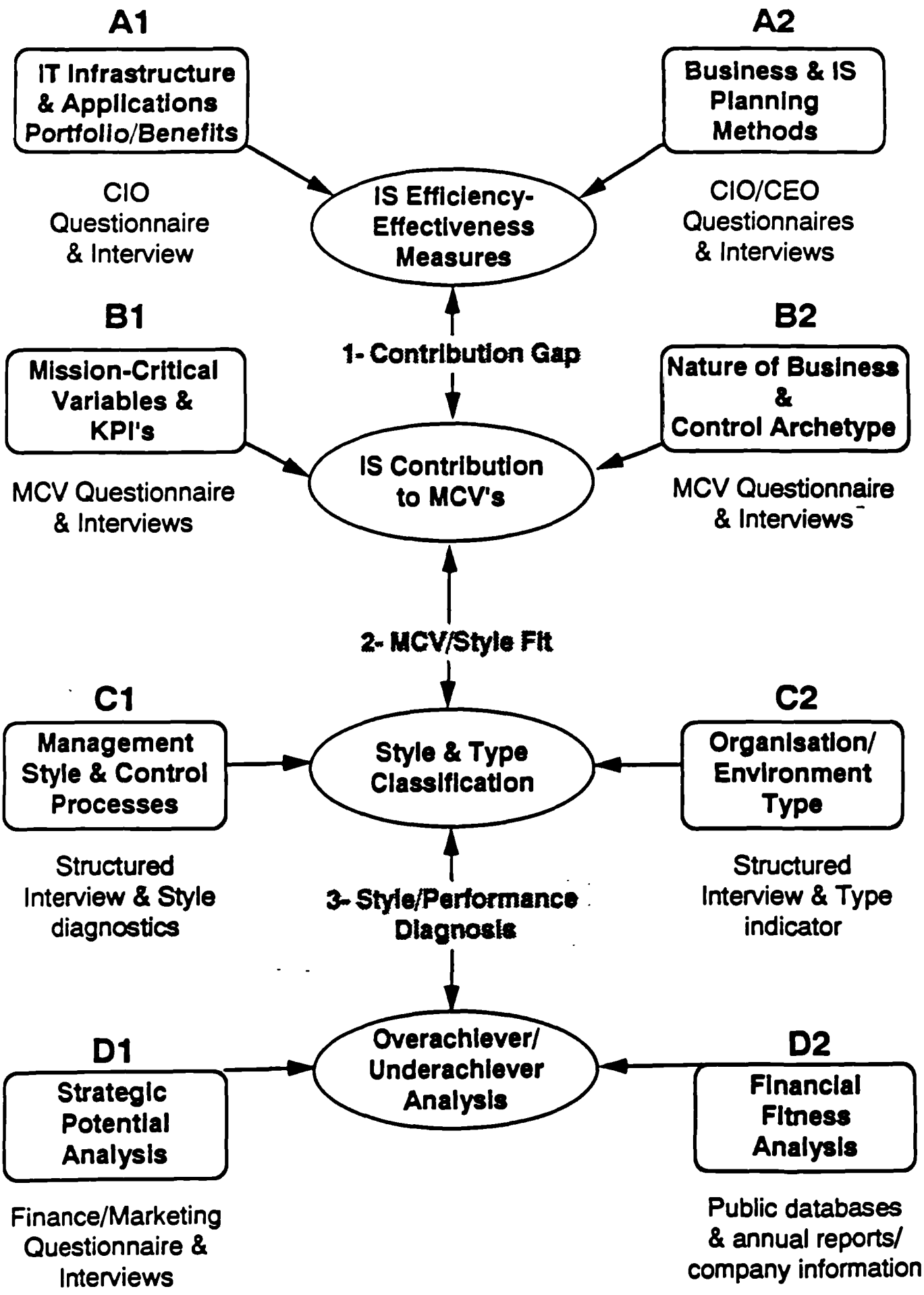
**b. Questionnaires**- four sets of questionnaires were used to establish the nature and effectiveness of information and planning systems in 24 firms in the UK top 500, and the impact of information systems and technology on business performance in these firms.

**c. Interviews**- 72 directors of the participating organsiations were interviewed to confirm questionnaire findings and gather more detailed information on the nature and strategic context of their organisations.

**d. Database modelling**- the PIMS, EXTEL and other financial databases were used to establish the financial performance and strategic position of the respondents.

The research process has four components, as illustrated in Diagram 32.

DIAGRAM 32: RESEARCH PROCESS- COMPONENTS



**COMPONENT A. IT/IS Infrastructure/Applications/Benefits and Business/IS Planning Methods**

The objectives of this component of the research and questionnaires A1 and A2 are to explore and document:

- the educational and career backgrounds of the respondents, by profiling the IT directors/managers who completed the questionnaire in terms of their experience, education and career record.

- the organisation's information technology infrastructure, in terms of hardware, telecommunications, applications portfolio, and software development methods/languages.

- the uses and benefits derived from that infrastructure, including strategic (organisational and competitive advantage), value-adding and user benefits.

- how the organisation plans for its business, to provide greater detail about the nature and effectiveness of planning processes, and the links between such processes and information systems planning.

- how the organisation plans for information systems and to track trends in information systems planning against Galliers' 1987 results, enabling a longitudinal comparison to be drawn.

- how successful such business and information systems planning processes are. Particular emphasis is placed upon the relative success of the different information systems planning methods in use, and the perceived reasons for the success or failure of such methods.

Particular IS efficiency and effectiveness measures can be arrived at from the data provided in A1, and compared across the sample of firms and against other IS efficiency research findings.

A 30 page questionnaire (A1) is completed by the chief information officer in each organisation, and information therein is confirmed at a subsequent interview. The questions relate to the firm's information systems infrastructure, application portfolio, system functionality, use and benefits. The two parts in this section reflect the various levels at which information systems are specified, implemented and used. The head of information systems is then asked to describe the information systems planning approach currently in use, and how successful it is, and if unsuccessful, why it is so. The CEO's views on the planning methods in the organisation are also covered in the CEO questionnaire and interview (A2). As described in 11.8.1., the views of the two to four directors interviewed in each organisation are cross-checked and then summed to provide a composite score for each organisation.

A copy of questionnaires A1 and A2 are attached as Appendices A & B.

**COMPONENT B. Mission Critical Variables, Nature of the Business and Control Archetype**

The objective of this research component is to document the strategic challenges facing each of the participants, and the nature of the business of each participant for control purposes.

A 15 page questionnaire (containing B1 and B2) is completed by the CIO, CEO and a marketing/finance/planning manager or director, to establish what they see as the mission critical variables in their business, and how IS/IT has supported them. At the same time, they are asked about the nature of their business using Goold and Campbell's (1987) framework, to

determine what control archetype the organisation tends to in theory: operational or strategic.

The comparison of the results of questionnaires A1/2 and B1/2 enable any contribution gaps between what the respondents consider to be mission critical variables and the level to which IS/IT has supported/enabled their control and or influence over these variables, to be identified. A large contribution gap may indicate that IS/IT investment is going into the wrong areas, or is being poorly planned for or implemented. A copy of questionnaire B1/2 is attached as Appendix C.

**COMPONENT C. Management Style, Control Processes, Organisation and Environment Types**

The objective of this research component is to classify each participant in terms of their environment (simple stable, complex stable, simple dynamic and complex dynamic), management style (centralised formal, centralised informal, decentralised formal and decentralised informal), organisation type (mechanistic closed, mechanistic open, organic closed and organic open), and processes of control (monarchic fixed, oligarchic fixed, oligarchic flexible and pluralistic flexible).

An interview structured around a 3 page questionnaire (containing elements C1 and C2), is conducted with the CEO, CIO and another manager/director to establish what the interviewee thinks their organisation's management style, control process and organisation/environment type are.

The alignment between the management style, organisation type, processes of control and the style implied by the mission critical variables and control archetype identified in stage B can then be assessed. A copy of questionnaire C1/2 is attached as Appendix D.

**COMPONENT D. Overachiever/Underachiever Analysis**

The objective of this component of the research is to determine which of the participants are "overachievers" and "underachievers". Overachievement means that the firm's financial performance over a five year period exceeded the level of performance which one would have expected from the strategic position of the firm as measured by the PIMS PAR score. The PAR score is calculated using statistical software to compare the 15 key strategic and operational variables which explain 80% of a firm's performance, with the 3 000 other business units in the PIMS database.

The financial fitness and strategic potential of the organisation are measured using three to five years financial history and marketing/ production information which is captured into the PIMS database. From this analysis we can tell whether an organisation is performing above or below its strategic potential.

These four components provide the basic data to assess whether the environment and ENFMOPIT variables are aligned, and what impact this has on performance. Further evidence is gathered in the form of background material on each organisation, together with structured interview notes which provide a "case history". A copy of questionnaire D1/2 is attached as Appendix E.

### 11.7.4. FIELD RESEARCH PROCESS

The field research process commenced in January 1990 and was completed in March 1992. Over these two years, over 180 questionnaires and 72 interviews were completed by 72 directors in the 24 participating organisations. What follows is a brief account of progress over these two years.

### 11.7.4.1. OVERVIEW OF THE RESEARCH PROCESS

A pilot questionnaire was designed in mid 1989. Whitbread acted as the first respondent before the launch of the pilot in November 1989. Thanks to their assistance, the questionnaire was redesigned into four parts, rather than the unwieldy prototype. In January 1990 the strategic planning managers and IT directors at five companies selected from the sample were contacted. Despite the apparent length of the overall mailing, the actual time required to complete each section individually was no longer than an hour at most- provided the correct person in the organization filled in his/her section. The CEO's section tended to be completed on his behalf by planning/accounting staff in the division.

The Chairman of PIMS Associates, Keith Roberts, kindly vetted the section of the questionnaire relating to PIMS data, so that the intervals set in each question were grouped around the mean value for that item in the PIMS database.

The pilot study appeared to confirm that the questionnaire format was effective, being both unambiguous and easy to complete. The questionnaire definitely provided sufficient data to enable the hypotheses to be tested in conjunction with interview material.

Following the pilot survey, 500 questionnaires were mailed to the strategic planners/business development directors of the 500 largest corporations in the UK (as measured by revenue). The questionnaires were targeted for completion by main board directors, so it was expected that approximately ten percent would be returned completed.

The pilot study results were not confirmed in the main questionnaire mailing, however. Although 40 companies completed one or more parts of the questionnaires, only 24 made it to the end of the research process. The

questionnaire proved to be complex and lengthy for many respondents, resulting in a lower response rate than was initially anticipated (4.6% actual as opposed to 10% expected). There was probably also a sample bias in the pilot firms, who may have had a greater interest in the subject of the research than those who did not complete. Given that many of the respondents in each organisation were exceptionally busy, top level directors of some of the world's largest organisations, it is still impressive that so many were prepared to dedicate many hours of their time to the questionnaire and interview process.

The 24 organisations who completed the questionnaire and interview programme in full are:

| | |
|---|---|
| BBA | Prudential Insurance |
| BIS | Rank Xerox |
| Bull HN | Rover Group |
| BUPA HI | Sainsburys |
| CAA | Shorts Aviation |
| Enterprise Oil | Southern Water |
| Extel | TSB Bank |
| Friends Provident | TWIL |
| Hill-Samuel Merchant Bank | Watson & Philip |
| ICI C&P | Welsh Water |
| ICI Fibres | WH Smith |
| Josiah Wedgwood | Lloyds Register |

### 11.7.4.2. THE FOUR RESEARCH PROCESS COMPONENTS

The following progress was made in respect of each of the four research process components:

### COMPONENT A: IT/IS Infrastructure/Applications/Benefits and Business/IS Planning Methods

24 information systems directors completed questionnaire A1/2 in 1990, and the results were analysed in September 1990. Some of the preliminary conclusions were presented to a conference entitled "Transforming Organisations through Information Management" at London Business School on 3 October 1990.

The phase two questionnaire was sent out to the 24 respondents in March 1991. Data from the EXTEL and PIMS databases about each respondent was also compiled at this time.

### COMPONENT B: Mission Critical Variables, Nature of the Business and Control Archetype

These questionnaires were completed in 1991 and early 1992 at a variety of stages in the research process, by two to three of the directors in each organisation involved in the interviews forming part of component C. The questionnaires were analysed cross-sectionally and interesting or anomalous information in them used as prompt questions in the interview process.

### COMPONENT C: Environment, Management Style, Control Processes, and Organisation Types

Each of the 72 directors interviewed in the 24 respondents was interviewed in two stages:

First, the management style, organisation types and processes of control questionnaires were completed together with them, and interesting or important comments noted. These interviews lasted between one to three hours, occasionally involving a second session or telephone call. Although it would have been ideal to be able to "shadow" these directors and interview the other members of their board and management team, this was just not physically possible in 24 of the UK's largest organisations. Booking even

ninety minutes in the diary of a managing director of a multi-billion pound firm is a time consuming process!

Secondly, each interviewee was asked:

- what they saw as the current benefits of IT/IS in the firm
- what future benefits IT/IS could deliver in their organisation

A questionnaire detailing the IS/IT benefits in each firm is attached as Appendix F.

A comprehensive interview note was prepared during and after each interview, detailing both the interviewer's impressions and noting the verbatim comments of the interviewee which had been noted. Extracts from company annual reports and newsletters were also added to this note to provide some background to the interviewees and their organisations. Interview notes from previous interviews were used in preparation for subsequent interviews in the same organisation, to sharpen the listening and probing process of the interviewer.

**COMPONENT D: Overachiever/Underachiever Analysis**
**Financial Performance**

The Extel, ICC and Dunn and Bradstreet databases together with published annual reports, press clippings and internal confidential documents were used to create a profile of the financial performance of each of the 24 business units over a five year period. 36 financial ratios were used, grouped as follows: growth ratios (8), profitability ratios (4), revenue ratios (4), credit ratios (5), gearing ratios (4), productivity ratios (7) and value-added ratios (4). The key growth ratios were used to rank the participants' according to their financial performance over the five year period 1985-1989. The 1990 and 1991 performance of these organisations was also added, to provide a seven year overview of financial performance.

**Strategic Performance**

This part of the research uses the PIMS database to compare the 24 participating business units against each other, and against the 3 000 plus business units in the database. The purpose of such profiling is to:

- establish the strategic position and potential of each business, and movements in position over the seven year period 1985-1991.

- measure and interpret the impact of environmental conditions on the performance of the firm, and on planning and information systems in the firm.

- understand the links between over/underachievement in the context of firm's environment, management style, organisational type, processes of control, information and performance measures and IT/IS.

The strategic position and potential measurements can be used in two ways to further our understanding of each organisation and its systems:

- to appreciate the implications of their strategic position for their information management needs/imperatives- are information systems evolving in response to the critical strategic challenges facing the firm?

- to examine the relationship between the firm's information technology investments and performance- are systems being identified, selected, designed, built and operated to enhance the firm's strategic position in the longer term?

The financial, marketing and planning directors in each participant company completed the questionnaires attached as Appendix E. The strategic position and potential data was analysed with the aid of the PIMS limited data set

programme, to calculate the "PAR" measure which indicates the strategic potential of each participant. These PIMS PAR results were captured on a large spreadsheet together with the financial results to provide the financial and strategic performance rankings.

### 11.7.5. QUESTIONNAIRE AND INTERVIEW ANALYSIS

The results of components A to D were normalised to fit onto the wheel diagnosis described in diagram 28 for each participant organisation. The key elements of this diagnosis are highlighted in diagram 33, and explained below. The wheel profile enables the relationship between the ENFMOPIT factors and over/underachievement to be identified visually, and forms the basis of feedback provided to the participants subsequent to the research programme.

### INTRODUCTION TO THE ALIGNMENT WHEEL

There are eight spokes on the wheel and three kinds of spokes: strategic, organisational and management systems. Each of the eight spokes represents a composite index of a large number of underlying variables (over 400 in all), and each variable is measured using a standard scale. The ends of each scale represent opposite extremes. The position of each organisation on each scale represents the balance struck between these two extremes at a point in time (when the interview or questionnaire was completed). The different ends of each scale are listed after the description of each spoke.

The strategic spokes, which tend to "lead" the other spokes, are:
-the organisation's **environment**, comprising its stakeholders (e.g. customers, employees, shareholders, suppliers), its competitors and other external agencies such as regulators. Social and technological change have a major influence on the relationship between these groups; (varies from simple, stable to complex, dynamic). The environment spoke is derived from

component C, as described by the interviewees and corroborated by the PIMS measures.

-the **nature of the business** reflects several aspects of the kind of markets served, products and services offered and resources and technologies applied by the organisation; (varies from systematic processor with hard infrastructure (like a railway) to versatile innovator with soft process (like a theatre company). This spoke is derived the answers to the questionnaire in component B.

The organisational spokes, derived from component C, are:
-the **focus of the organisation's mindset,** which is reflected in the extent to which management are focused outward towards the environment, or inward towards the organisation; (varies from internal to external).

-the **management style** of the top executives and senior managers in the organisation, which describes how responsibility is shared, resources are allocated and controlled, objectives are set and monitored and how leaders behave; (varies from centralised formal to decentralised informal).

-the **organisational type** which comprises its culture, structure, and the way in which work is done and information created and shared; (varies from mechanistic closed (like a government department) to organic open (like a small entrepreneurial firm).

-**processes of control**, which describe in more detail the way in which the jobs and roles in an organisation are defined, managed and rewarded; (varies from monarchic fixed (where power is held by a few and controls are rigid) to pluralistic flexible (where power is widely distributed and controls are adaptable)).

The management systems spokes are:

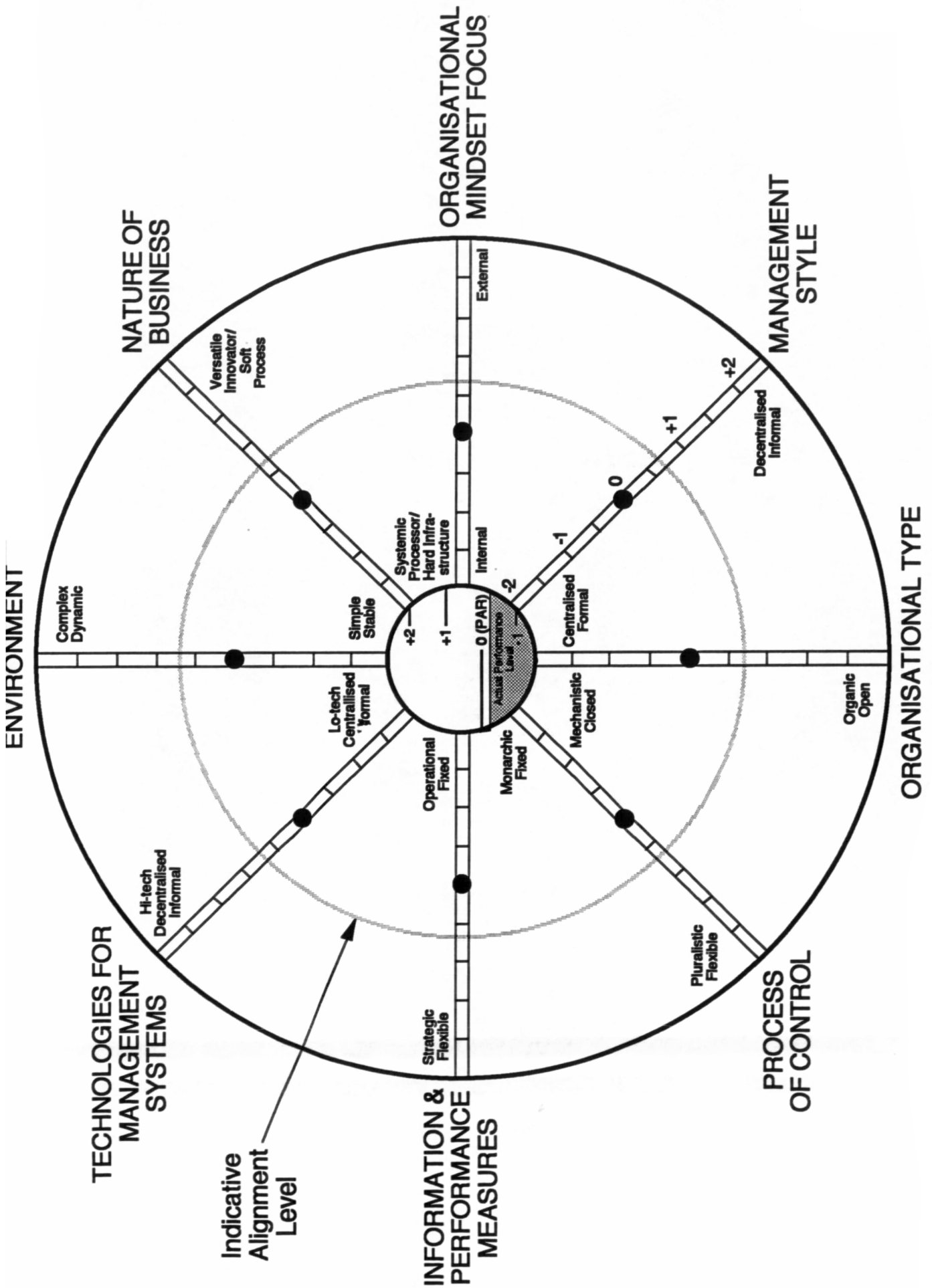
-**information and performance measures, which** embody the strategic and operational parameters that the organisation considers to be critical to its success; (varies from operational fixed to strategic flexible). This variable was derived from component B.

-**technologies for management systems, which** represent the formal systems available to management and employees to run the business, including IS/IT infrastructures, planning and budgeting systems; (varies from low-tech, centralised formal to high-tech, decentralised informal). This variable was derived from component A.

**PERFORMANCE LEVEL**

The circle in the middle of the wheel represents the performance level of the organisation. The performance level is measured by taking the organisation's five year financial performance and comparing this with the strength of its underlying strategic position (using the Profit Impact of Market Strategy model). A full circle represents high performance. An empty circle either means the organisation did not contribute sufficiently accurate PIMS data to get a score (where explicitly stated in 6 of the cases), or that the organisation is an underachiever. In cases where insufficient PIMS data was available, other financial measures were used to score performance, but not

**DIAGRAM 33: THE WHEEL PROFILE- PROFORMA EXAMPLE**
**(Wood, 1993)**



represented on the wheel. A partially full circle means that the organisation is neither a high or underachiever, but performing at the level indicated.

### INDICATIVE ALIGNMENT LEVEL

The scores reflecting the nature of their environment and business were used to set the indicative alignment level for each organisation. This level is represented by the shaded circle on the wheel. The indicative alignment level is important as it strongly influences the desirable level of the other wheel variables. The direction of movement of the indicative alignment level, though not shown on the wheel, also influences the direction in which the other variables should be moving. For example, if the indicative alignment level is moving outwards (from a simple, stable environment and systematic processor / hard infrastructure business type to a complex, dynamic environment and versatile innovator / soft processor business type), then the other variables should follow.

### WHEEL PROFILE PATTERNS

Certain generic patterns may be able to be discerned from the wheel profiles, which may be useful in diagnosing the situation an organisation is in and what it could be doing to improve its performance through better management of the ENFMOPIT variables.

## 11.8. RESEARCH METHOD: DESCRIPTION OF MEASURES AND THEIR SIGNIFICANCE

The central aim of this research is to test whether superior performance in organisations is, (adjusted for relative strategic position), a function of the alignment between the ENFMOPIT variables. We will now describe the way in which the ENFMOPIT variables were measured, and their significance for the central hypothesis.

### 11.8.1. DIRECTOR PERSPECTIVE

The most important aspect of the way in which many of the research variables were measured, was the way the perspectives and opinions of the directors of the participating companies were solicited. In order to ensure consistency between each questionnaire and interview event, the interviewer used exactly the same set of questions in every interview, in the same order. Respondent replies were recorded on the same interview framework and diagrams each time.

The variables which could be said to be most subjective in their nature are:

- focus of top management's mindset- it would be difficult to obtain this information from any other source apart from the directors themselves.
- management style- given further time and resource, it would have been possible to verify the views of the directors on their management style at other levels in the organisation. The consistency between the content derived from the completion of the questionnaires, and the actual impressions of the interviewer, was checked when the interview notes were written up and analysed.
- processes of control- directors who are influenced by fashion in management styles may have been inclined to portray their processes of control as more enlightened than actually are. The cross-check between management style and organisation type with processes of control provided a control on such "wishful thinking".
- information & performance measures- the mission criticality of the measures selected by directors is clearly a matter of experience and judgement. It is not possible to second guess the view of directors on this subject, except to conduct an extensive post-mortem on each of the participant companies to test whether the variables they believed to be mission-critical, turned out to be so.

The variables on which director's perspectives could be cross-checked against objective evidence were:

- environment- the director's assessment of the nature of the environment in which their business operates, was cross-checked against the PIMS variables, financial reports and financial results. These sources, together with press clippings and Extel news excerpts, provided some record of the nature of the competitive game being played in each of the industries in which the participating companies operate.
- nature of the business- the director's assessment of the nature of their business, was cross-checked against the PIMS and financial data.
- organisation type- much published material exists in the public domain about many of the participating companies. The directors diagnosis of organisation type could in some cases be corroborated by this material, and the cross check with processes of control and management style.
- technologies for management systems- this area is the most objective and least controversial of all the ENFMOPIT variables. Most of the underlying measures which comprise the T variable are capable of being verified in some detail, such as computing and telecommunications infrastructure. Planning and management systems and procedures can also be verified, though with greater difficulty.

The view of a fellow director/s forms a useful cross-check on the accuracy and authenticity of the views and perspectives of a director. As a minimum of two and maximum of four directors were interviewed in each company, any divergence in their views was examined particularly carefully. The questionnaire and interview responses were fed back to each respondent, and the chief executive of each company was shown the responses of his directors for comment. Although the responses of each director were not allowed to be changed by the CEO, his comments on the discrepancies were often revealing. In a few cases, relatively new directors had obviously interpreted the organisation as being more "liberal" than the old-guard. The

CEO's tended to be most realistic about their organisation, and reflected the consensus opinion most often.

### 11.8.2. OVERVIEW OF THE ENFMOPIT MEASURES

The environment variable measures the complexity and rate of change in the environment of an organisation. The management style and organisation type variables measure the capacity of an organisation to respond to or enact changes in and manage the complexity of its environment. The processes of control and information and performance measures variables describe the systems in place to manage the organisation, and how flexible and responsive those systems are to change. The technologies for management systems variable measures the maturity and effectiveness of the IT/IS processes and infrastructure in an organisation.

Each one of the ENFMOPIT variables are described below in terms of the variables which comprise them. Each variable is described, together with the question which is asked of interviewees about the variable in question. In almost all cases, interviewees were asked to select between two opposite ends of a spectrum for a particular variable, and indicate the nature and strength of that variable. If the interviewee felt a variable lay to the left-hand-side of the scale, then this view was scored as a negative number using two different scales for different variables:

- where a "type" selection was being made (for example, type of environment and organisation), then a scale of -3, -1, +1 and +3 was used
- where an opinion on the different elements of the management style or processes of control was being given, for example, then a wider ranging scale of -5 to +5 was used.

The N variable was scored using a three interval scale of -3, 0 and +3, while the I variable was scored using a scale of 1 (irrelevant) to 5 (mission critical).

The F variable was then derived from the I variable using a weighting scale of -3 and +3 for internal and external variables.

Each of these scales was then normalised using a simple arithmetical procedure to equalise each scale by dividing the absolute scale (3 or 5, for example), into the overall results for each variable.

#### 11.8.2.1. Environment

Interviewees were asked the following question about the environment in which their business operates, and then given an explanation of each environment type: In which of the following four environment types does your organisation operate: simple, stable; complex, stable; simple, dynamic or complex dynamic?

(Simple means one to a few players with simple technologies and business processes, complex means many players with complex technologies and business processes; stable means little or no change in the environment and the way in which the firm and its competitors operate and compete; dynamic means that the environment and the way in which the firm and its competitors operate and compete is changing frequently).

Simple stable environments were scored as -3; complex stable scored -1; simple dynamic scored +1; and complex dynamic scored +3.

#### 11.8.2.2. Nature of the Business

Three dimensions of "N" were measured, each in a different way. The first two measures are qualitative and interpretative, based upon the judgment of the researcher. These two qualitative variables were used to flesh out the quantitative response gathered from respondents using the third dimension of the "N" variable.

**N1. Mode of operation and infrastructure**- the diagnosis as to whether a business tended to be a systematic processor with hard infrastructure, or a versatile innovator with soft process, was based upon two sources: a reading of the company's annual report, and anecdotal evidence gathered in the 72 interviews about each business. The PIMS analysis of each organisation was used to corroborate the impressions gained through these two sources.

**N2. Distinctive capabilities & core competencies**- interview material was used to gain an impression of whether the organisation in question relied upon its organisational architecture, strategic assets, reputation and/or innovation for its competitive advantage. The PIMS analysis also informed these impressions.

**N3. Criteria of good performance**- each of the 72 respondents was asked to score eight aspects of the nature of their business on a scale from -3 (representing "many, long and high" region of the variables) to 0 (representing "some, medium and average" region of the variables) to + 3 (representing "many, long and high" region of the variables) .

The eight aspects are:

- number of important linkages between businesses (linkages can be forms of either vertical or horizontal integration)
- number of "bet your company" decisions (irrevocable, major investments the failure of which would be affect the viability of the organisation)
- level of diversity (number of **different** businesses within the organisation)
- level of uncertainty (reflected by the ability to plan ahead for more than a few months/year at a time with any degree of accuracy)
- rate of change (rate of new product innovation, new entrants into the industry and new substitutes for the organisation's products or services
- number of easily measured sources of advantage
- number of multiple, complex, hard to measure sources of advantage

- average time-lag between investments and paybacks for major projects.

The average score for each organisation of the sum of these eight variables was used as the "N" variable in the statistical analysis, while the mode of operation and distinctive capabilities assessment was used to interpret the quantitative criteria of good performance measure.

#### 11.8.2.3. Focus of Top Management's Mindset

The 72 respondents completed a questionnaire which asked them which of a set of variables in their business were "mission critical". As indicated in Appendix F, eight of these variables were externally focussed, such as leadership, entrepreuneurial qualities, service responsiveness, ability to innovate quickly, good marketing management, customer power, effective strategic controls and effective formal planning systems; seven were internally focussed, such as good management, flatness of structure, core competence focus, high capacity utilisation, high productivity, tightly controlled costs and good information and control systems. The other twenty on the list of candidate MCV's were neutral.

Those variables which were evaluated for their "mission criticality" by the respondents were scored from 1 (irrelevant) to 5 (critical to performance). In order to arrive at the "F" score for a respondent, the 20 internally/externally neutral variables were simply left with their original score of 1 to 5. The eight externally focused variables were weighted by multiplying their original score by a positive 3, and the seven internally focused variables were similarly weighted by multiplying their original score by a negative 3. The sum of the MCV's for each respondent then adds up to either a positive (external) or negative (internal) score, with those with a neutral score being balanced between the two.

The decision to weight the external MCV's with a positive number was based on the assumption that organisations which were in changing environments would need to be more externally focused in order to learn from that external change, and would thus need to be more organic open. The negative weighting for internal MCV's was based on the assumption that organisations in stable environments would be more likely to be internally focused, and would therefore be more likely to be mechanistic closed in character.

#### 11.8.2.4. Management Style

The management style diagnosis is based upon six pairs of opposite characteristics. Each interviewee was asked to describe the management style amongst the cadre of top/senior managers in their organisation (a group of between 50 to 200 managers, depending upon the size of the organisation). The six sets of style variables were selected from the work of Goold and Campbell (1987) on strategies and styles. They are:

**M1. Management of Overlap: Clear Responsibilities vs Multiple Perspectives-** are objectives and activities assigned to specific individuals according to their function and/or speciality, or are all senior managers encouraged to look at and take responsibility for groups of objectives and activities on a cross functional basis?

**M2. Nature of Planning Processes: Detailed Reviews vs Entrepreneurial Decisionmaking-** are planning processes characterised by a high level of detailed review, or are individual managers encouraged to make many entrepreneurial decisions within an agreed framework?

**M3. Leadership Style (Themes, Thrusts and Suggestions): Strong Leadership vs Business Autonomy-** does senior management exercise much influence in direction setting through, for example, group themes, thrusts and suggestions about quality or specific product/market areas, or

are individual business units encouraged to develop their own directions within an agreed framework? What level of involvement does senior management prefer in operating company strategic decisionmaking?

**M4. Objectives: Long-Term vs Short-Term**- are the objectives of the business set several years into the future (for example, five years and longer), or do you operate largely on shorter-term objectives (for example, one to two years).

**M5. Controls: Tight Controls vs Flexible Strategies-** does senior management emphasise tight control over more flexible strategies for the organisation and its operating units?

**M6. Resource Allocation: Long-Term Strategies vs Short-Term Payback-** is the bulk of the resource of the firm being allocated to a few long-term, large projects/areas, or is it being allocated to many small, short-payback projects?

### 11.8.2.5. Organisation Type

For the organisation type, four quadrants were overlaid by five concentric ellipses each of which represents a variable. Interviewees were asked to choose which quadrant best described the nature of the variable in each ellipse. The top left quadrant (corresponding to the mechanistic closed organisation type) scored a -3. The bottom right quadrant (corresponding to the mechanistic open organisation type) scored a -1. The bottom left quadrant (corresponding to the organic closed organisation type) scored a 1. The top right quadrant (corresponding to the organic open organisation type) scored a 3.

The organisational type diagnosis is based upon five variables which are derived from the work of Mintzberg (1989) and Boisot (1987). The five

variables, provide an overview of the "personality" of the organisation. This is predicated upon the way in which organisational personality is formed by the processes of information creation and sharing in and around the organisation.

The five variables are:

**O1. Environment Type**- as set out in 11.8.2.1. above.

**O2. Knowledge Base of Business**- which of the following knowledge base types characterise your business: proprietary, common sense, personal or public?
(Proprietary means codified, private knowledge owned by or defensible by an organisation, such as a patent, brand or secret procedures/ information; common sense describes the uncodified but shared way in which professionals tend to apply their knowledge, on a case-by-case basis; personal describes knowledge which is private and uncodified in the head of a person/people, such as the network and ideas of an entrepreneur; while public describes knowledge which is codified and in the public domain, such as scientific, engineering, financial and other market information available to anyone who can access it.)

**O3. Work Coordination and Control Processes**- which of the following ways of coordinating and controlling work best describes how your organisation manages its business processes: Standardised work processes, standardisation of skills, direct supervision or mutual adjustment?

(Standardised work processes are designed to create "factory" conditions where activities are specialised and sequenced to optimise efficiency- for example, a motor-car assembly line; standardisation of skills applies in many professions where professionals must conform to a set of standards in their

profession- for example, the qualifications required to become a doctor, lawyer or architect; Direct supervision describes the simplest form of coordination and control, where commands of those higher up in the hierarchy must be obeyed; and mutual adjustment describes the way in which new and uncertain situations are handled through projects and teamwork, where both the task and output are uncertain- for example, new product design).

**O4. Organisational Culture-** which of the following best describes the type of culture which characterises your organisation: centralised bureacratic, decentralised bureaucratic, centralised organic or decentralised organic?

(Centralised bureacratic describes a formal, hierarchical organisation with clear functional boundaries and specialisation eg. a large government department or centralised manufacturing organisation; decentralised bureaucratic describes a formal, flat organisation with major emphasis on functional specialisation eg. a hospital; centralised organic describes an informal but hierarchical organisation with few functional boundaries eg. a firm in which the founder still exercises control, but in a flexible rather than rule-based way, with most major decisions being made at the centre; decentralised organic describes a flat, networked organisation in which hierarchy and functional specilisation are less important than a team approach and contribution.

**O5. Structure-** the five main organisational types identified by Mintzberg are described to the interviewee, and they are then asked to select the type which best described their organisational structure: the machine bureaucracy, the professional bureacracy, the simple structure, the divisionalised or the adhocratic form.

(Machine bureaucracies are pyramidal structures with strong vertical functional boundary "stovepipes"; professional bureacracies are relatively flat, rectangular structures with strict vertical functional boundary "stovepipes"; simple structures are pyramidal with alot of functional overlap; divisionalised forms are many smaller pyramids held together by a group function; and adhocracies are network shaped, unstable structures with loose ties between units held together by a shared framework or vision at the group level.)

### 11.8.2.6. Processes of Control & Learning

Using Stacey's (1990) framework, interviewees were asked to choose the control style descriptor which best describes the control processes throughout their organisation. As opposed to management style, which applies to the 50-200 most senior managers in an organisation, control processes apply to all employees. Stacey's framework comprises twelve sets of control process variables. Each variable can be described on a spectrum from those which are required in closed change situations (on the left), to those which are required in open change situations (on the right).

Interviewees were asked to choose between the opposite ends of the spectrum, and indicate the strength of their preference from 1 to 5. Those choosing the left-hand-side (closed ended change) for a variable were assigned from -1 to -5 for that variable depending upon the strength of their preference. Similarly, those choosing the right- hand-side were assigned from 1 to 5 depending upon the strength of their preference. Each mark made by the interviewer was confirmed as to its exact position with the interviewee, who occasionally asked for adjustments to their score to be noted.

The first three requirements (P1 to P3) create **method tensions**- choices must be made about control process, control element focus and objectives constraints, determining the method of control which is applied.

Requirements five to eleven (P5 to P11) create **behavioural tensions**- the way people are matched to roles; the manner in which roles are defined and determined; the perception people have of their roles; the relationships between people in their roles; and the culture which conditions the conduct of those roles. The manner in which the behavioural tensions are resolved determines the nature of the political system to be found in the business.

The twelve variable sets are:

**P1. Cognitive Nature of Control Process-**
**ANALYTICAL FORMAL VS INTUITIVE**

Are the control processes in your organisation characterised more by analytical/formal methods (eg. many formal reports with numbers and measurements required before a decision can be made), or intuitive methods (relying on individual judgement and intuitive processes)?

Closed change situations require the application of formal, analytical, instructing processes to the elements of control. Open change situations require the application to the elements of control, of individual intervention based upon intuition and judgement, as well as the use of informal rules, procedures and modes of communication.

**P2. Control Element Focus**
**PLANNING VS MONITORING**

Do the control elements in your organisation focus mainly on planning ahead in detail, or are they predominantly focussed on monitoring events and their implications?

Closed change situations require the primary emphasis to be placed upon the planning element of control- monitoring and corrective action are made much easier with comprehensive planning processes. Open change situations require the focussing of attention on the detection of small changes occurring now and having important long-term consequences. This is a form of monitoring and becomes far more important than planning.

**P3. Objectives Constraints**
**TIGHT/FIXED VS LOOSE/TENTATIVE**

Are the constraints on the objectives set by individuals in the organisation tightly fixed for them, or are they more of a loose and tentative nature?

Closed change situations require the setting of fixed objectives, which are tightly constrained in that they are to be taken precisely and literally. Open change situations require the setting of objectives which are tentative, changeable and loosely defined, as the future is unknowable.

**P4. Objectives Time Frame**
**SHORT-TERM VS LONG-TERM**

Is the behaviour of people in the organisation being driven by short-term goals, or are they set in terms of a longer-term context?

Closed change situations enable the future to be more easily predicted, and allow individual goals to be set according to shorter control cycle intervals. Open ended change requires individuals to have longer term goals as the future is unknowable and short-interval controls will not reflect the shifting range of options open to individuals and the organisation.

**P5. Role Attributes**
**AUTHORITY/RESPONSIBILITY VS INITIATIVE/COLLABORATION**

Are roles in your organisation defined formally by responsibility and authority (eg. the sergeant-major in the army), or informally by the way in which

individual initiative and collaboration are coordinated through group processes (eg. as in an innovative software company)?

Closed change situations require the definition of the roles of people carrying out the control tasks primarily in terms of responsibility and authority. Open change situations require the definition of roles in terms of attributes of collaboration and initiative to allow opportunistic experimentation.

**P6. Role Constraints**
**POSITION/RESOURCES VS POWER/PERSONALITY**

Are the constraints on the roles in your organisation defined by the formal position and responsibility of the holder of the role, or by power, individual personalities and organisational culture?

Closed change situations require the constraining of those roles by their formal positions in the hierarchy as well as by resource availability. Open change situations require the constraining of roles through power, personality and organisational culture rather than formal position, to encourage experimentation.

**P7. Role Perceptions**
**PAROCHIAL VS HOLISTIC**

Do people perceive their roles in terms of the interests of themselves and their units, or do they consider the widest possible interest of the organisation?

Closed change situations require the development of role perceptions which are parochial in that people see their roles in terms of the part of the organisation in which they are operating. Open change situations require the development of role perceptions which are holistic in the sense that they are more concerned with the good of the organisation as a whole rather than

with the good of one part alone. This encourages synergy and new ways of doing things, rather than more efficient ways of doing old things.

**P8. Role Relationships**
**DIRECTING VS FACILITATING**

Are relationships between roles in your organisation based more upon direction or facilitation?

Closed change situations require relationships of a primarily directing nature to be fostered between on role and another. People are given objectives and instructed to take corrective action. Open change situations require the fostering of relationships between roles which are facilitating, to allow the surfacing of whatever inadequate information is available and to allow the experimentation and innovation which is central to learning in open-ended situations.

**P9. Matching People to Roles**
**SPECIFIC SKILLS/KNOWLEDGE VS WIDE COMPETENCES**

Does your organisation look more for people with specific skills, knowledge and expertise when filling most jobs, or are you more interested in the wider competences of individuals?

Closed change situations require the matching of people to roles using selection criteria to do with specific expertise, bodies of knowledge and a limited number of personal skills. Training and development programmes are tailored to such specific areas. Open change situations require the matching of people to roles using selection instruments where the criteria are personal competences rather than specific skills and knowledge. Management development instruments in this case seek to develop intuitive, team working competences above specific analytical and instructional skills.

**P10. Rewards**
**PERSONAL PERFORMANCE VS TEAM RELATED**

Are people rewarded in your organisation for personal performance on the whole, or do they tend to be rewarded for team results?

Closed change situations require the use of instruments of reward which closely relate individual short-term performance to rewards. Open change situations require reward instruments which are related to team performance and willingness to experiment.

**P11. Culture**
**CONSERVATIVE VS RADICAL**

Do the majority of people in your organisation desire frequent change in the organisation, or are they more concerned with the avoidance of change and the maintenance of the status quo?

Closed change situations require developing cultures which are conservative with relatively unquestioning acceptance of objectives and instructions. Open change situations require radical cultures which foster the questioning of objectives, perceptions and actions.

**P12. Organisation Structure**
**SIMPLE/DECENTRALISED VS COMPLEX/CENTRALIST**

Is your organisation structured in a simple, decentralised way, or is the structure more complex and centralist?

Closed change situations require the design of organisational structures which are decentralised into market-related profit centres. Open change situations require organisational structures which reflect centralist tendencies. Complex structures are needed to bring issues and perspectives to the centre, to get people to take the holistic view and to provide a mechanism for directing the whole organisation's attention and energy into important issues.

#### 11.8.2.7. Information & Performance Measures

Respondents in each organisation were asked to complete a questionnaire detailing, inter alia, the "mission critical variables" ("MCV's") which were most important to the viability and success of their business and organisation. An MCV is a variable the absolute value of which is critical to the achievement of the mission of an organisation, and differs from a critical success factor which is a relative competitive measure.

The full list of MCV's which respondents were asked to select from is attached as Appendix F: Mission Critical Variable Listing. The MCV's are grouped under several headings: people, organisational configuration, organisational characteristics, products/markets, operating structure, and controls/systems. Several MCV's were listed under each heading, and respondents asked to rank the importance of each MCV for their organisation using a scale from 1 (factor irrelevant to performance) to 5 (factor critical to performance).

Those MCV's which score highest represent the information and performance measures which the organisation should be measuring and improving.

MCV's can also vary from being strategic flexible to operational fixed. Strategic flexible MCV's measure high-level, interactive variables which will change as often as the firm's strategic situation. "Customer satisfaction" and "relative market share" are two good examples: changes in competitor activity will have frequent impacts on both these measures. These two measures are strategic in the sense that they measure whether the firm is winning or losing the competitive game, and flexible because they need to be reviewed frequently to sense and respond to changes in the marketplace.

Operational fixed MCV's, on the other hand, measure variables which are lower level and less interactive, though no less important. (One need only think of the operational rubber "O" rings on the solid fuel boosters on the space shuttle Challenger which failed, and blew the mission apart in 1986). "Productivity" and "capacity utilisation" are two good examples: both are derived directly from operational information, and both are likely to be fixed for reasonable period of time.

### 11.8.2.8. Technologies for Management Systems

The world of management and information systems contains many assumptions about what constitutes a better management or information system. Some objective criteria are available, such as whether the systems provide better customer service or are able to deliver new products to market faster than competitors. Those who advocate that the information systems strategy must align with the business strategy (such as the authors of the MIT Corporation of the '90s report (Scott-Morton, 1991)), would agree that successful management and information systems deliver business benefits in accordance with the business strategy.

Others such as Nolan (1979) and Galliers (1991) would also contend that an organisation which has reached the sixth stage in both their models ("maturity" and "interactive planning" respectively), would be more likely to achieve better performance through IS/IT than an organisation in an earlier stage of evolution.

Both lifecycle descriptions imply certain measurable characteristics of IS technologies and infrastructures, though Nolan does not suggest how such a measure could be quantified in his published work. Nolan's six stages are: initiation, contagion, control, integration, technology assimilation and maturity. Galliers' (1991) six stages are: obfuscation, confusion, senior management concern/DP defence, cooperation, opportunistic

entrepreneurial/intrapreneurial and interactive planning. Galliers also offers descriptive criteria by which one may determine the likely stage of growth an organisation is in, providing a qualitative check on the quantitative measures developed in this research.

In addition to the stage of the life-cycle the systems of an organisation are in, we need to know whether they work efficiently. Martin (1989 and 1990) derived an IT efficiency index based upon three key measures:

a. resources (including personnel, expense, capital expenditure and CPU capacity),
b. applications development (including key project status, defects discovered, and applications function delivered) and
c. services/operations (including transaction volumes, CPU utilisation, network utilisation, SLA commitments met, system availability and service availability).

The "T" measure used in this research is not as detailed from the technical perspective as Martin's measure, as it is designed to provide a wider perspective on the total techniques, infrastructure and level of relative scale/maturity/sophistication of such techniques and infrastructure.

What is lacking is a comprehensive framework and set of measures enabling the IS/IT and management systems in an organisation to be evaluated as to their contribution to organisational performance. Using our "common sense" and experience of many different management systems and computer and telecommunication systems in different organisations, we might be able to express an opinion that "the management systems and computer and telecommunication systems in organisation X are better than those in organisation Y" i.e. faster, more modern, reliable, easier to use and so on. Again, common sense would tell us that such superior systems will deliver

better business results- but how can we measure this? To this author's knowledge, the measurement of the comprehensive range of variables required to do this has not previously been attempted in any survey or research.

During the past decade suppliers of IT hardware, software and computing services, supported by consultants and academics, have made lavish claims on behalf of IT and its ability to improve business performance. The hypotheses in this research contend that what matters most in the improvement of business performance through IT is not just IT spend/scale/sophistication supported by effective business and information systems planning systems, but the alignment between the ENFMOPIT variables including IT. We would thus expect to see some evidence to demonstrate that great emphasis on IT and formal systems in an organisation did not necessarily result in superior performance in all or even most cases.

In order to measure whether or not this is in fact true, we need to be able to measure the extent of the money and time organisations have put into their IS/IT and supporting formal systems, relative to the scale of their business. We also need to be able to measure how effectively such systems are operating in each organisation, to see whether or not this might influence performance. In order to do this, we need to measure both the scale of the IT/IS infrastructures and formal planning systems in the sample, as well as the scope of such systems and the effectiveness with which they are run.

We also need to be able to appreciate how "formal" or "informal" the technologies for management systems in each organisation are, to test the alignment between the strategic control approaches used in each organisation and the nature of the IT/IS infrastructure and supporting business and information systems planning systems,

A high T score (characterised as "mature (possibly hi-tech), decentralised and informal technologies for management systems"), would indicate that an organisation is making reasonably extensive and effective use of both IS/IT and formal management systems in their organisation, relative to their size and the nature of their operations. A low T measure (characterised as "emerging (possibly lo-tech) centralised and formal technologies for management systems"), would indicate that an organisation is still in the early stages of IT/IS and planning system growth, and may not be making full use of the technology throughout the organisation.

Of the ENFMOPIT variables, the "T" is the most comprehensive. Technologies and infrastructure for management systems represents the formal systems available to management and employees to run the business, including both information systems and infrastructures, and planning systems. Five key variables are measured in order to arrive at a single score for each organisation, which represents the relative scale, power, sophistication, and efficiency of the formal information and planning systems in each organisation.

The "T" measure is a composite of the measures set out below and detailed in Appendix "H": Listing of Sub-Variables Incorporated in "Technologies for Management Systems". The five key variables which comprise the "T" measure are:

**T1. IS/IT Infrastructure (Hardware Platform)-** this is a measure of relative IS/IT infrastructure scale, centralisation and maturity. It is assumed (following Nolan and Galliers above) that a decentralised, widespread, technically sophisticated, powerful IT infrastructure based upon modern hardware is more desirable than a centralised, limited, unsophisticated, low-powered IT infrastructure based on out-of-date hardware.

**T2. Applications Portfolio Scale and Package to In-house-** this is a measure of the relative scale of the applications portfolio in each respondent, and the ratio of package software to in-house development in each portfolio. It is assumed that a large applications portfolio relative to the size of the business, and a high ratio of package software to in-house developments, would be superior to an insignificant applications portfolio developed competely in-house. (Unless the latter offered some rare competitive advantage).

**T3. Business Planning Effectiveness Rating-** this is a measure of the effectiveness of the planning process in each respondent, using managers' own assessments of their planning system effectiveness. Decentralised, frequent, deep and comprehensive planning efforts are assumed to be superior to centralised, infrequent, shallow, narrow planning efforts. Various measures were developed to guage these attributes in each respondent, based upon Glueck & Jauch (1984), Rhyne (1986) and the author's experience as head of marketing and planning in the BIS Group (a worldwide information services organisation, part of the NYNEX Corporation).

**T4. Information Systems Planning Effectiveness Rating-** this measures managerial perceptions of ISP effectiveness in each respondent, the frequency of ISP and review, and the level of integration between ISP and business planning. The findings of Galliers (1986) as to the successful characteristics of effective ISP efforts were applied to define effective versus ineffective ISP efforts.

**T 5. IS Benefit Assessment-** this measures management's assessment of the benefits of IS in marketing, production, administration and organisational characteristics. IS benefits were defined by synthesising the benefits described in several books on IT/IS, such as Earl (1987), Kaye (1989) and

others. The IS benefits are listed in part 2 of the questionnaire in Appendix C.

The "T" measure should be relatively well aligned with the other ENFMOPIT variables. For example, it is unlikely that a centralised, mechanistic closed bureacracy would make effective use of a mature, decentralised and flexible systems infrastructure. Conversely, it is improbable that a decentralised, open organic adhocracy would be able to make effective use of a centralised, technically immature and inflexible systems infrastructure. Individual components of the "T" measure such as IS/IT centralisation, IS/IT infrastructure relative scale, applications portfolio coverage and IS benefits assessment will also provide interesting insights into the role of IS in organisational performance in their own right.

### 11.9. STATISTICAL PROCEDURES

The scores for each respondent for each of the components of each of the ENFMOPIT measures were aggregated to reflect the overall position of each organisation's directors on each variable. These organisational scores were then normalised to provide a consistent scale on which to represent the results. Alignment was calculated by measuring the variance between each organisation's ENFMOPIT scores. The lower the variance, the greater the degree of alignment is indicated. This alignment variance was then inverted by dividing it into one, in order to reflect alignment using a score which increased as alignment increased. This alignment score was then correlated with the financial and PIMS strategic performance results for each organisation.

Correlation and multiple regression tests were also run across all of the ENFMOPIT variables, to establish which variables tended to vary together, so as to provide a clue as to some of the underlying dynamics of the ENFMOPIT variable behaviour across the sample of organisations.

The usual tests of confidence and reliability were applied to all of the statistics:

- all scores were renormalised around a common scale using a squaring technique
- the standard deviation for all scores was tested for each column of scores, and has to add up to 1 to indicate that the scale is correctly normalised
- the standard error and F-statistics were checked for every correlation and regression to ensure that they were within acceptable limits
- a cross-correlation table (see Appendix I) was created to ensure that the correlations produced in all of the different analyses actually tally with each other.

The Excel 4 spreadsheet and statistics package was used to process all of the data for this research, as well as the graphs which appear in section 12.

## 11.10. CONCLUSION

The four research methods and eight sets of measures used to test the ENFMOPIT model should yield some interesting insights into the role of IT/IS in organisational performance. At best, some significant relationships between ENFMOPIT alignment and strategic performance will be demonstrated. At worst, we will at least dispel the notion that alignment is essential for superior performance, at least in the way in which that set of relationships is formulated in the ENFMOPIT model. In any event, it is likely that out of all the possible relationships which will be tested, a few will yield some significant insights. The actual data generated in this research is contained in Appendix I, together with the graphs and tables which were not considered to be sufficiently relevant for inclusion in the main body of the thesis.

# 12. FINDINGS & CONCLUSIONS

In this chapter the positive relationship between organisational alignment, strategic and financial performance is explored. The conclusion is reached that the role of IT/IS in organisational performance is mediated by the role of the other 7 ENFMOPIT variables, and that there is no direct relationship between organisational performance and traditional measures of management systems and IS/IT performance.

A dynamic model of the interaction between the ENFMOPIT variables is developed, which is used to illustrate and explain the relationships between the 8 variables. This model is also used in the testing of the 17 research hypotheses and in answering the 21 research questions. The wheel diagnostic tool is then tested for its interpretive power using the 24 organisational profiles which emerge from the research.

The key findings and conclusions as set out in the 10 sections of chapter 12 are:

### 12.3. Nature of the Environment and its Interaction with the Nature of the Business

- Systematic processors with hard infrastructure businesses generally operated in simpler, more stable environments than versatile innovators with soft processes.
- Operational controls tended to predominate in systematic processors with hard infrastructures, while in versatile innovators with soft processes strategic controls tended to predominate.
- Versatile innovators with soft processes perceived greater IS benefits than systematic processors with hard infrastructures, which may be explained by the fact that the former are more information intensive.

- The organisational mindset of versatile innovators with soft processes tends to be more externally focused than systematic processors with hard infrastructures.
- 12 of the 24 participants operate in complex dynamic environments, while the rest spread evenly across the other 3 environment types ranging from simple stable to complex stable.
- Increasing environmental change resulted in significant leads and lags between changes in the ENFMOPIT variables, which resulted in under-par performance in the 8 least aligned organisations.

### 12.4 Organisational Change

- Well aligned organisations are more capable of changing themselves successfully to meet the challenges posed by changes in the environment than poorly aligned organisations.
- Changes/improvements in planning/control systems and IS/IT only support beneficial organisational change when a reasonable degree of alignment exists between most of the ENFMOPIT variables.
- Organisational change appears to be managed in a fragmented way by the organisations in the sample- where changes to IS/IT and management systems are concerned, this makes it more difficult to measure and reap the benefits of such changes.
- A more holistic, integrated approach to change management would clearly be beneficial to most of the organisations in the sample.
- IS/IT and management systems changes are successful as part of a major change process where most of the changes in the ENFMOPIT variables are being managed in a coordinated way. Well aligned organisations are more likely to be able to manage such change processes well and reap the rewards in the form of superior performance.

### 12.5. Management Style and Control Approach

- A decentralised informal management style tends to be associated with superior performance.
- Management style and processes of control are negatively correlated- this could be explained by the fact that these 2 variables are acting as balancing forces for each other.
- There is a very strong correlation between the organisation type and environment type i.e. organic open organisations tend to populate complex dynamic environments, while mechanistic closed organisations tend to populate simpler more stable environments.
- The focus of the organisation's mindset correlates positively with the nature of the business, the environment and organisation type.

### 12.6. Organisation Types

- The 24 participants fell evenly into the 4 organisation types of mechanistic closed, mechanistic open, organic closed and organic open.
- Organisations moving toward the open organic type tended to use IT/IS as a change lever- the "T" measure was slightly ahead of the other ENFMOPIT variables in these cases
- Mechanistic closed organisations operated more centralised formal system than those tending toward organic open.

### 12.7. Processes of Control

- Organisations with tighter control processes tended to outperform those with looser control processes.
- 50% of the sample exhibited monarchic fixed processes of control, while the balance of the sample had moved towards pluralistic flexible processes of control in varying degrees.
- Monarchic fixed processes of control were often associated with more decentralised informal management styles, while pluralistic flexible

processes of control were often associated with more centralised formal management styles.

- The organisation type and processes of control are positively correlated, indicating the importance of the balancing effect of the management style.

### 12.8. Technologies for Management Systems

- A lack of a strong relationship between T and other ENFMOPIT variables (apart from the weak positive relationships with the nature of the business, the organisations type and processes of control), indicates that the total effect of all the ENFMOPIT variables has to be taken into account in making IT/IS investment decisions.
- Retailing and manufacturing organisations had the least developed IT/IS and hence lowest "T" score- while IT service and financial sector organisations had the highest "T" score.
- In general the respondents had large IT infrastructures with an annual average IT/IS spend of £31M.
- 66% of participants have a centralised formal IT/IS infrastructure.
- All 24 participants have an annual strategic planning system with a time horizon of 2 to 10 years.
- 77% of the sample conduct ISP on an annual basis, but in isolation from strategic planning in 66% of cases.
- In the 33% of organisations in the sample who were well aligned, management style and organisation type are reflected in the planning control processes and IS/IT type.
- The top ten mission critical variables in the participants were, in order of priority: service quality and speed, good management, effective information and control systems, financial control, closeness to the customer and a flatter organisational structure.
- IS/IT was perceived to contribute to 7 of the top 10 mission critical variables in the organisations surveyed.

- 88% of organisations believed that they had gained competitive advantage from their use of IT/IS, though only 25% could cite specific evidence for this. In the other 75% it was clear that IT/IS had enhanced or enabled a specific capability which improved the strategic position of the firm or made the organisation more effective/efficient.
- The major benefits of IS/IT in most of the participants tended to accrue through lower costs and better control, rather than through value-adding applications.
- *Information systems planning ("ISP") efforts only supported superior* performance where it was closely linked to business planning.
- The formality/informality of and methods used in the ISP process appear to be irrelevant to the delivery of superior systems aligned to the business strategy.

### 12.9. The Wheel Diagnostic Method

The wheel proved to be a useful tool in diagnosing the IS/IT investment "do's" and "don'ts" in the 24 participants. The following table illustrates the different patterns which emerged and their implications:

| No.of Orgs | Wheel Pattern | Implications |
|---|---|---|
| 9 | Spiders Web | Relatively high alignment & superior performance. Maintain creative tension in organisation. |
| 3 | Irregular Core | A somewhat bureaucratic organisation with changes in a few dimensions taking place. Strong method and political tensions make change difficult. |
| 1 | Wide & Flat | High propensity for top-down change but limited resource & bottom-up challenge for change. |
| 4 | Tall & Thin | Strong functional orientation with a tendency to look inward with a directive management style. |
| 3 | Diamond | Responsive, flexible organisation with above average performance. Tendency to dissipate resource must be avoided. |
| 2 | Left-handed | Strong bottom-up, middle-out pressures for change balanced by a centralised, formal management style |
| 1 | Right-handed | Top-down change the norm- challenge to achieve speed of change required across wide range of variables |
| 2 | Top-heavy | Mechanistic closed organisations emphasising tight controls in which incremental change is the norm |

# 12. FINDINGS AND CONCLUSIONS

What is the role of information and management systems in organisational performance? There are several ways of answering this question, based upon the evidence gathered during the course of this research:

- examining the evidence for answers to the **research questions and hypotheses;**
- exploring the interrelationships between the **ENFMOPIT** variables themselves, using statistical techniques to generate insights into the nature of these relationships;
- exploring the relationship between these variables and the **B** (Benefits of IS) and **R** (Return on Investment, PIMS Par ROI strategic performance measure); as well as
- understanding the role of strategic alignment in enhancing the capability of information and management systems to improve performance in each organisation surveyed (using the **"wheel"** to interpret the findings).

Each of these perspectives is used to investigate the role of information and management systems in organisational performance and to reach some findings and conclusions about the nature of this role.

Each of the following areas will be examined in turn, combining the answers to the research questions and hypotheses as supported by the evidence, as well as providing some original observations about the research evidence:

- strategic alignment and performance
- a dynamic model of ENFMOPIT variable interaction
- the nature of the environment and its interaction with the nature of the business
- organisational change and technologies for management systems implications

- organisation types and their implications for technologies for management systems
- processes of human control in the respondents
- the nature of the technologies for management systems in use in the respondents
- interpretive findings and conclusions.

We will follow the order of the 21 research questions and 17 hypotheses set out in chapter 11 in drawing our findings and conclusions. Research questions and hypotheses are referred to by their number: Q1 to Q21, and H1 to H17. Due to the close links between the research questions and hypotheses, they will be dealt with together where possible.

## 12.1. STRATEGIC ALIGNMENT & PERFORMANCE

**H1.1. (Q1) The degree to which a firm's ENFMOPIT variables align with the environment in which it operates, and with each other, will be reflected in its performance.**

Comment: This hypothesis was confirmed in two ways:

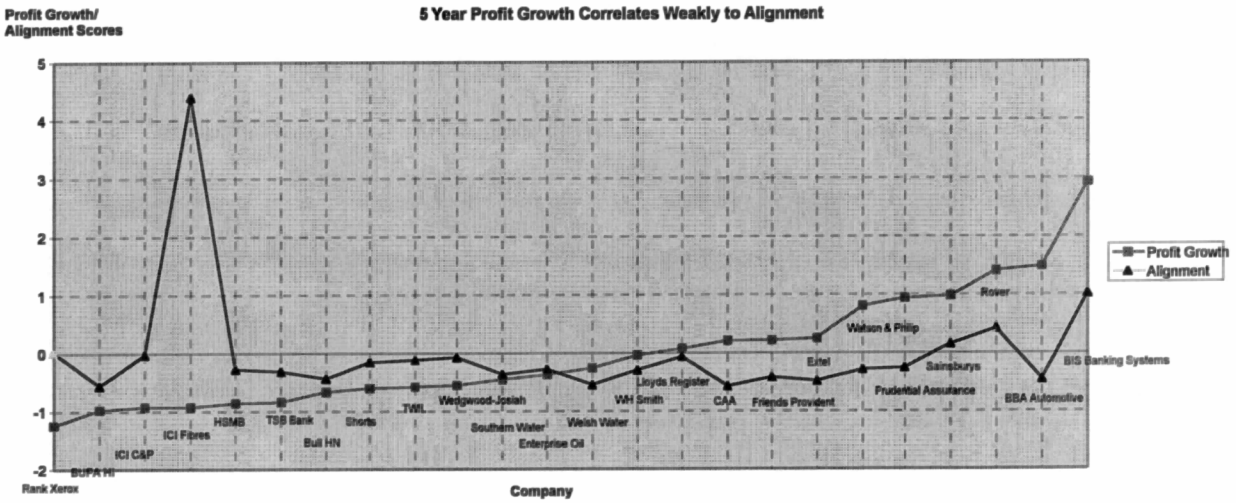
- **PIMS par ROI-** the statistical correlation on the multiple regression of the ENFMOPIT variables and deviation from par was high at 0.69. This indicates that certain types of firms perform better than others in particular types of environment if they are strategically aligned with their environments, and organisationally aligned as between the other 7 ENFMOPIT variables.This relationship is illustrated in diagram 34 overleaf, while the underlying data can be found in Appendix I (sheet alignmt2).

- **Five year profit growth-** A positive but weak correlation of 0.4 exists between the five year profit growth of the 24 participants measured between 1984 and 1989, and alignment between the ENFMOPIT variables and the environment. Alignment between the ENFMOPIT

variables and the environment was calculated by normalising the scores for each ENFMOPIT variable and the environment, and then taking the reciprocal of the deviance between each the normalised ENFMOPIT variables and the environment variable.

**Discussion-** It was surprising to find that any correlation exists between profitability growth and ENFMOPIT alignment over the relatively short five year period measured. This finding indicates that ENFMOPIT alignment is, on balance, beneficial for an organisation, though not critical for superior performance.

**Diagram 33: The Weak Positive Correlation between Strategic Alignment & Profit Growth (Wood, 1993)**

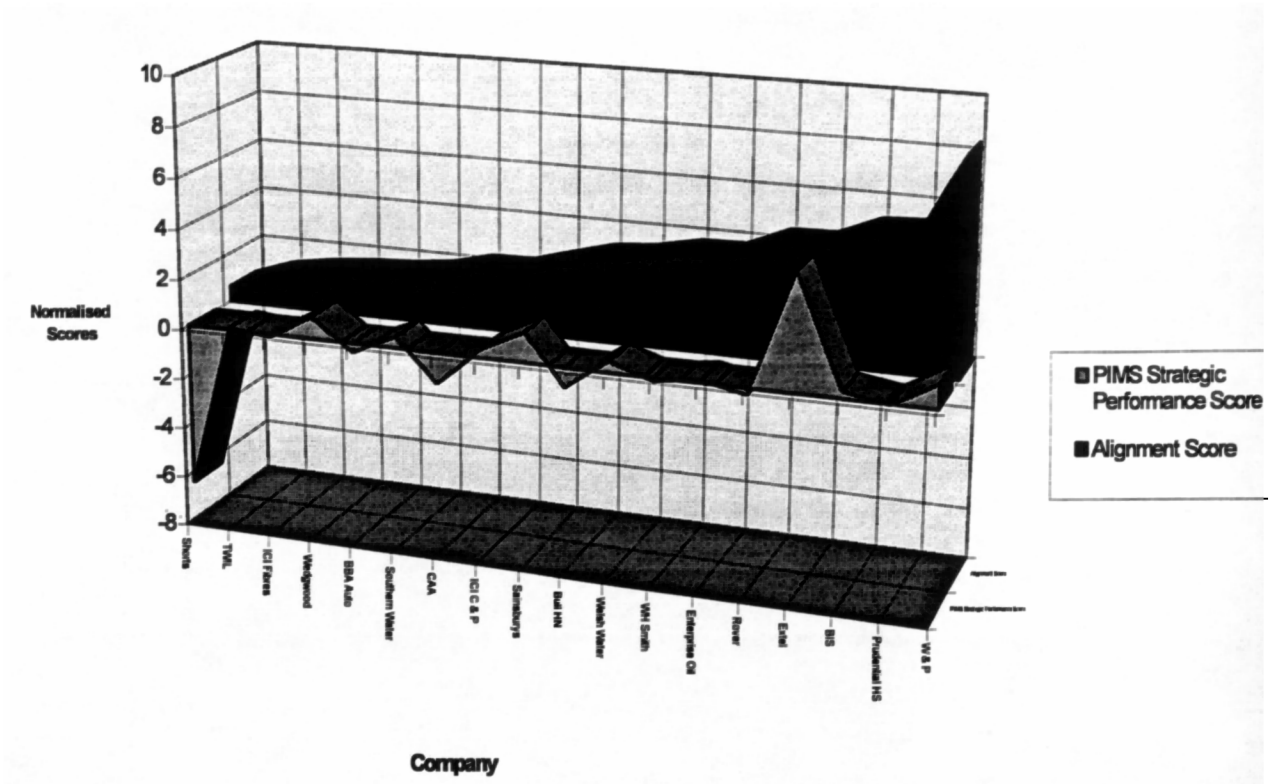



**Return on Investment- Deviation from PIMS par ROI measure**

A strong positive correlation of 0.69 exists when the ENFMOPIT variables are run through a multiple regression analysis against deviation from ROI in each of the participants. The PIMS database was used to identify 30 strategic peers for each participant, from which the expected return on investment for each participant was calculated. This return was then compared with the actual return earned by each participant over the period 1984 to 1989. The difference between the expected and actual returns for each participant was then calculated and normalised to arrive at a deviation

from par measure. Secondly, an interpretive analysis of several cases from the research documented below confirms this link. **Diagram 34** illustrates the alignment/overachiever relationship.

**Diagram 34: The Strong Positive Correlation between Strategic Alignment and Strategic Performance: the Overachiever/Alignment Relationship (Wood, 1993)**




## 12.2. A DYNAMIC MODEL OF THE ENFMOPIT VARIABLE INTERACTION

The following section attempts to answer research question Q1:

**"Is there a relationship between the level of complexity and dynamism in an environment, the type of organisations which survive in that environment, their management style, processes of control, information and performance measures and technologies for management systems (i.e. the "ENFMOPIT" variables)?"**

**and hypothesis H1.1, set out on page 231 above.**

The interactions between the eight groups of ENFMOPIT variables identified in the course of the research provide many valuable insights into the role of information and management systems in organisational performance. The

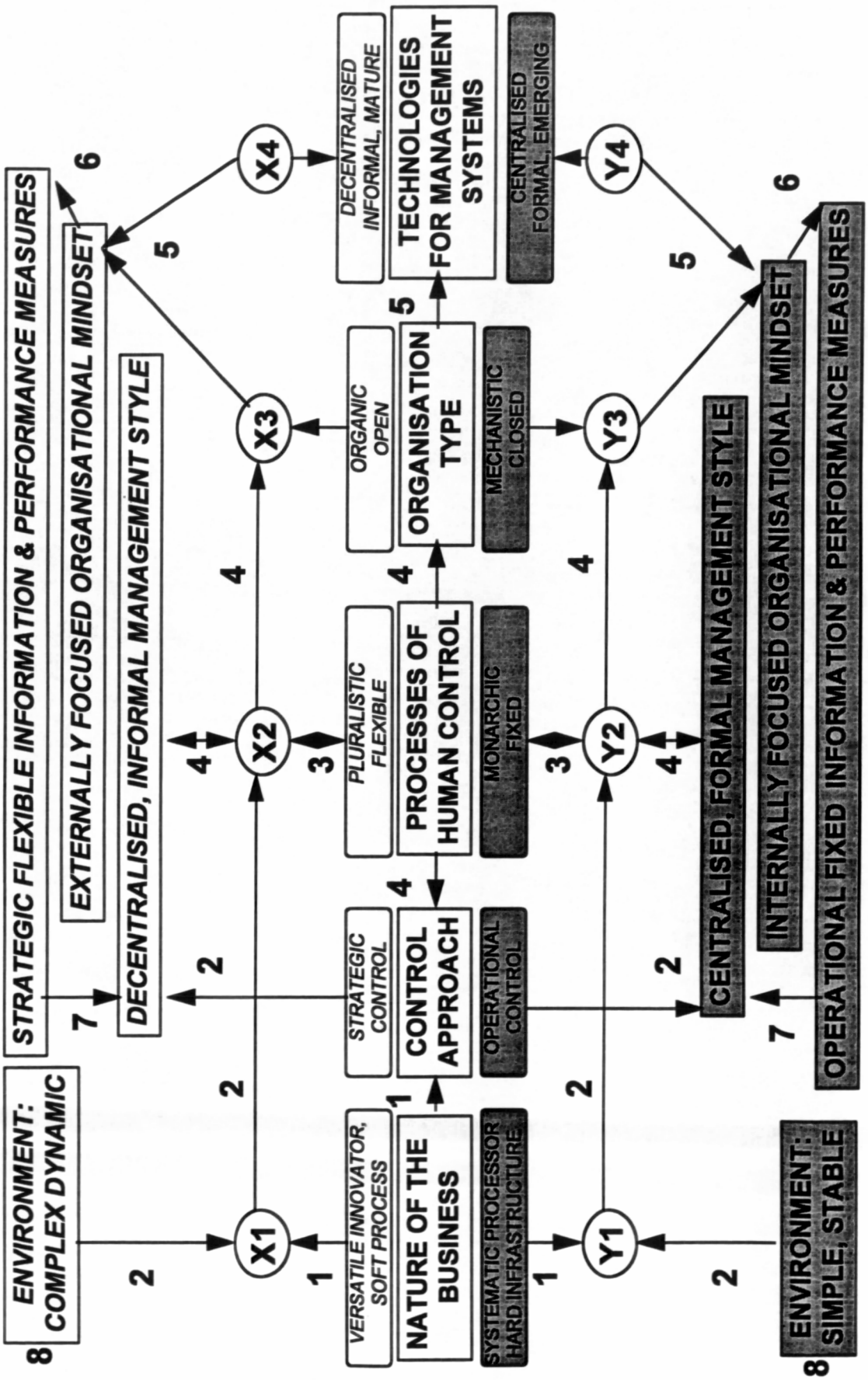
"Wheel" diagnostic method builds on these insights, providing a practical tool for managers to enhance the return on their management and information systems, and to evaluate where they can improve the contribution their systems make to their organisation's performance. Let us start with the insights this research provides into the links between the ENFMOPIT variables.

**Diagram 35** proposes an eight phase dynamic model of the interaction between the ENFMOPIT variables, as identified from the findings of the research programme leading up to this thesis. The eight phases are not necessarily sequential- they simply represent processes which may happen together. The model is symmetric: the upper, lightly shaded half of the model represents the processes which may lead to an organic open organisation with mature, decentralised, informal technologies for management systems, while the lower, heavily shaded half of the model represents the processes which may lead to a mechanistic closed organisation with centralised, formal technologies for management systems. Using Charles Hampden-Turner's (1988) language, let us call the first kind of organisation the "whirlpool", and the second kind the "rock". As the profiles of each organisation surveyed reveal, there are few archetypal or "pure" "whirlpool" or "rock" organisations, though a handful come close to being archetypes.

These two poles of the organisational spectrum highlight the forces at work in the organisational development process. We begin our description of the interaction of the eight ENFMOPIT variables by describing the eight phases of interaction. These phases may or may not overlap in time, and may or may not occur in the sequence in which they are depicted in **diagram 35.**

The interaction between the different phases of this dynamic model is explored at the appropriate point in each of the following sections of the findings and conclusions.

**Diagram 35: A Dynamic Model of the Interaction between the ENFMOPIT Variables (Wood, 1993)**



## 12.3. THE NATURE OF THE ENVIRONMENT & ITS INTERACTION WITH THE NATURE OF THE BUSINESS

**Phase 1 of Diagram 35: The Nature of the Business Interacts with the Environment and sets the Control Approach (N<=>E=C)**

What follows is a description of the way in which the nature of the environment interacts with the nature of the business for each of the organisations surveyed. Of the 24 organisations surveyed, 13 tended towards being systematic processors with hard infrastructures, while 4 tended towards being versatile innovators with soft processes- the rest were neutral. Steel, water, chemicals, insurance, civil service and manufacturing businesses were amongst the former, while information services, image processing and software businesses were amongst the latter.

Each of these businesses interacted with the environments they operate in, in different ways: Rover, Extel, Enterprise Oil, Xerox and Welsh Water were creative in their approach to their businesses, even though both their businesses and environments were very different in nature. As a result, they entered new markets/areas with new products/approaches, and excelled at learning new things. Most of the other organisations, however, tended to be reactive or mildy proactive with regard to their environments, with two respondents the subject of a takeover (Shorts taken over by Bombardier, and Wedgwood taken over by Waterford) and others fighting to protect and expand their dominant industry positions against new entrants. (TWIL in steel wire and rods, Sainsbury's in retailing, both with large market shares in specific market segments)[1].

Systematic processors with hard infrastructure businesses tended to operate in simpler, more stable environments than the versatile innovator with soft process businesses, though the environments of most of the systematic

[1] *The Monopolies Commission defines 40% or more of a specific market as an effective monopoly.*

processors with hard infrastructure businesses were tending to become more complex and dynamic during the 1980's. The control approach also tends to be set by the nature of the business- versatile innovators with soft process tend toward strategic controls, while systematic processors with hard infrastructures tend toward operational controls. (As defined by Goold and Quinn (1989)).

The nature of the business was closely correlated (0.70) with the IS benefits realised- in other words, the more a business tended toward the versatile innovator with soft process type, the greater were the IS benefits realised. There was a slightly lower correlation between N and the T variable (0.42), indicating that benefits were not realised solely as a result of a more advanced and extensive set of technologies for management systems. It is suggested that information advantage is more useful to a versatile innovator with soft process type businesses, which is by its very nature a more information intensive business than a while systematic processor with hard infrastructure.

N was also well correlated with F (focus of the organisation's mindset) at 0.60. This accords with the versatile innovator with soft process type business operating in more complex and dynamic environments, and requiring a greater focus on external matters to succeed than systemic processors operating in simple stable environments.

### 12.3.1. NATURE OF THE ENVIRONMENT AND STRATEGIC/ OPERATIONAL CONTROLS

**HYPOTHESIS H6. (Q10) Strategic control theories are useful in explaining the role of IS in organisational performance, in that organisations operating in simple, stable environments will emphasise operational controls, while those operating in complex, dynamic environments will emphasise strategic controls.**

The evidence confirms this hypothesis- firms operating in complex, dynamic environments tended to perceive the nature of their businesses to be such that predominantly strategic controls were required, while those operating in simple stable environments perceived the nature of their businesses to be such that predominantly operational controls were required. Firms in mixed environments were less clear about the match between the nature of their environment and business.

A negative correlation of -0.42 between the type of control profile of each participant (strategic vs operational) and deviation from par, indicates that operationally controlled firms tend to outperform strategically controlled firms. As the evidence suggests that operationally controlled firms tend to populate simpler, more stable environments than strategically controlled firms, there is clearly a virtuous circle which rewards operationally controlled firms which remain in simpler, more stable environments.

13 of the 24 respondents perceived themselves to be operating in complex, dynamic environments. 7 of these organisations perceived the nature of their business to be one which required predominantly strategic control, while 4 perceived the nature of their business to be one which required predominantly operational control. 2 did not complete this section of the questionnaire. The following list ranks these organisations according to their organisational type score (from Rover at 1.2 as the most open organic, to Friends Provident at -0.7 as mechanistic closed):

| | |
|---|---|
| Rover Group | (environment type 3.0; organisation type 1.2) SC +0.4 |
| Rank Xerox | (environment type 3.0; organisation type 1.1) SC 0.3 |
| Extel | (environment type 3.0; organisation type 1.1) SC 0.3 |
| BBA | (environment type 3.0; organisation type 1.1) SC 0.2 |
| Bull HN | (environment type 3.0; organisation type 1.1) SC 0.3 |
| BUPA HI | (environment type 3.0; organisation type 0.9) no score |

| | |
|---|---|
| WH Smith | (environment type 3.0; organisation type 0.8) OC -0.1 |
| Shorts Aviation | (environment type 3.0; organisation type 0.6) OC -0.1 |
| Hill- Samuel Bank | (environment type 3.0; organisation type 0.2) no score |
| BIS | (environment type 3.0; organisation type 0.1) SC +0.2 |
| Enterprise Oil | (environment type 3.0; organisation type 0.1) SC +0.2 |
| Wedgwood | (environment type 3.0; organisation type -0.4) OC -0.2 |
| Friends Provident | (environment type 3.0; organisation type -0.7) OC -0.1 |

4 of the 24 respondents perceived themselves to be operating in simple, stable environments. All 4 perceived the nature of their business to be one which required predominantly operational control. The following list ranks them according to their organisational type (from Welsh Water at 0.3 as organic closed to TWIL at -2.3 as mechanistic closed):

| | |
|---|---|
| Welsh Water | (environment type -3.0; organisation type 0.3) OC -0.2 |
| Southern Water | (environment type -3.0; organisation type -1.4) OC 0.0 |
| CAA | (environment type -3.0; organisation type -2.0) OC -0.3 |
| TWIL | (environment type -3.0; organisation type -2.3) OC -0.5 |

The balance of 7 respondents perceived themselves to be operating in a mixture of simple dynamic to complex stable environments. Perceptions were mixed as to whether the nature of their businesses required operational or strategic control to predominate. The following list ranks them according to their organisational type (from ICI Fibres at -1.5 as mechanistic closed to Watson & Philip at 0.5 as organic closed):

| | |
|---|---|
| Lloyds Register | (environment type 2.3; organisation type -0.4) SC +0.3 |
| ICI C&P | (environment type 2.0; organisation type 0.5) OC -0.2 |
| Watson & Philip | (environment type 1.0; organisation type 0.5) OC -0.1 |
| TSB Bank | (environment type 1.0; organisation type 0.1) SC +0.1 |
| Sainsburys | (environment type 1.0; organisation type -0.2) OC -0.2 |

Prudential Assurance (environment type 1.0; organisation type -0.6) OC -0.5

ICI Fibres (environment type-1.5; organisation type -1.5) SC +0.4

•

### 12.3.2. ENVIRONMENT TYPES

**Hypothesis H1.2.** (Q1) **Environments can be classified into four basic types, which arise from the level of complexity and dynamism inherent in them:**

i. a simple, stable environment, containing only one or two "players" (characterised by a monopoly or government department), with little or no change.

ii. a less simple, more dynamic environment, containing several players, with some competition between a relatively stable group of players.

iii. a complex but relatively stable environment, characterised by professional organisations such as universities, hospitals, law firms and so on. Professional and government entry barriers maintain a stable group of many hundreds or thousands of players.

iv. a complex, dynamic environment, characterised by large multinational organisations operating in global markets against a large number of competitors with rapid shifts in technologies and consumer preferences.

**Discussion:** the respondents fell into all four environment categories, as follows:

**i. simple, stable-** Southern Water, CAA, TWIL and Welsh Water

**ii. simple, dynamic-** ICI Fibres, Watson & Philip, Prudential Assurance, TSB Bank and Sainsburys

**iii. complex, stable-** ICI C&P, Lloyds Register

**iv. complex, dynamic-** Wedgwood, Shorts, WH Smith, Friends Provident, BUPA HI, Hill-Samuel Bank, BIS, Enterprise Oil, BBA, Rover, Extel, Bull and Rank-Xerox.

**Diagram 36** illustrates the positive correlation between the environment type, the organisation type, the focus of an organisation's mindset and the nature of the business. **Diagram 37** shows the positive correlation between the nature of the business, the focus of the organisation's mindset, organisation

type, technologies for management systems and PIMS ROI par performance.

**Diagram 36: Environment Type Correlates Positively with Organisation Type, Focus of the Organisation's Mindset & the Nature of the Business (Wood, 1993)**

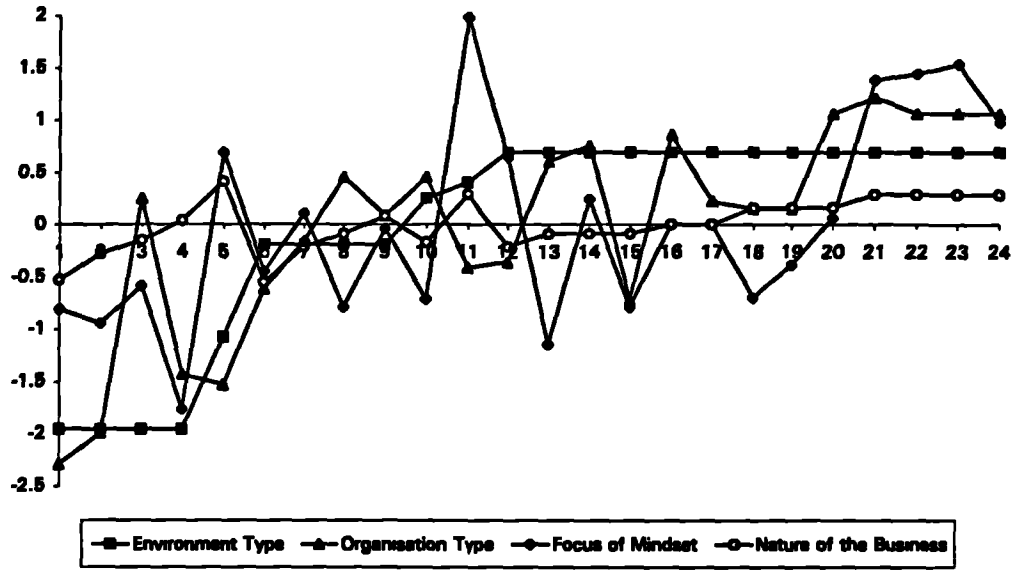
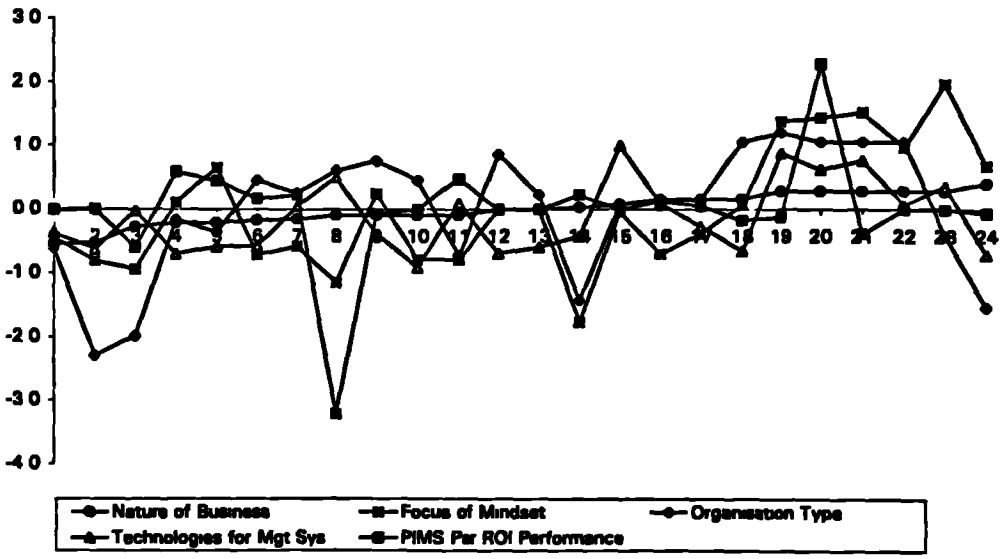



**Diagram 37: The Nature of the Business Correlates Positively with the Focus of the Organisation's Mindset, Organisation Type, Technologies for Management Systems and PIMS ROI Performance**



### 12.3.3. CHANGE IN THE ENVIRONMENT

**Hypothesis H2. The business environment for large UK firms is growing increasingly complex and dynamic across most industries and types of organisations, due to increasing competition, changes in technologies (particularly IT) and increasing consumer, supplier and regulatory pressures.**

Comment: This hypothesis was confirmed by measuring the perceived rates of change in each respondent's environment. In some cases the environment had changed dramatically between 1983 and 1989. These perceived rates of change were also compared with the industry information available on each respondent.

Though the source and nature of the changes in the several industries in which the 24 respondents operate are qualitatively different, the levels of complexity and dynamism in these firms and their industries increased measurably between 1983 and 1989 in all of the organisations studied.

**Question Q3: What are the implications of an increasingly complex and dynamic business environment for some large UK firms for their organisational structures, information systems and corporate control?**

**Hypothesis H3. The implications of this (increasingly complex, dynamic environment) for organisations, information systems and corporate control are that, over a number of years:**

i. the ENFMOPIT variables will tend to show leads and lags in relation to the environment, due to the impact of events on the organisation, particularly in rapidly changing environments;

ii. the organisation and its management will attempt to reduce the degree of misalignment between the ENFMOPIT variables and the environment;

iii. the degree to which they have succeeded in this will be reflected in organisational performance.

Comment: All three sub-hypotheses of H3 were confirmed. Major leads and lags in the ENFMOPIT variables were detected in the underachieving

organisations in the sample. Even the high performers exhibited some degree of lead and lag, though their magnitude and direction was lower and more beneficial than in the case of the underachievers. Formal, hierarchical organisation structures, information and control systems are less capable of coping effectively in conditions of rapid change. The implications of this in each of these areas was that:

- bureaucratic organisations attempted to transform themselves into more flexible and responsive organisations, through a variety of means and programmes: total quality and continuous improvement, customer service, culture change, business reengineering and strategic planning were among the methods employed. Such programmes had a mixed effect across the organisations in which they were employed. Even open organic/adhocratic type organisations made attempts during the period under observation to further increase their flexibility and responsiveness.

- though a variety of major and more flexible information systems were invested in between 1983 and 1989, it was clear that many of the older systems in place were constraining the growth and/or change processes in many of the respondents. Various attempts were made to debottleneck older systems through the use of personal computing networks, CASE and telecommunications solutions.

- the basic management control systems in most respondents were changed through delayering, changes in the monitoring/budgetting/planning systems, though there was less evidence of a more empowering and decentralised management culture being created in the sample.

## 12.4. ORGANISATIONAL CHANGE

**QUESTION Q15: Have the planning, control and information systems in large UK firms enabled/supported beneficial change in those organisations?**

The evidence suggests that such systems are in themselves neutral- only where strategic and organisational alignment exists do planning, control and information systems support beneficial change.

**QUESTION Q16. Does the degree of alignment between management style, organisational type, processes of control, information and performance measures and management/ information systems have any effect on the ability of an organisation to achieve beneficial change?**

Yes- it appears that those organisations which were well aligned managed to improve their performance through beneficial change processes, as described in greater detail below under Hypothesis H12 on p 249.

**QUESTION Q17. Can the goals and direction of organisational change in large UK firms be articulated and progress towards their achievement measured?**

No. All 72 directors interviewed expressed interest in the fact that the ENFMOPIT variables could be measured at all. Several of the chief executives confided in the interviewer that the ENFMOPIT framework was the most comprehensive set of measures they had yet seen, and that they were looking forward to seeing the research findings to calibrate their own intuitive judgments on where their firm was and where it was going. Change tended to be managed using management consultancies through "initiatives", "programmes" and "task forces", but often with little coordination of the overall change effort.

**QUESTION Q18. How can IT and IS help a firm be more flexible and responsive to change?**

IT and IS need to be managed as one of a set of the ENFMOPIT variables, rather than as a "silver bullet", in order to create the requisite degree of flexibility and responsiveness for change in an organisation. The increasing power of IT and the greater flexibility of open systems appear to be increasing the flexibility of the information infrastructure in some of the respondents, but such cases were in the minority. (For example, Rover has successfully used open systems to enable it to manage the major changes which have taken place in that organisation in the past decade, highly successfully). We should, however, note that Rover is one of the best aligned companies in the sample, and that such open systems applied in non-aligned organisations do not have the same degree of beneficial impact- for example, in Southern Water.

**HYPOTHESIS H12. Over a period of five years those organisations which use IS as a substantial part of a major change process will dramatically improve their performance if alignment between the key organisational variables is maintained.**

Several of the respondents underwent a major change process during the five year period under observation: Bull, CAA, Rank-Xerox, Rover, Shorts, Southern Water, TSB, Wedgwood and Welsh Water. Others were just beginning major change processes: BUPA, Prudential, TWIL and Watson & Philip.

Of the nine organisations which underwent major change processes in their businesses, four were due to privatisation (CAA, Shorts, Southern Water and Welsh Water). The other five faced major discontinuities in their industries: IT equipment manufacturing (Bull and Rank-Xerox, where competition from the Far East dramatically undercut their traditional competitiveness and market share); motor vehicle manufacturing (where Rover in its previous existence

as BLMC had to respond to increasingly difficult conditions in its home market); banking (where TSB became a full-frontal competitor with other retail banks after banking deregulation); and ceramic tableware and gifts manufacturing (where Wedgwood was merged with Waterford crystal to create a global glassware, tableware and giftware marketing company).

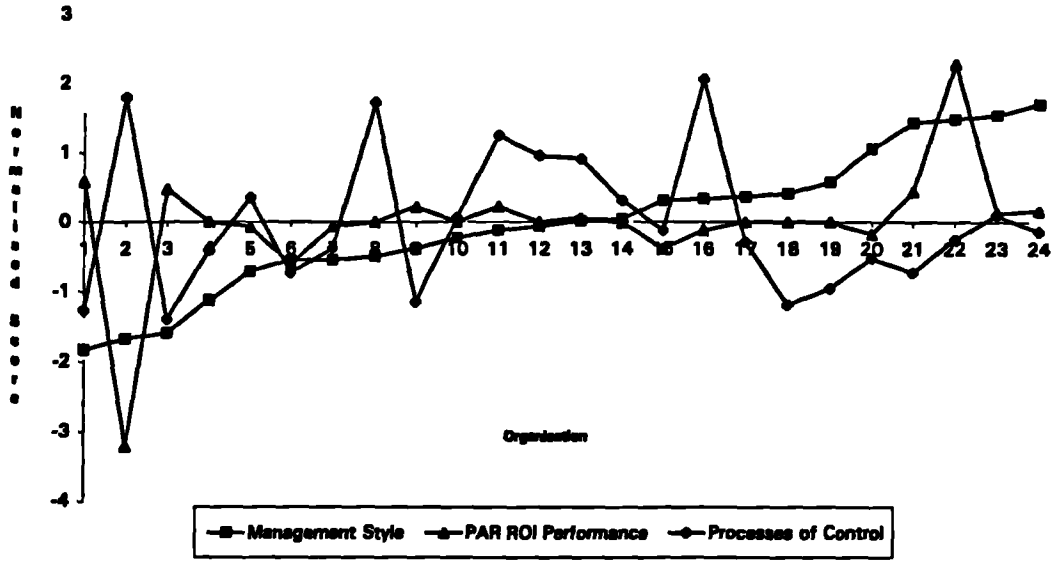
IT/IS was used as part of a major change process in Bull, Rover, Rank-Xerox, Shorts and TSB. All of these organisations are high-achievers and, (with the exception of Shorts), well aligned.

IT/IS was incidental to the change processes in CAA, Southern Water, Wedgwood and Welsh Water. The upgrades in the IT infrastructures in these organisations helped them become more efficient, and in some cases, more entrepreneurial.

### 12.5. MANAGEMENT STYLE & CONTROL APPROACH

A relatively strong positive correlation of 0.56 between management style and deviation from par indicates that a decentralised, informal management style tends to be associated with superior performance, while a centralised formal management style is associated with underachievement. **Diagram 38** illustrates this relationship, and also shows the apparent balancing effect of processes of control, which correlate negatively with management style.

**Diagram 38: Management Style Correlates Positively with PIMS Par ROI Performance and Negatively with Processes of Control**




**Phase 2 of Diagram 35: The Environment Responds to the Nature of the Business, and the Management Style is Influenced by the Control Approach (E=>N; C=>M)**

In this phase competitors, regulators, customers, suppliers and partners all respond to the moves being made by the business, thereby refining the nature of the business and influencing its success or failure. This highly complex interactive process is represented by interactions X1 and Y1 in diagram 35. The tendency for simple stable environments to become more complex and dynamic in this sample, meant that most of the respondents who used to be in simple stable environments had to become more like versatile innovators (faster product development in a greater variety of markets) with more soft process (more services/better service), though their organisation culture/type and technologies for management systems often lagged these developments.

Businesses with operational control approaches tended to be associated with more centralised, formal management styles, in 20% of the respondents- for example, the CAA, ICI Fibres, Prudential, Southern Water and Welsh Water. In another 10% of respondents, strategic control

approaches tended to be associated with decentralised, informal management styles- for example, Bull HN and Rover.

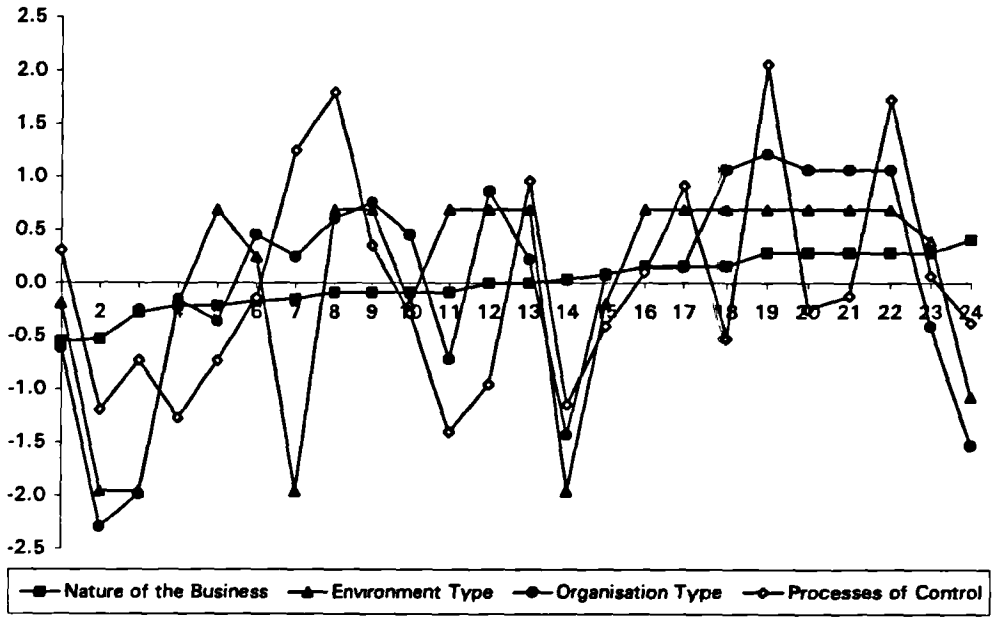
In about 20% of the respondents, the management style was considerably looser (more decentralised informal) than would be indicated by the nature of the business: BIS Banking Systems, Extel, ICI Chemicals & Polymers, TWIL, Watson & Philip and Wedgwood. It may be that the executives interviewed were more "liberal" and "enlightened" than many of their colleagues in the rest of the business, especially as some of them had been recently appointed or come from other industries. For example, BIS Banking Systems (owned by the BIS Group and NYNEX, both with strong empowerment/ autonomy values), Extel (owned by the Mirror Group, with an empowering approach), ICI C&P (strong John Harvey-Jones influence in the former CEO), Watson & Philip (enlightened Scottish management) and Wedgwood (several ex-Ford managers had been headhunted for top positions).

In another 20% of respondents, the management style was considerably tighter than indicated by the nature of the business: Friends Provident (where an inspired but autocratic ex-CEO created a centralised style), Rank Xerox (where tight centralised management systems had evolved out of their decade long quality drive), Sainsburys (where the Sainsbury family run a very tight ship), Shorts (which reflected its government-owned/ managed history of tight controls), and TSB Bank (which reflects tight control over retail operations and a powerful head office).

It is clear that the dominant mindset (Prahalad and Bettis, 1987) of the top management can differ substantially from the nature of the business, with positive and negative consequences, depending upon whether the difference is with or against the direction of environmental change.

The final interaction in phase 2 occurs between the resultant of the nature of the business and the environment (X1 and Y1), influencing the processes of human control in the organisation through X2 and Y2. Some positive correlation between the N, E, and O variables exists at 0.40 **(NE)** and 0.46 **(NO)**. A very strong correlation exists between the organisation type and the nature of the environment, at 0.75 **(OE)**, and a positive correlation exists between the organisation type and processes of control (0.52) **(OP)**. These relationships are illustrated in **diagram 39.**

**Diagram 39: The Nature of the Business is Positively Correlated with the Environment Type, Organisation Type and Processes of Control**



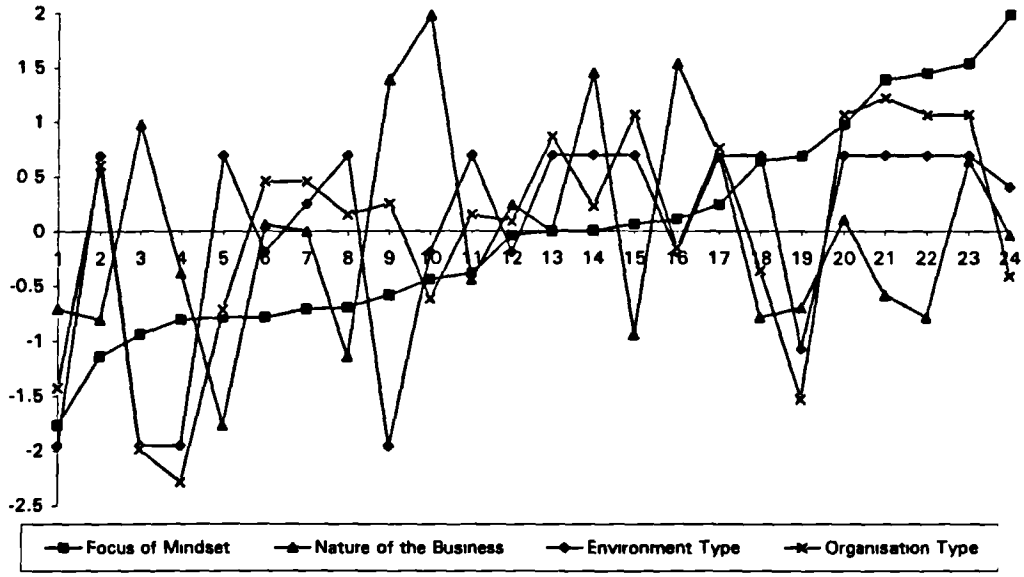

Before describing how the processes of control and organisation type relate to the technologies for management systems in an organisation in Phases 3, 4 and 5, we need to consider the "back-end" of the dynamic interaction between the ENFMOPIT variables: the way in which the focus of the organisation's mindset influences the I and M variables:

**Phases 6, 7 and 8 of Diagram 35: The Focus of the Organisation's Mindset Influences its Information & Performance Measures, Management Style and Environment (F=>I=>M=>E)**

One would expect a relationship between the focus of an organisation's mindset and the information and performance measures (or "mission critical variables") in use in the organisation. No independent test of this relationship was possible as the information and performance measures were used to create the focus of the organisation's mindset measure. The best correlations with F are as follows, in descending order: N: 0.60; E: 0.47; B: 0.47; O: 0.43; T: 0.39; P: 0.23; and M: 0.17.

The strong correlations between the focus of the organisation's mindset, the nature of its business, and its environment type accord with common sense: it is quite probable that a versatile, innovative soft process business operating in a complex dynamic environment would be (and would need to be) more externally focussed than a systematic processor with hard infrastructure business operating in a simple, stable environment. There may also be a virtuous circle relationship between organisations being able to survive in complex dynamic environments, and their external focus, which explains relationship 8 on **diagram 35**. The positive correlation of 0.5 between the F, N, E and O scores of the participants shows that superior strategic performance is associated with externally focused organisations in complex dynamic environments in versatile innovator, soft process businesses, and with internally focussed organisations in simple stable environments in systemic processor, hard infrastructure businesses, as illustrated in **diagram 40**.

**Diagram 40: The Focus of the Organisation's Mindset Correlates Positively with the Nature of the Business, Environment Type & Organisation Type**




## 12.6. ORGANISATION TYPES

We will now explore the relationship between the type of organisations found in the sample, and the other ENFMOPIT variables. The organisation type measure includes the predominant type of knowledge used in the business, the dominant work coordination and control process type and the organisation's culture and structure. Let us nowanswer the research questions and test the hypotheses for the organisation type.

**Question Q5. What is the nature of the links between the four different kinds of organisations and the other ENFMOPIT variables?**

There was only a very low correlation of 0.30 between the organisation type and technologies for management systems. As the organisation type was strongly correlated with the nature of the environment (0.8), it is clear that open organic organisations face a tougher information processing challenge than mechanistic closed organisations. Due to this challenge one would expect systems to be more flexible and responsive as a result, but this was not the case in many of the participants, however.

**Hypothesis H4. There are four archetypal organisation types, which will tend to align with their environments and the other ENFMOPIT variables if they are performing well. Actual organisations will be a mix of these archetypes:**

**i. Organic open** organisations tend to operate in complex dynamic environments, with decentralised informal management styles and pluralistic flexible processes of control. Information and performance measures tend to be strategic flexible with decentralised informal tools, techniques and IT platforms.

**ii. Organic closed** organisations tend to operate in simple dynamic environments, with decentralised formal management style and oligarchic flexible processes of control. Information and performance measures tend to be strategic fixed with decentralised formal tools, techniques and IT platforms.

**iii. Mechanistic open** organisations tend to operate in complex stable environments, with centralised informal management styles and oligarchic fixed processes of control. Information and performance measures tend to be operational and flexible with centralised informal tools, techniques and IT platforms.

**iv. Mechanistic closed** organisations tend to operate in simple stable environments, have centralised formal management styles, with monarchic fixed processes of control. Information and performance measures tend to be operational and fixed with centralised formal tools, techniques and IT platforms.

**Comment:** The 24 organisations in the sample fell fairly evenly into these four groups:

**i. Organic open-** Extel, Rover, Bull and Rank-Xerox.

**ii. Organic closed-** BIS, BBA, Enterprise Oil, Hill-Samuel Bank, ICI C&P, Sainsburys, Watson & Philip, Welsh Water.

**iii. Mechanistic open-** BUPA HI, Lloyds Register, Prudential Assurance, TSB Bank, Wedgwood and WH Smith.

**iv. Mechanistic closed-** CAA, Friends Provident, ICI Fibres, Southern Water and TWIL.

None of these organisations was a "pure type"- each exhibited a mixture of leads and lags between the different management style, organisation type

and processes of control variables. The scores indicate, however, that several of the organisations were close to being pure types- Rover and Extel as open organic, BIS and BBA as organic closed, BUPA HI and Lloyds Register as mechanistic open, and CAA and Friends Provident as mechanistic closed.

**Question Q6. Do the different organisational types exhibit different ways of learning and adapting to their environments, and what role does IT/IS play in the process of learning and adaptation?**

Yes- where an organisation was attempting to become more open and organic in response to increasing complexity and dynamism in its environment, systems were often used as a means of bringing about organisational change. (Rover, for example, in responding to the Japanese invasion of the European motor markets). In other words, the most beneficial alignment between technologies for management systems and the other ENFMOPIT variables, is for the "T" to be slightly ahead of the other variables together with management style.

Mechanistic closed bureaucracies tended to operate more centralised and formal systems than the organic open adhocracies. A package approach was also more common among the latter group, which also tended to be more comfortable with experimentation with new systems and methods.

In static situations where little change was occurring, the "T" variable was best positioned in line with the other variables for optimal performance.

**Hypothesis H5. The degree of misalignment between the ENFMOPIT variables will highlight significant political and method tensions in an organisation. Severe internal misalignment will lead to a poor IS payoff.**

This hypothesis was confirmed. The worst performer, Shorts Aviation, had a deviation from PIMS par score of -3.2 and the highest score for ENFMOPIT variance (or lack of alignment) of 3.5. Extel, which had the highest positive

deviation from PIMS par of 2.3, had a low ENFMOPIT variance of 0.5. Firms with positive deviations from PIMS par such as Sainsburys (0.6;0.5), Watson & Philip (0.5;0.3), Southern Water (0.2;0.4), Welsh Water (0.2;0.5), and Enterprise Oil (0.1;0.2), illustrated mixed but relatively low levels of variance/ high levels of alignment between the ENFMOPIT variables. Wedgwood (0.4;1.0), ICI C&P (0.2;0.9) and BIS Banking Systems (0.1;0.7) were exceptions to this rule.

Firms with negative deviations from PIMS par tended to show higher ENFMOPIT variance in proportion to the extent of their deviation from par: for example, CAA (-0.6;0.6), Bull HN (-0.4;0.5), BBA Automotive (-0.2;0.5), ICI Fibres (-0.1;0.7) and WH Smith (-0.1;0.3). TWIL (0;1.2) was an exception.

Although it was not possible to get the respondents to discuss the political and method tensions in their organisations, some examples can be mentioned which were picked up informally. In Sainsburys, for example, there appears to be a constructive tension between the buying and distribution sides of the business, which makes them "as different as London Buses (dealing with a chaotic system and human judgement/reliability) and London Underground (systematic management of a predictable infrastructure)", in the words of the CEO. The classic tensions between production and sales surfaced many times during the interviews, particularly in the information service businesses in the form of IT/marketing tensions.

The relationship between poor alignment and IS benefits perceived by management was non-significant, indicating that the relationship is much more complex than suggested by the hypothesis, mediated by the dynamic relationships described in the dynamic model in diagram 35.

## 12.7. PROCESSES OF CONTROL

A negative correlation of -0.4 between processes of control and deviation from par indicates that firms with tighter control processes tend to outperform those with looser control processes. Processes of control and management style were also negatively correlated, indicating that they are, to some extent, countervailing forces.

**Phases 3 & 4 of Diagram 35: The Nature of the Business and Environment Establish the Nature of the Processes of Human Control and Organisation Type, which are also influenced by and influence the Management Style (N=>C; C=>M; N<=>E=>M=>P; P=>M; P=>O)**

The processes of human control tend to be the most enduring feature in any organisation, as they pervade all levels and evolve naturally from the nature of the business. Particular industries and sectors evolved rigid hierarchies and specialisations with a strong emphasis on rank, technical specialisation, coordination through rigid rules and regulations, and measurement using analytical, hard measures of performance. Respondents exhibiting processes of human control tending toward the monarchic, fixed (or bureaucratic) type include: the civil service and air force (the CAA), high volume retail operations (food- Sainsbury, Watson & Philip; financial products and services- Friends Provident, BUPA HI and TSB Bank), continuous chemical production (ICI C&P and ICI Fibres), water companies (Southern Water), steel wire and rod production (TWIL) and specific kinds of manufacturing: automotive components (BBA), and porcelain and pottery (Wedgwood).

Exceptions to this rule in similar industries amongst the sample include Shorts (ex-government, privatised manufacturer of aircraft nacelles and wings), WH Smith (high volume retailer), the Prudential (high volume personal financial services retailer), Welsh Water and Rover (motor vehicle manufacturing). In every case, the movement towards pluralistic, flexible

processes of human control away from previously monarchic, fixed processes of human control, was a result of a series of largely deliberate decisions taken by management to empower the workforce and reengineer the business over a number of years. A variety of causes and management decisions could be identified as the source of the changes in the processes of human control over several years: quality/ customer care/reengineering programmes (WH Smith and Prudential in particular), new management (Welsh Water), strategic alliances (Rover/Honda), privatisation (Welsh Water) and privatisation/takeover (Shorts by Bombardier and Rover by British Aerospace).

On the other hand, three respondents in complex dynamic industries with businesses evenly balanced between systematic processor with hard infrastructure and versatile innovator with soft process, exhibited pluralistic processes of human control: Enterprise Oil, Hill Samuel Bank and Rank Xerox. The entrepreneurial histories of each of these businesses would be one of the factors leading to this situation, together with the level of complexity and dynamism in their environments.

In BIS Banking Systems, Bull HN and Lloyds Register the processes of human control mirrored the nature of the business.

The relationship between the management style and the processes of human control appears to be a balancing act between the changes in the environment and the aspirations of/limitations on the management team. For example, increasing complexity and dynamism in the environment together with management styles tending toward decentralised informal for BBA, BIS, Bull HN, BUPA HI, Extel, and Wedgwood, were associated with a tendency to monarchic fixed processes of control. Rover was an exception to this rule, exhibiting pluralistic flexible processes of human control in addition to

increasing complexity and dynamism in the environment together with management styles tending toward decentralised informal.

On the other hand, Enterprise Oil, Rank Xerox and Shorts exhibited both pluralistic flexible processes of human control in addition to increasing complexity and dynamism in the environment together with management styles tending toward centralised formal. Here the management style appears to be compensating the other way, towards tighter control. In a simple stable environment where the aspirations of management appeared to be generating much dynamism in the organisation, as in the case of Welsh Water, a neutral management style appears to balance strongly pluralistic flexible processes of control.

Finally, the processes of human control shape the type of organisation that emerges in the development process. Apart from BUPA, BBA and Extel, all of the 21 other organisations exhibited strong correlations between these two variables. (covarying in both positive and negative directions by no more than, at most, one degree out of five, with a positive correlation of 0.52).

This result is not surprising, given that the co-variables comprising the organisation type variable are strongly related in the organisational behaviour literature to the culture of an organisation, which is a product of the interactions between the organisation's members inter se, and between the organisation's members and its environment. As the processes of human control regulate such interactions, one would expect them to produce a characteristic organisation type.

There is some evidence to bear this out as a rule: in 14 of 24 cases, the organisation type is closely linked to the processes of human control. Eleven of these organisations tended towards being mechanistic closed and monarchic fixed: ICI Fibres, Sainsburys, Hill-Samuel, Southern Water, WH

Smith, Enterprise Oil, Welsh Water, BIS Banking Systems, Friends Provident, Lloyds Register and TSB Bank. Three of them tended towards being organic open and pluralistic flexible: Rank-Xerox, Rover and Shorts.

Of the remaining ten organisations, five exhibited processes of control with monarchic fixed tendencies, with organisation type tending toward organic open (Watson & Philip, BBA Automotive, ICI C&P, Extel and Bull).
Five other organisations displayed monarchic fixed processes of control with organisation types tending toward organic open: Watson & Philip, BBA Automotive, ICI C&P, Extel and Bull. In these organisations the processes of control and organisation type appeared to be balancing each other out.

## 12.8. TECHNOLOGIES FOR MANAGEMENT SYSTEMS

We know from the statistical evidence in this research that, apart from a few weak correlations between the T variable and the nature of the business (TN=0.4), IS benefits (TB=0.4) and organisation type (TO=0.3), there are few direct relationships between T and the other variables. This is because T is influenced by all of the variables at different points in time. Let us return to the dynamic model of ENFMOPIT interaction to explore complex set of relationships further.

### 12.8.1. INFLUENCERS OF THE NATURE OF TECHNOLOGIES FOR MANAGEMENT SYSTEMS

**Phase 5 of Diagram 35: The Organisation Type Influences the Technologies for Management Systems, which also influence the Mindset of the Organisation and its Information & Performance Measures (O=>T; O=>F=>I)**

The way in which an organisation operates is reflected in its processes of human control and organisation type. In a healthy organisation, one would expect to find a measure of alignment between the technologies for management systems and the processes of human control and organisation type in the organisation.

There appears to be a weak relationship between the overall score for technologies for management systems maturity, and the organisation type (correlation of 0.40) or processes of control (correlation of 0.40 as well). There are slightly higher levels of correlation between the T variable, and the nature of the business and focus of the organisation's mindset (0.43 and 0.41 respectively). This might indicate that investment in and implementation of technologies for management systems are attempts by a business to automate its underlying business processes, while the social processes measured by the processes of human control and organisation type are complementary to the automation process.

The organisations with the **least developed technologies for management systems** relative to their size were, in ascending order from -1 and 0 on the T scale: Watson & Philip, ICI Fibres, Sainsburys, BUPA HI, BBA Automotive, TWIL, Hill-Samuel Bank, Wedgwood, ICI C&P, Southern Water, WH Smith, Prudential, Enterprise Oil and the CAA. Apart from the Prudential and Hill-Samuel in financial services, all of these organisations are in manufacturing and retailing.

The organisations with the **most developed technologies for management systems** relative to their size were, in ascending order from 0 to 1 on the T scale: Welsh Water, Rank Xerox, BIS Banking Systems, Friends Provident, Lloyds Register, Shorts, Extel, Bull, Rover and TSB Bank, who all scored between 0 and 1 on the T scale. Seven of these organisations are in businesses where one would expect highly developed technologies for management systems: IT and financial services. Rank Xerox, BIS and Bull are players in the IT services industry while Friends Provident, Lloyds Register, Extel and TSB Bank operate "information factories" in the financial or business service sector. Some of the different aspects of these relationships are illustrated in **diagrams 41 to 46.**

**Diagram 41: Technologies for Management Systems- Levels of Development**

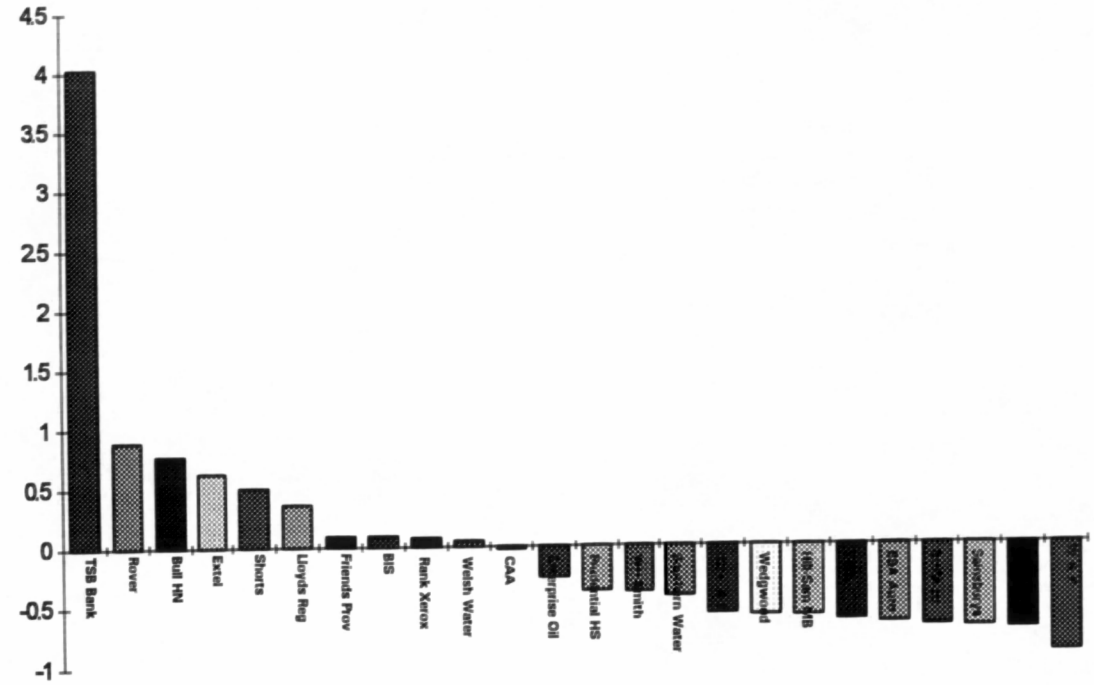



**Diagram 42: Technologies for Management Systems- Components**

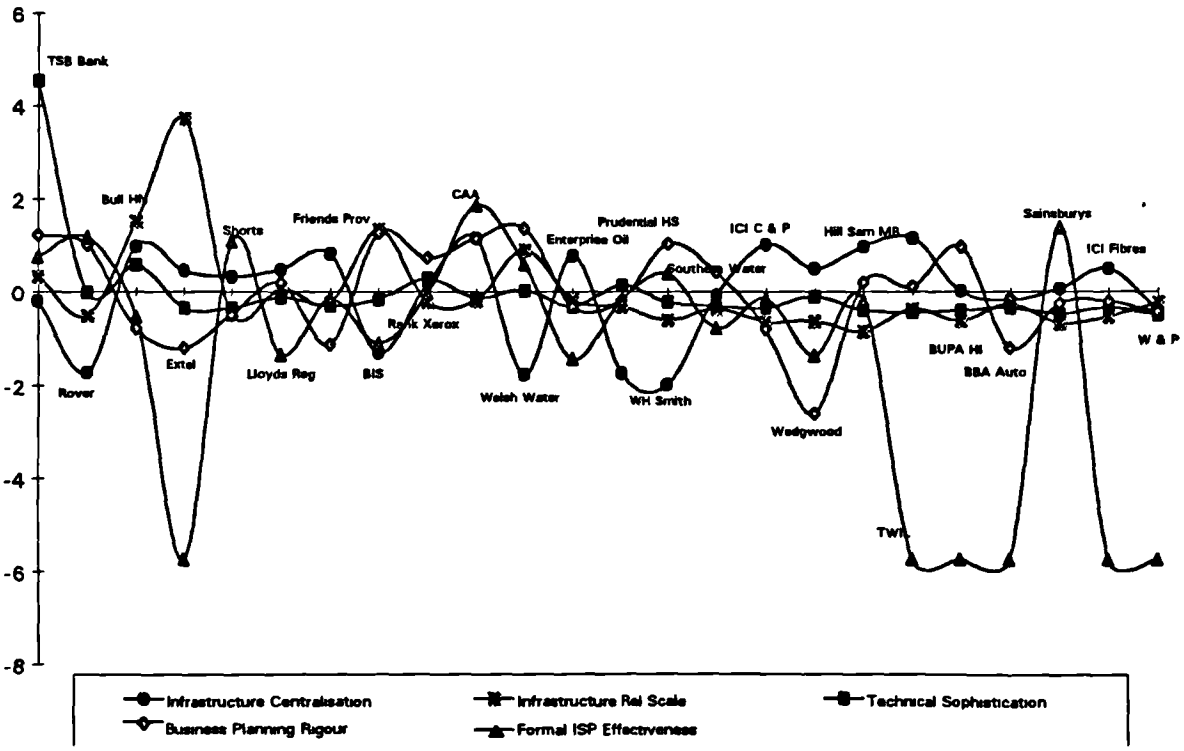


**Diagram 43: Technologies for Management Systems & Correlation with ENFMOP Variables**

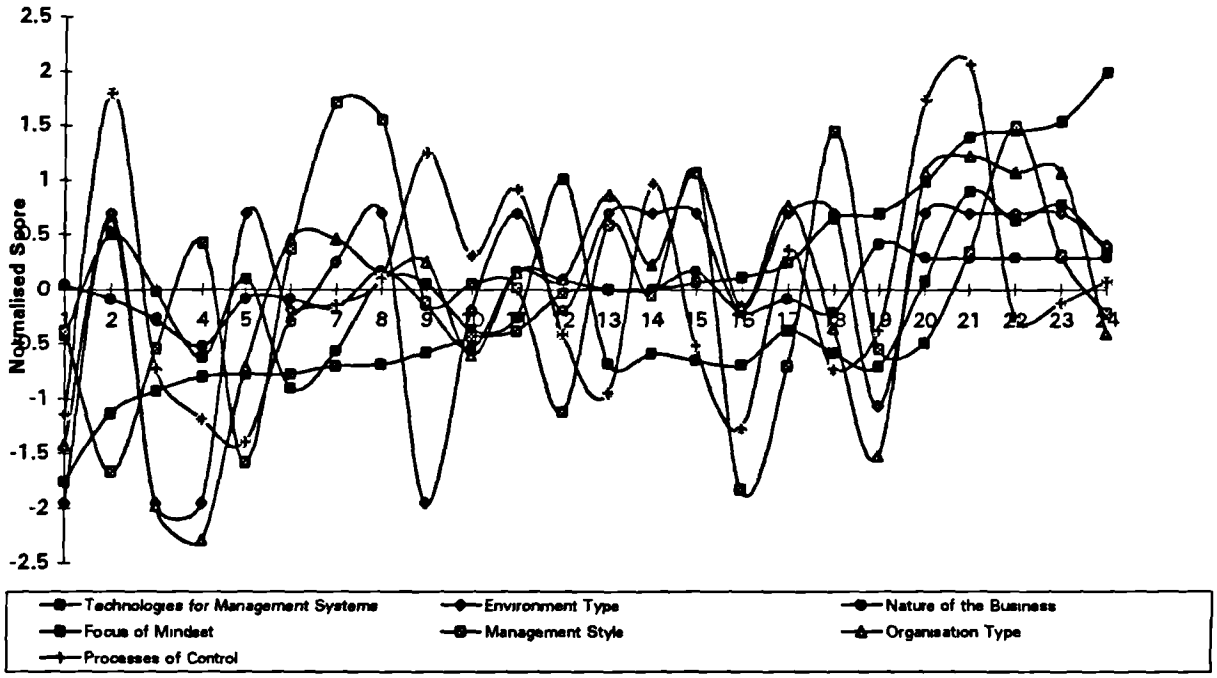



**Diagram 44: Technologies for Management Systems are Weakly Positively Correlated with IS Benefits**

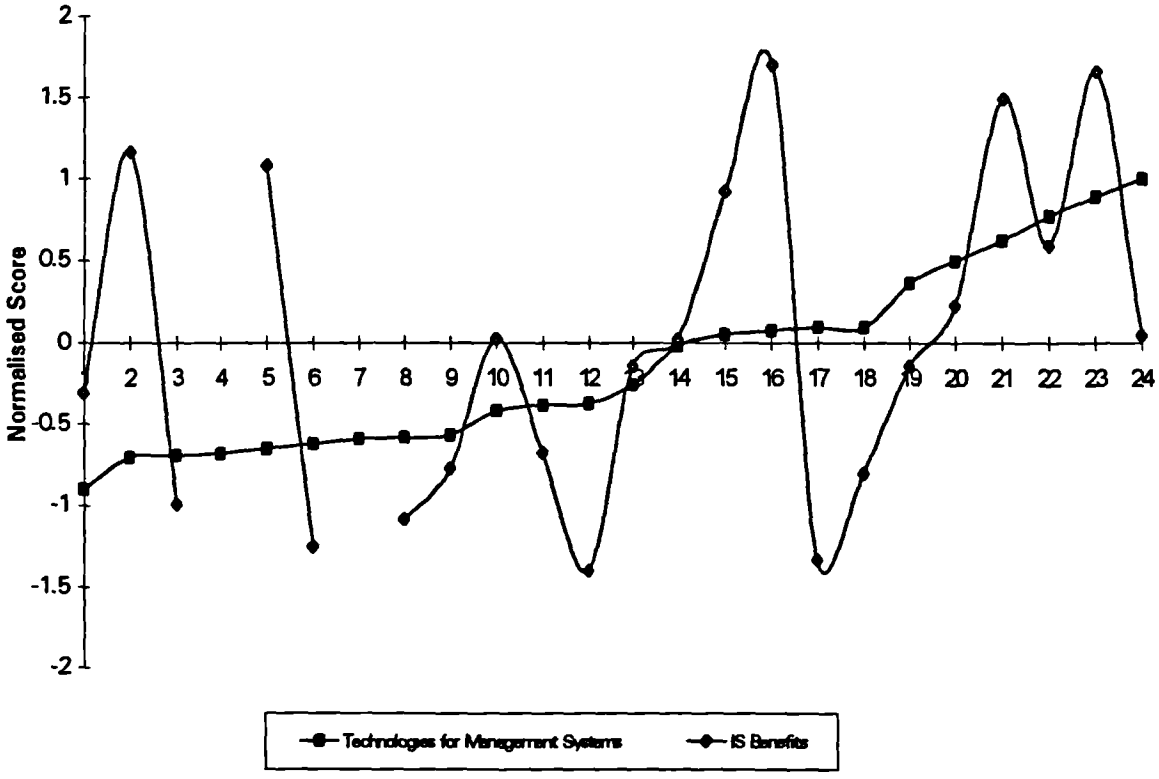
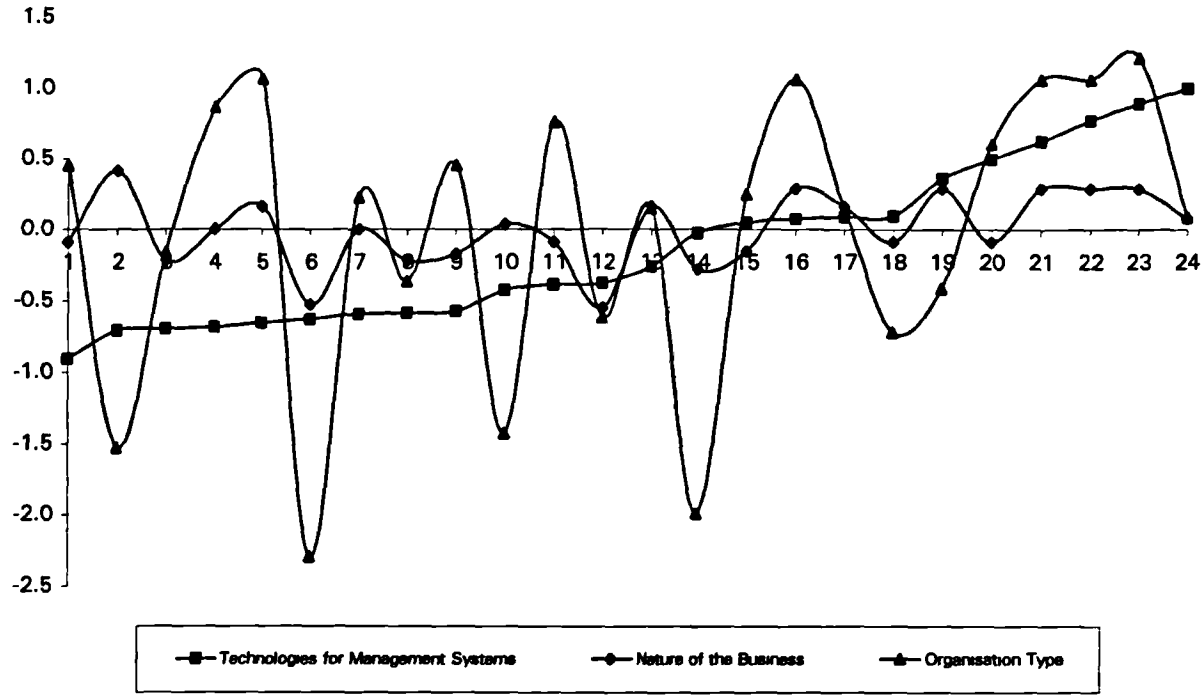


**Diagram 45: Technologies for Management Systems are Positively Correlated with the Nature of the Business & Organisation Type**




## 12.8.2. THE NATURE OF THE TECHNOLOGIES FOR MANAGEMENT SYSTEMS IN USE BY THE RESPONDENTS

We will now explore the nature of the technologies for management systems in the sample of respondent organisations in greater depth. The respondents expressed a concern that IS/IT, while displaying much potential to create business benefits, was not actually living up to its potential, despite the significant levels of investment most of them had made in IS/IT. What kinds of systems did these 24 organisations get for their money? And what kinds of planning and control systems were prevalent in the sample of organisations?

**Question Q7. In addition to financial control systems, what is the nature of the major information and management systems in large UK firms, including planning and control systems?**

### 12.8.2.1. INFORMATION SYSTEMS

**The Nature of the Information Systems and Technologies in Use, and the IS Function**

The 24 firms surveyed had large IT infrastructures: the average annual IT budget was £ 31 million, employing about 500 staff with 2 400 terminals in

use (including personal computers). The hardware used was a mix of mini and mainframe computers, with the typical firm using 40 minis and about 4 mainframes, with about £ 10 million being spent annually on hardware. Annual total telecommunications spend was £ 2.6 million. The typical firm was technically sophisticated, with one in two using EDI and expert systems, and having about 12 local area and 4 wide area networks in operation. Software packages dominated the application portfolio: there were two packages for every in-house development. 5 000 man months went into the average in-house development.

## DESCRIPTION OF THE RESPONDENTS

The IT function now reports directly to the chief executive in over half of all the firms surveyed, and in other cases to the strategic planning, finance or management services director. This has clearly raised the profile of IT in the firms where IT reports to the CEO.

The job experience, responsibilities, qualifications and career records of the respondents indicated that they were a well qualified, experienced group of managers who had been with their present employers for at least four years. Most had spent at least four years in tertiary education, and had between two to seven years experience of ISP. About two-thirds of the IT directors/managers had a business or consultancy, as opposed to a technical background.

## JOB EXPERIENCE AND RESPONSIBILITIES

18 out of 24 respondents were responsible to the board of directors for the performance of the IS function in the organisation and managed the IS area either directly or through subordinates. 21 of the 24 respondents were directly responsible for ISP in their firms. Their experience of ISP ranged from a minimum of 2 years to over 7 years, with the average being about 6.4 years. 21 of the respondents had worked their way up to the position of IT

Director or its equivalent with some experience in the IT area. 10 of the respondents had a consultancy background, while 7 had a business background as well. A few of the respondents were chartered accountants, while only 6 of the respondents had a scientific or technical background.

## QUALIFICATIONS AND CAREER RECORD

The respondents were a well qualified and stable group of managers. Several of the respondents had over 6 years of tertiary education, while only a few had none (and in those cases were professionally qualified). The average level of tertiary education was 3.6 years. Most of the respondents had been in their jobs for over 4 years, and with their companies for over 6 years.

## INFORMATION SYSTEMS INFRASTRUCTURE OF THE FIRMS SURVEYED

8 of the 24 firms had a decentralised IS infrastructure- in other words, the other 14 had single site processing with personal computers and terminals located in branches. The average IS budget for each firm was £ 30.5 million per annum, with a few firms spending under £ 2 million. The largest IS budgets were £ 160 million and £ 150 million, both financial institutions.

60% of the IS functions reported directly to the CEO in their firm, while 20% reported to the management services or planning director, and the other 20% reported to the finance director or the main board direct.

The average number of staff employed in the IS function was 468, with the smallest IS functions employing less than 50 people, and the largest near 5 000. This corresponded with a minimum number of terminals/ microcomputers of 150 and a maximum of over 7 000, with the average number of workstations being 2 402. The hardware used varied enormously- from small sites of 5 minicomputers to large sites with 15 mainframes and

150 minicomputers. The average number of minis and mainframes in organisations surveyed was 40 and 4 respectively (an interesting 10:1 ratio).

At least 1 in 3 of the respondents used a bureau or facilities manager, though this accounted for less than 10% of their computing resource in most cases, and only near 100% in 2 cases. Annual hardware spend varied between £ 0.5 million and £ 70 million, with the median being around £ 10 million. Telecommunications spend (including equipment and line charges) rose from less than £ 0.1 million to well over £ 10 million with the average being £ 2.6. million per annum.

The number of LANS and WANS in operation varied from 0 to 70 and 0 to 14 respectively, the averages being 12 and 3 respectively. 55% of respondents used EDI. About 45% of firms had expert systems in operation, with a maximum number of 10 in one firm, and an average of 4.

**APPLICATION PORTFOLIO**

All of the firms surveyed used a mixture of in-house and package software. Of the 25 typical generic application areas identified by the author, firms had software in at least half of these areas. The most common applications are accounts & finance, payroll, word processing, spreadsheets, executive information systems, desktop publishing, warehousing & inventory, personnel and sales and marketing systems. At least half of the firms surveyed had all of these applications in operation, using a mixture of packages and in-house development, though packages outnumbered in-house developments by at least 2:1 for most application areas, and in some cases predominated (for example, in the areas of accounts and finance, word processing, spreadsheets, personnel and desktop publishing).

At least 5 000 man months went into the average application portfolio, with some firms having spent as much as 40 000 man months on their systems,

and others as little as 1 000. Most firms used between 6 to 10 major packages. Fourth generation languages and COBOL were the most widely used languages (used by 82% of all respondents). Fortran, BASIC, APL and Assembler were used by 1/3 of all firms, while RPG3 was used by only 3.

In summary, both the respondent IS executives and the IS infrastructures in their firms were, by and large, sophisticated and mature.

### 12.8.2.2. STRATEGIC PLANNING SYSTEMS

All 24 respondents used an annual strategic planning system (with 23 out of the 24 firms surveyed having a "formal" planning system). Such systems forecast between 2 to 10 years ahead, with an average length of 4.5 years. Though in most cases the directors were not involved in planning, where they were the finance director was most often involved in plan preparation (36% of cases), while the planning director/manager (32%) and the CEO (27%) were less involved.

The strategic plans prepared were reasonably comprehensive in both their logical and functional coverage. Of the 14 sections which most strategic plans usually contain in the authors experience as a planning manager, most firms had at least 8- the financial forecast was an essential component of all respondent's plans, while mission statements, assumptions, objectives, strategies and actions were almost universal. Situation analyses (82%), critical success factor analysis (68%), strength/ weakness competitor comparisons (64%) and opportunity/threat analysis (55%) were all popular. Milestones, contingency and risk analysis and issues critical to success were also contained in about half of the plans.

In functional terms, the financial projections were listed as the most important in terms of emphasis by all respondents, while product/service plans, human resource issues/plans, technology issues/plans, information systems and

marketing and distribution were scored as receiving major emphasis by 2 out of 3 firms.

Between 1 to 6 layers of management were involved in producing the strategic plan, with an average of just over 2. Most plan content was produced by business units, with an average of 40% being produced by the centre (though some centres produced between 10% to 90%). Planning meetings were held biannually on average, and also reviewed biannually on average. There are still more planners at the centre of most firms, with the average number being 14 in the centre as opposed to 12 in the business units. Half of all respondents had a "bottom-up" planning process, while the other half were "top-down", with a few in the middle claiming they had both.

**Question Q8. How closely are these planning and control systems linked to information systems in such organisations?**

18 of the 24 organisations surveyed (77%) undertake ISP on an annual basis. This is a fair-sized increase over the number reported by Galliers in 1986 (about 55%). In only 9 cases was the ISP process integrated into the planning process. In all others, ISP was isolated from strategic planning as a process. Despite this process hiatus, of the firms who do ISP the IS plan is quite closely linked to the business plan (3.4 on a scale of 1-totally isolated to 5-inextricably tied).

**Hypothesis H8. The closeness of the links between such planning and control systems and information systems in such organisations will vary.**

This hypothesis was strongly confirmed- some organisations had no links whatsoever between their business and information systems planning, while others had very strong links. The evidence for this is set out on the page above.

**Question Q10. Are different organisation types and management styles reflected in different planning/control process and information system types?**

On balance the answer to this question is affirmative. In the 8 well-aligned organisations, management style and organisation type are reflected in the planning/control process and information system type. There is, however, a relatively high degree of misalignment between the MOPIT variables in about third of the large organisations surveyed, and a weak relationship in another third.

**Question Q11. Given the mission and/or objectives of an organisation, which variables in the organisation are considered critical for monitoring progress towards the mission/objectives?**

The top ten MCV's were rated by respondents as:

1. Service quality
2. Service speed
3. Good management
4. Effective information and control systems
5. Effective financial control
6. Close to customer
7. Leadership
8. Tightly controlled costs
9. Flat organisational structure
10. Cultural fit with situation

Given these "MCV's", we are now in a position to establish whether IS/IT was perceived to be contributing to their achievement by the respondents.

**Hypothesis H9. Information systems will be perceived to be enabling and supporting a wide variety of mission critical variables in all firms.**
**Question Q12. How well are information systems perceived to be enabling and supporting these mission critical variables?**

It was clear from the questionnaire responses that IS/IT had enabled and supported all 39 of the MCV's. Apart from three exceptions, IT/IS was perceived to be supporting the ten MCV's which respondents considered most important to their success, while IT/IS was also perceived to have contributed to higher productivity (IS/IT impact 6;MCV priority 18), higher capacity utilisation (IS/IT impact 7;MCV priority 23) and ability to innovate quickly (IS/IT impact 8;MCV priority 11) which were not in the top ten MCV list.

The most frequently cited IS/IT impacts, were, in order of frequency:

1. Service speed (MCV ranked as number two by most firms)
2. Effective financial control (MCV ranked as number five by most firms)
3. Service quality (MCV ranked as number one by most firms)
4. Better management information and control systems (MCV ranked as number four by most firms)
5. Tightly controlled costs (MCV ranked as number eight by most firms)
6. Higher productivity (MCV ranked as number eighteen by most firms)
7. Higher capacity utilisation (MCV ranked as number 23 by most firms)
8. Ability to innovate quickly (MCV ranked as number 11 by most firms)
9. Close to the customer (MCV ranked as number 6 by most firms)
10. Flatter organisational structure (MCV ranked as number 9 by most firms)

**Hypothesis H7. The planning and control systems in large UK firms will tend to be highly sophisticated. The effectiveness of such systems in supporting organisational performance and change will, however, vary dramatically.**

Both parts of this hypothesis were confirmed. Evidence of both the comprehensiveness and sophistication of the planning and control processes in the 24 respondents is set out above. Despite the sophistication of these planning processes, only 59% of respondents believed their planning process to be effective. Common causes cited for ineffectiveness were lack of communication by senior management, limited involvement of line and

middle management, crisis management based on financial forecasts, poor implementation, excessive decentralisation and poor or non-existent process.

**Hypothesis H13. Despite high relative levels of expenditure on IS, those organisations with poor ENFMOPIT alignment will fare as badly if not worse than those with substantially lower levels of IS spend. A specific relationship between any particular aspect of organisational performance and IS cannot be identified. In some cases, however, IS will clearly enable the creation of greater organisational capability in a particular area.**

This hypothesis was strongly confirmed, supporting Strassman's (1989) findings that returns on IS spend were associated with high returns on management. What appears in **table 3 and diagram 46** below is a ranking of the respondents according to their IT spend as a per cent of turnover. The correlation between this measure and the relative peformance of these organisations according to the PIMS database is low, while the correlation between alignment and relative performance is high. It is interesting to note that the four top spenders on IT were information businesses- in the case of Extel, a pure information provider; the Civil Aviation Authority providing flight information services and air traffic control services together with regulatory functions for the aviation industry in the UK; TSB Bank operating in the money information business; and BIS Banking Systems, an international provider of banking software and consultancy.

The column headings in table 3 below are abbreviated as follows:

**1. Company-** the respondents listed in order of the scale of their Management System and IS infrastructures relative to their turnover in 1989.

**2. Scale relative to business-** the scale of the management system and IS infrastructures of each respondent relative to their business turnover. This measure comprises the sum of measures 3 to 7 below.

**3. ITSpend % Turnover-** the total annual IT/IS budget for the company in 1989 relative to their turnover in 1989, expressed as a percentage.

**4. ITStaff %TotStaff-** the ratio of IT staff in the firm to total staff numbers in 1989.

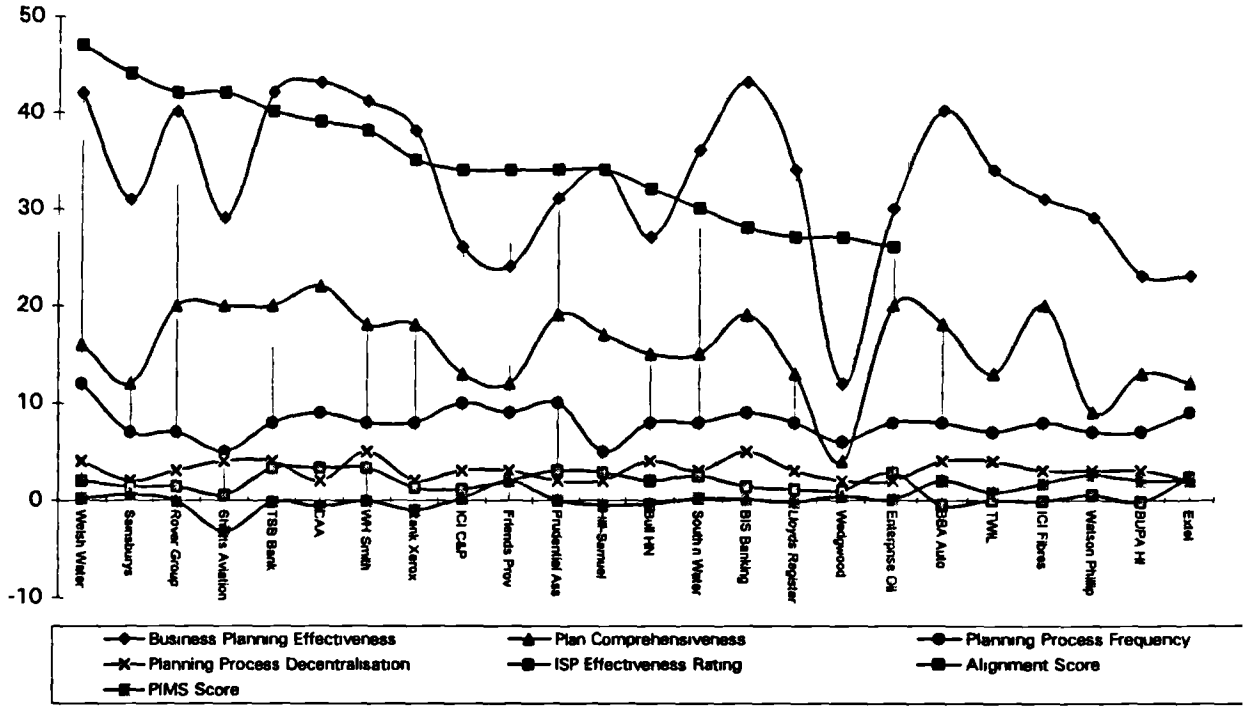
**5. TCSpend/Added Val-** the ratio of annual spending on voice and data communications by each respondent, to the measure of value-added of each firm in 1989.

**6. Terminals/Staff-** the ratio of terminals/microcomputers in the organisation to the total number of staff in each organisation in 1989.

**7. Proc'ing Power/Add.Val-** the ratio of processing power of all the computing resource available to each firm, expressed in MIPS, relative to the measure of value-added of each firm in 1989.

**8. PIMS Score-** the PIMS PAR rating for each respondent, measured over the period 1986-89. (A positive rating indicates overachievement relative to PAR, while a negative rating indicates underachievement relative to PAR).

**Diagram 46: Technologies for Management Systems- IT Infrastructure Scale, Spend & Effectiveness Ratios Relative to Scale of Business & its Performance**




## TABLE 3: IT SCALE, SPEND & EFFECTIVENESS RATIOS RELATIVE TO THE BUSINESS & ITS PERFORMANCE

| COMPANY | Scale | IT Spend | IT Staff | TC Spend | Terminals | Proc'ing | PIMS |
|---|---|---|---|---|---|---|---|
| | Relative | as % of | % Total | Added | /Staff | Power/ | Score |
| | Business | Turnover | Staff | Value | | Add Val | |
| Extel | 83.034 | 37.386 | 21.097 | 14.447 | 2.110 | 7.994 | 2 3 |
| CAA | 31.528 | 16.613 | 8.492 | 2.800 | .463 | 3.160 | -0.6 |
| TSB Bank | 21.038 | 10 163 | 6.568 | 2.732 | .301 | 1.275 | -0 2 |
| BIS Banking | 39.289 | 9.209 | 21.552 | 1 404 | 1.509 | 5.616 | 0 1 |
| Bull HN | 42.560 | 6.660 | 5 433 | 13.602 | .543 | 16.322 | -0 4 |
| Shorts | 6.593 | 6.407 | 2.042 | - 772 | .510 | -1.595 | -3.2 |
| Lloyds Reg | 16.175 | 4.851 | 3.975 | 1.531 | .431 | 4.388 | -0.2 |
| Welsh Water | 11 546 | 5 464 | 3.387 | 1.214 | .387 | 1.093 | 0.2 |
| Rank Xerox | 11.135 | 3.144 | 2.930 | 3 316 | 451` | 1.294 | -1 0 |
| Rover Group | 5 723 | 2 923 | 1.250 | .634 | .125 | .799 | -0 1 |
| BUPA HI | 10.221 | 2 627 | 3 542 | 1 855 | .551 | 1.646 | |
| TWIL | 8 250 | 2 486 | 4 337 | 216 | .130 | 1.081 | |
| Prudential | 9 219 | 2 437 | 5 516 | 599 | .368 | .299 | 0.0 |
| Hill-Samuel | - 532 | 2 143 | .750 | -2.500 | .075 | -1.000 | -0 5 |
| South'n Water | 8 412 | 1 550 | 5 376 | 522 | .269 | .695 | 0 2 |
| ICI C&P | 3 224 | 1 605 | .987 | 369 | 141 | .122 | 0.2 |
| WH Smith | 3 772 | 1.546 | .861 | .176 | 049 | 1.14 | -0 1 |
| Friends Prov | 10 547 | 1 537 | 7 584 | 493 | 758 | .174 | 2 0 |
| BBA Auto | 3 728 | 1 493 | 924 | .623 | 115 | .573 | |
| Enterprise Oil | 11 831 | 1 483 | 8 021 | .155 | 1 404 | 768 | 0 1 |
| Wedgwood | 3.509 | 1 343 | .510 | 876 | 080 | .701 | 0 4 |
| ICI Fibres | 5.249 | 1 078 | 862 | 359 | 172 | 2 778 | |
| Sainsburys | 2.757 | .592 | .623 | 667 | .062 | .813 | 0 6 |
| Watson Philip | 10 698 | 396 | 1 675 | 3 887 | 284 | 4 457 | |

## 12.8.3. THE ROLE OF IT & IS IN ORGANISATIONAL PERFORMANCE

**QUESTION Q19. In the sample of large UK organisations selected, did those whose financial performance exceeded their strategic potential over a five year period exhibit a better degree of alignment between their ENFMOPIT variables?**

**HYPOTHESIS H14. In the sample of large UK organisations selected, those whose financial performance exceeds their strategic potential over a five year period will exhibit a better degree of alignment between their ENFMOPIT variables, and between the ENFMOPIT variables and the environment.**

The question was answered in the affirmative and the hypothesis strongly confirmed. These results are discussed in full in **section 12.1.** above.

**QUESTION Q20. Were specific information technologies and systems used in the sample of large UK organisations mentioned as playing an important role in the performance of those organisations over the five year period under observation?**

**HYPOTHESIS H15. Specific information technologies and systems used in the sample of large UK organisations can be identified as playing an important role in the performance of those organisations over the five year period under observation.**

This hypothesis was confirmed in some cases, as discussed above. In other cases, however, IS proved to be a liability when it was used inappropriately or became out of date- in the cases of Hill-Samuel (where poor credit management due to fragmented systems resulted in major losses), and Friends Provident and Prudential, where old policy databases inhibited the development of more flexible relational customer databases, for example.

Specific operational systems were mentioned as "strategic" by various respondents. These systems were usually closely allied to the core tasks of the organisation, as follows:

| ORGANISATION | KEY SYSTEM |
|---|---|
| BBA Automotive | Financial Control |
| BIS Banking System | Financial Control |
| Bull HN | Financial Control |
| BUPA HI | Financial Control |
| CAA | Air Traffic Control |
| Enterprise Oil | Exploration Systems |
| Extel | Financial Databases & Networks |
| Friends Provident | Customer Databases and Agency Network |
| Hill-Samuel MB | None- all being replaced |
| ICI C & P | Production control |
| ICI Fibres | Production control & marketing |
| Lloyds Register | Register database and case system |
| Prudential Home Svcs | Policy database & pensions system |
| Rank Xerox | Sales and service databases |
| Rover Group | Production & logistics systems |
| Shorts Aviation | None- all being upgraded |
| Southern Water | Reservoir & geographic mapping systems |
| TSB Bank | Customer database & branch networks |
| TWIL | None- all being upgraded |
| Watson & Philip | Point of Sale |
| Wedgwood- Josiah | Financial Control |
| Welsh Water | Financial Control |
| WH Smith | Point of Sale |

**QUESTION Q21. How important was IT/IS perceived to be in creating organisational capability or competitive advantage in the sample of organisations?**

**HYPOTHESIS H16. The 72 directors interviewed will perceive IT/IS to be essential in creating organisational capability or competitive advantage in their organisations.**

IT/IS is perceived by the directors interviewed to be essential in creating organisational capability and competitive advantage. A very strong positive

correlation of 0.79 between the IS benefits perceived by senior management, and deviation from par, indicates a strong link between management perceptions of IS benefit and superior performance.
Respondents were asked to list the five most important application systems in their organization in terms of:

- strategic significance (providing a competitive edge for the organization)
- value-added (the payback on the application- best cost/benefit ratio)
- perceived user satisfaction.

60% of respondents could list the most important applications in their firm according to at least one of the above three criteria, though this was done on a judgemental rather than an empirical basis.

The strategic value of the new systems was the way in which major new systems initiatives were justified in 77% of the organisations surveyed. 41% and 36% of respondents respectively used the return on investment and payback methods to measure the return on new systems.

88% of the firms surveyed believed that they had used information systems for competitive advantage (2% above Galliers' finding in 1986 of 86%). This was borne out in about 25 % of cases, where the respondent has actually listed the applications which he/she believed had given rise to competitive advantage. Information system benefits were easily listed by 6 out of 10 firms, with 77% of the firms justifying IT investments on their strategic significance. While 88% of those surveyed believed that they were using IT for "competitive advantage", the level of understanding of what this term really means was low. 77% of the firms surveyed prepare or had prepared an information systems plan. The objectives of such an information systems plan usually included supporting the business plan, but it was clear that transformation or competitive advantage were not deliberately planned for.

The majority of respondents could not measure the benefits of information technology or information systems planning.

All of the organisations who mentioned a strategic system saw the main advantage of the system mentioned as critical to organisational capability to carry out the primary tasks of the organisation. Such systems were strategic in the sense that they enabled the core tasks to be carried out more efficiently. Apart from Friends Provident, none of the companies provided evidence for direct competitive advantage through a particular system. Friends Provident's Frentel system had provided loyalty in the distribution chain of brokers in the mid- 1980's, thereby gaining crucial market share for the organisation. (Nonetheless, Frentel had become a strategic liability several years later). Extel & BIS relied on IS as a production technology to provide new services and products to their clients, which would not have been possible without IT. Their competitors were doing this as well, however, so IS in itself offered no sustainable advantage. Rank-Xerox had been able to improve its quality through the intelligent use of IS in its sales and service process, thereby improving customer satisfaction and retarding its loss of market share. Enterprise Oil's exploration systems proved critical in securing strategic acreage in the North Sea. In the main, however, IS benefits tended to be better control and lower costs, rather than major direct revenue contributions. For example, Sainsbury's use of IT yielded efficiency in its distribution channels primarily, while the computerised application of point-of-sale data in the buying process was still at an early development stage. The latter has great potential to enable breakthroughs to be made in the buying process, which could yield strategic advantage if effectively deployed against other retailers.

**HYPOTHESIS H17. IS infrastructures and applications portfolios will tend to reflect the operational or strategic control emphasis in various ways. Some firms will opt for centralisation/ formalisation of both strategic and operational controls, while others will opt for decentralised/informalised controls or use a mixed approach somewhere between these two. From the perspective of organisational performance, what matters is the degree of alignment between the organisational variables rather than the level of management system and IT/IS centralisation/formalisation in itself.**

The first part of this hypothesis was not confirmed, although the second part was confirmed. The overall level of alignment of the ENFMOPIT variables appears to be the most important factor in performance, rather than any specific match between strategic controls and decentralised/informal systems infrastructures, or between operational controls and a centralised/formal systems infrastructure. This may be explained by the role of management systems as a balancing force in the organisation, mediating between the uncertainties of the environment and the need for certainty in the organisation and its stable operating processes.

### 12.8.4. THE ROLE OF PLANNING FOR THE BUSINESS (BP) & INFORMATION SYSTEMS (ISP)

The business planning and information systems planning questions and hypotheses are derived from hypotheses generated by the author from a variety of sources, particularly Galliers (1986), to test the link between business planning, ISP and organisational performance.

**QUESTION Q13. What role does ISP play, if any, in developing systems which contribute to superior organisational performance?**

Very little, it would appear from the evidence in the 24 respondents. Those who did no or little ISP did not perform worse than the rest of the sample who used ISP extensively. ISP appears to deliver systems which fulfil their purpose, provided hybrid managers are involved in the ISP process and senior management are committed to ISP. It was difficult to judge exactly how large the gap was between deliberate strategy and the systems delivered through ISP, but management generally appeared to be of the

opinion that ISP had delivered systems more aligned with the business strategy where it was closely intertwined with business planning. Where ISP and business planning were not integrated, it was still perceived that ISP had delivered a superior systems infrastructure than if it had not been done.

The lack of a formal or successful ISP process does not appear to constrain the organisation in any way. It appears that organisations which practise ISP rely upon formal processes more than those which do not, including business planning. Such an emphasis on formal processes may not necessarily be a strength, just as a relative lack of formal processes may not necessarily be a weakness. The research results show that what matters is whether the management processes in an organisation are aligned to the demands of the organisation's environment and the nature of its business. In other words, formal methods tend to be more appropriate in simpler, more stable environments in systematic processor, large infrastructure kinds of businesses; while informal methods appear to be more appropriate in complex, dynamic environments in versatile innovator, soft process kinds of businesses.

**HYPOTHESIS H10. That though information systems planning success is not directly related to organisational performance, ISP plays a useful role in developing systems which contribute to superior organisational performance when ENFMOPIT alignment exists.**

In testing this hypothesis, one must ascertain:

- what respondents deemed to be successful ISP
- whether those respondents who believed they had successful ISP processes, were in fact better aligned than those who did not
- whether those respondents who had successful ISP and were better aligned, actually exhibited better performance.

Let us examine each of these aspects in turn:

### 12.8.4.1. WHAT IS SUCCESS IN INFORMATION SYSTEMS PLANNING?

Commitment of senior management to ISP was the most important factor for ISP success, followed by close links between the business and ISP processes, and the involvement of senior management in ISP. These 3 factors mirror Galliers' 1987 findings exactly. The research has also unearthed four new success factors in ISP:

- ISP should span internal boundaries in the organisation.
- The Chief Information Officer &/or head of IS should be part of the ISP team.
- The existence of structures to enable discussion between users/IS/senior management about information systems strategies.
- Mixed teams of users/senior managers and IS staff on projects.

Only 2 out of 17 firms which do ISP had attempted to measure the benefits of ISP within their organisation, though most respondents could describe what they felt the benefits had been- for example, efficiency, effectiveness and competitive advantage benefits were identifiable in many of the cases due to the use of ISP. This represented a similar picture to Galliers' 1987 findings. ISP was judged to have worked well from the IS and senior management's points of view by all respondents, but only fair from the user's point of view.

### FACTORS CONTRIBUTING TO SUCCESSFUL ISP

Respondents were asked to score the factors they believed contributed to successful ISP, on a scale of 1 to 4, as follows:

1= not a factor in successful ISP

2= a reasonably important factor

3= very important factor

4= essential for successful ISP

Seven factors scored over 60 i.e. they were regarded as essential by 95% of all respondents:

1. Commitment of senior management to ISP was the most important factor for ISP success
2. Close links between the business and ISP processes.
3. Involvement of senior management.

(These 3 factors mirror exactly Galliers' 1986 findings).

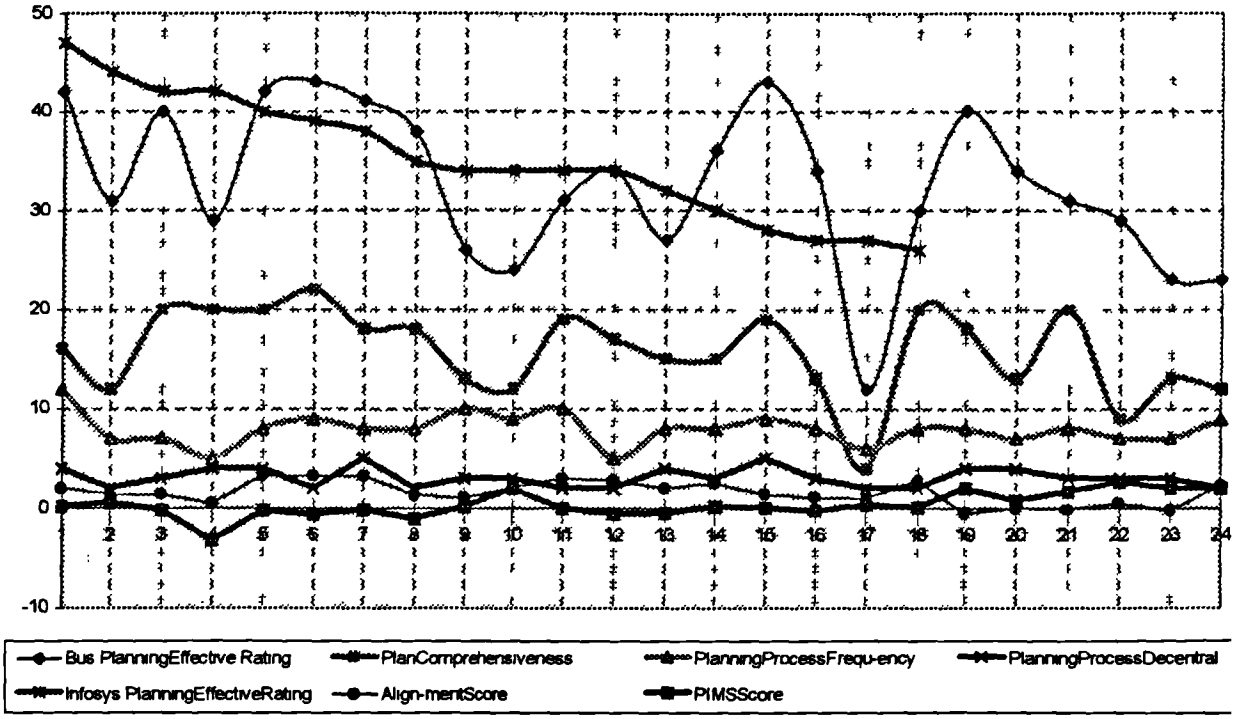
4. ISP should span internal boundaries in the organisation.
5. The Chief Information Officer &/or head of IS should be part of the ISP team.
6. The existence of structures to enable discussion between users/IS/senior management about information systems strategies.
7. Mixed teams of users/senior managers and IS staff on projects.

Factors 4 to 7 all involve the spanning of internal boundaries in the firm to achieve a shared result as a team, overcoming the old us/them attitudes of the data processing days. The hybrid manager is probably a result of this new development.

### 12.8.4.2. RESPONDENTS WHO HAVE SUCCESSFUL ISP PROCESSES WHO ARE WELL ALIGNED

The relative success of respondents at ISP is shown in **table 4 and diagram 47** below, according to their own evaluation and an assessment made of their ISP process based upon the answers provided by them to questions on the extent, nature and type of ISP process in use. The alignment and performance of the respondents are then compared. It is clear that there is no relationship between alignment and ISP success.

**Diagram 47: Relative Planning Effectiveness & Performance of the 24 Respondent Organisations**




## TABLE 4: PLANNING EFFECTIVENESS & PERFORMANCE

| Company | Bus. Planning Effective Rating | Plan Comprehe nsive ness | Planning Process Frequ-ency | Planning Process Decentral | Infosys. Planning Effective Rating | Align-ment Score | PIMS Score |
|---|---|---|---|---|---|---|---|
| Welsh Water | 42 | 16 | 12 | 4 | 47 | 2.0 | 0.2 |
| Sainsburys | 31 | 12 | 7 | 2 | 44 | 1 4 | 0 6 |
| Rover Group | 40 | 20 | 7 | 3 | 42 | 1.4 | -0.1 |
| Shorts Aviation | 29 | 20 | 5 | 4 | 42 | 0.5 | -3.2 |
| TSB Bank | 42 | 20 | 8 | 4 | 40 | 3.3 | -0.2 |
| CAA | 43 | 22 | 9 | 2 | 39 | 3 3 | -0.6 |
| WH Smith | 41 | 18 | 8 | 5 | 38 | 3.3 | -0.1 |
| Rank Xerox | 38 | 18 | 8 | 2 | 35 | 1 3 | -1 0 |
| ICI C&P | 26 | 13 | 10 | 3 | 34 | 1.1 | 0.2 |
| Friends Prov | 24 | 12 | 9 | 3 | 34 | 2 0 | 2 0 |
| Prudential Ass | 31 | 19 | 10 | 2 | 34 | 3 0 | 0.0 |
| Hill-Samuel | 34 | 17 | 5 | 2 | 34 | 2.8 | -0 5 |
| Bull HN | 27 | 15 | 8 | 4 | 32 | 2 0 | -0 4 |
| South n Water | 36 | 15 | 8 | 3 | 30 | 2.5 | 0.2 |
| BIS Banking | 43 | 19 | 9 | 5 | 28 | 1 4 | 0 1 |
| Lloyds Register | 34 | 13 | 8 | 3 | 27 | 1 1 | -0 2 |
| Wedgwood | 12 | 4 | 6 | 2 | 27 | 1 0 | 0 4 |
| Enterprise Oil | 30 | 20 | 8 | 2 | 26 | 2 8 | 0 1 |
| BBA Auto | 40 | 18 | 8 | 4 | | -0 5 | 2 0 |
| TWL | 34 | 13 | 7 | 4 | | 0 0 | 0 8 |
| ICI Fibres | 31 | 20 | 8 | 3 | | -0 1 | 1.7 |
| Watson Phillip | 29 | 9 | 7 | 3 | | 0 5 | 2 6 |
| BUPA HI | 23 | 13 | 7 | 3 | | -0.2 | 2.0 |
| Extel | 23 | 12 | 9 | 2 | | 2 3 | 2 0 |

### 12.8.4.3. RESPONDENTS WHO HAVE SUCCESSFUL ISP PROCESSES WHO ARE WELL ALIGNED & WHO PERFORMED WELL

It is also clear that there is no relationship between ISP success and performance as measured by the PIMS approach. There is also no relationship apparent between ISP success and planning effectiveness, nor does planning effectiveness have any apparent direct impact on performance or alignment. We can therefore conclude that ISP success does not appear to have a direct impact on the success of an organisation. This may be for any number of reasons:

- the ISP activity takes place in isolation from other activities in over half of the respondents.
- the impact of ISP may be very indirect, but still make some contribution, though hard to detect, in creating useful systems
- ISP may help create highly efficient systems which yield very little business benefit.
- ISP may increase the efficiency of the systems planning process, without any impact on the quality of the systems produced or their business benefit.

The lack of a formal or successful ISP process may be compensated for by informal strategy and managerial processes. This can be inferred from the lack of correlation between alignment, performance and ISP success. Other processes must clearly have been involved in enabling those organisations without a formal ISP process to create appropriate information systems and to harness them to business goals. This accords well with Ciborra's (1991) comments on the role of informal systems development.

### 12.8.4.4. INFORMATION SYSTEMS PLANNING AND BUSINESS/ STRATEGIC/CORPORATE PLANNING

All of the firms surveyed had a strategic planning process, though this process was only judged effective in 60% of cases. The business planning process appeared to be comprehensive and sophisticated in the typical firm, and typically covered a four year period. 60% of plan content was prepared by business units (as opposed to the corporate centre), while only 2 the top layers of management were involved in business plan preparation in the typical firm.

Information systems planning was only closely linked to the business planning process in just over half of all cases. Decentralisation and delayering appear to have made the task of the planner either difficult or non-existent in many of the firms surveyed. In-house planning methods tended to predominate, and once an ISP approach was selected, it was not likely to be changed. Planning teams consisting of senior management, external consultants and users averaged six members, who prepared a four year plan in about four months.

18 of the 24 organisations surveyed (75%) undertake ISP on an annual basis (though just more than half do so slightly less frequently). This is a fair-sized increase over the number reported by Galliers in 1986 (about 55%). In only 9 cases was the ISP process integrated into the planning process. In all others, ISP was isolated from strategic planning as a process. Despite this process hiatus, of the firms who do ISP the IS plan is quite closely linked to the business plan (3.4 on a scale of 1-totally isolated to 5-inextricably tied).

### 12.8.4.5. CHOICE OF INFORMATION SYSTEMS PLANNING APPROACH ADOPTED

The most common approach to information systems planning is an in-house approach which incorporates "top-down" features and elements of common or proprietary approaches e.g. PQM (originally BSP-IBM, 1984), CSF (Rockart, 1979), **or a variety of "pick and mix" approaches**

Galliers' 1987 hypothesis was strongly confirmed. Of the non-proprietary approaches to ISP, critical success factors were most frequently used (60% of all cases).The conclusion to be drawn from this evidence reinforces Galliers' findings of 1987- that in-house methods predominate over proprietary methods. Reasons cited for this include the tailored nature of many in-house methods to the systems of the firm, together with the familiarity of a "home-grown" method to its designers and users. The choice of method was largely historical, with only a few firms actually changing their method over several years, usually on the basis of a consultant's advice.

It is apparent from the results that there are very few genuinely "informal" processes as far as ISP is concerned. Planning or budgeting processes tend to fill the gap where no ISP exists. It is apparent that in the absence of ISP or an IS director, a board of directors will discuss any major capital investment in their usual way, so that the purchase of hardware, software and telecommunications items will usually have been discussed and evaluated in some way.

There was some variation in the information systems planning horizons of organizations, not necessarily explained by the corporate/business planning horizon, as there was no link between business and ISP planning horizons in most of the respondents. This can be explained in half of the cases by the lack of integration between the business and IS planning processes. The ISP time horizon was 4.4 years on average, ranging from 2 to 7 years.

The average elapsed time for an ISP study in the organisations surveyed was 4 months, ranging from 2 weeks to 9 months.

### 12.8.4.6. MANAGEMENT INVOLVEMENT IN INFORMATION SYSTEMS PLANNING

Despite the involvement of senior management in the information systems planning process, the leadership of the information systems planning team is

generally assumed by an information systems executive rather than a member of the general management team. A senior member of the IS/DP function typically leads the ISP team, in 65% of cases, while senior managers are most frequently selected in the rest. The typical size of an ISP team is 6 people, ranging from 2 to 12. External consultants and senior management form part of the ISP team most frequently (77% of the time), while user department personnel and corporate planning personnel are usually involved, but less frequently (65% and 53% respectively). The proportion of the staff in the IS/DP department who are or have been involved in ISP varied between 5% and 60%, with the average level around 10%.

### 12.8.4.7. INFORMATION SYSTEMS PLANNING OBJECTIVES, OUTCOMES & REVIEW

The major focus of the information systems planning effort is on the creation of the information systems application portfolio, and that technical matters (such as the composition of corporate databases or the information systems/technology architecture) are considered to be of secondary importance.The following possible outcomes of the ISP process scored above 65% mention by respondents (the rest were below 47%):

a. Prioritises IS developments
b. Identification of IT infrastructure for the organization
c. Generates ideas for IS developments driven by corporate goals
d. Generates cost and resource estimates for planned IS projects
e. Identification of sources of competitive advantage through IT
f. A clearly documented plan capable of being revised.

A was judged to be the most important result of an IS plan (88%), while b and c tied for second place (77%), with j and e tying for third at 71%. These answers appear to be consistent with the underlying purpose of ISP i.e. to generate a plan of action which will enable IS to support the business goals of the firm while perhaps giving the firm some competitive advantage. In the

process of doing this effectively, it is essential to prioritise developments so that the IT infrastructure for the firm can be developed cost-effectively.

Plans were reviewed and departed from once or twice during their life, with most of the departures being sanctioned by the review process. None of the respondents were able to provide evidence of any process by which they could evaluate the efficiency or effectiveness of the ISP process. All of them left this section blank or said that were not able to make such an evaluation.

### 12.8.5. GENERAL CONCLUSIONS ABOUT ISP

The overall message appears to be that the use of IT/IS is extensive in large firms, and that information systems planning is now a regular process in most of these firms. The planning and ISP processes however, could be much more effective than they currently are. Although the IT/IS infrastructure of the firms surveyed was both sophisticated and extensive, they found it difficult to justify new systems investments or measure the benefits of systems with any precision, or at all in many cases.

The implication of these findings for further research is that much more effort is required to design, build and operate strategic systems than at present, and that current systems could be operated more effectively.

Most of the findings confirmed Galliers' 1987 results, while providing evidence that information systems planning is carried out more regularly than in 1986. There was some evidence to suggest that firms were getting more competitive advantage or other benefits through IT/IS than they were several years ago, though it is difficult to corroborate this with hard evidence of the specific benefits, which the respondents had difficulty defining clearly or measuring accurately.

Most of the firms surveyed claimed that their information systems developments were driven by their business strategy. Yet it is clear from the difficulty these firms have in specifying which systems yield business benefits, and what these benefits are, that this claim may be more wish than reality.

Several factors associated with successful information systems planning in UK and Australian firms by Galliers (1986), were confirmed as important. They were inter alia: top management commitment, close links with the business planning process and the involvement of senior management in ISP. A large gap between claims that IT was being used for competitive advantage and evidence to support such claims, was also found.

## 12.9. INTERPRETIVE FINDINGS AND CONCLUSIONS

Following the findings and conclusions drawn from the statistical evidence above, we can now turn briefly to discover what support or refutation there is for such findings and conclusions in the qualitative material gathered during the course of the research. The purpose of this interpretive section is also to develop the wheel into a diagnostic tool for managers to use in a number of different ways.

### 12.9.1. THE WHEEL AS A DIAGNOSTIC TOOL

The wheel provides some insights for managers about their organisation and the way in which their technologies for management systems can be managed to yield greatest business benefit. These insights centre around the fact that alignment of the ENFMOPIT variables produces superior performance.

### 12.9.1.1. IMPLICATIONS OF ALIGNMENT

- **Alignment Leads To Superior Long-term Performance**

An organisation is aligned if its strategic intent and management and business processes are appropriate to the challenges of its environment and the nature of its business. The research evidence shows that over a five year period, the strategic and financial performance of the 24 organisations studied was found to be significantly correlated with their degree of alignment. In other words, superior alignment results in superior performance.

Alignment profiles are essentially a "snapshot" of the key factors influencing long-term organisational performance at a point in time. The dynamics underlying the movement of these factors are also important, as in fast changing and complex situations achieving and maintaining alignment represents a considerable management challenge.

- **IS /IT Makes A Positive Contribution To Superior Performance In Aligned Organisations**

The research evidence shows that if IS/IT and management systems in an organisation are aligned with the nature of the organisation and its environment, then IS/IT can significantly enhance key organisational performance. In unaligned organisations, however, IS/IT investment has low, and often negative impact on organisational performance.

- **Organisations Are Learning Systems Which Process Information & Create Value-adding Knowledge & Competences**

Superior organisational performance and sustainable competitive advantage are a function of an organisation's ability to learn faster than its competitors how to satisfy customers, stakeholders and employees. Alignment reflects the harmonisation of different forces in the organisation, its environment and management systems. Such harmonisation enables learning to occur at a faster rate than in unaligned organisations.

Management systems are one of the key ways in which the management team of an organisation learns, providing critical information about the degree of success the organisation is having in satisfying its environment. Unaligned organisations and management systems interfere with the learning process, with negative consequences for performance. Wheel profiles describe whether, and in what areas, learning and development are taking place in an organisation, while simultaneously indicating whether such learning and development are harmonised.

### 12.9.1.2. INTERPRETING A WHEEL PROFILE

If we can gain such insights into an organisation's situation from a wheel profile, then how can a manager looking at the wheel profile of his or her particular organisation discern what specific lessons lie in the wheel profile for them?

- **Performance Level**

First, one should check the circle in the middle of an wheel. Is it full or empty, or just partially full? A full circle represents high performance as measured by five year profit growth and strategic position strength (which is measured using the Profit Impact of Market Strategy model). An empty circle either means the respondent did not contribute sufficiently accurate data to get a score (if this is explicitly stated), or that there is scope to improve the firm's profitability and strategic position. A partially full circle means the organisation is neither a high or underachiever, but performing at an average level.

- **Indicative Alignment Level**

Second, one should look at the organisation's scores reflecting the nature of its environment and business. These two scores are used to set the indicative alignment level for the organisation, which is represented by the shaded circle on the organisation's wheel. Is the organisation's indicative

alignment level moving outwards; from a simple, stable environment and systematic processor / hard infrastructure business type to a complex, dynamic environment and versatile innovator / soft processor business type? Or are one or more of these variables moving inwards? The direction and speed of this inward or outward movement is important as it largely determines the desirable level of the other wheel variables.

- **Wheel Profile Type**

The manager can then identify the wheel profile type of his or her organisation against the eight wheel profiles arising out of the research, in order to begin to discern the underlying meaning of this pattern for their organisation and its current situation. These eight typical wheel profiles arising from the 24 participants are set out below, with some of the implications of each. An example of one of the diagrams from each type of wheel profiles is used to illustrate each wheel type.

## THE EIGHT WHEEL PROFILES ARISING OUT OF THE 24 RESPONDENT SAMPLE

Eight typical wheel profile patterns emerge from the 24 participant profiles. The underlying meaning of these patterns for the organisations which correspond to them is interpreted below:

### 1. SPIDER'S WEB -

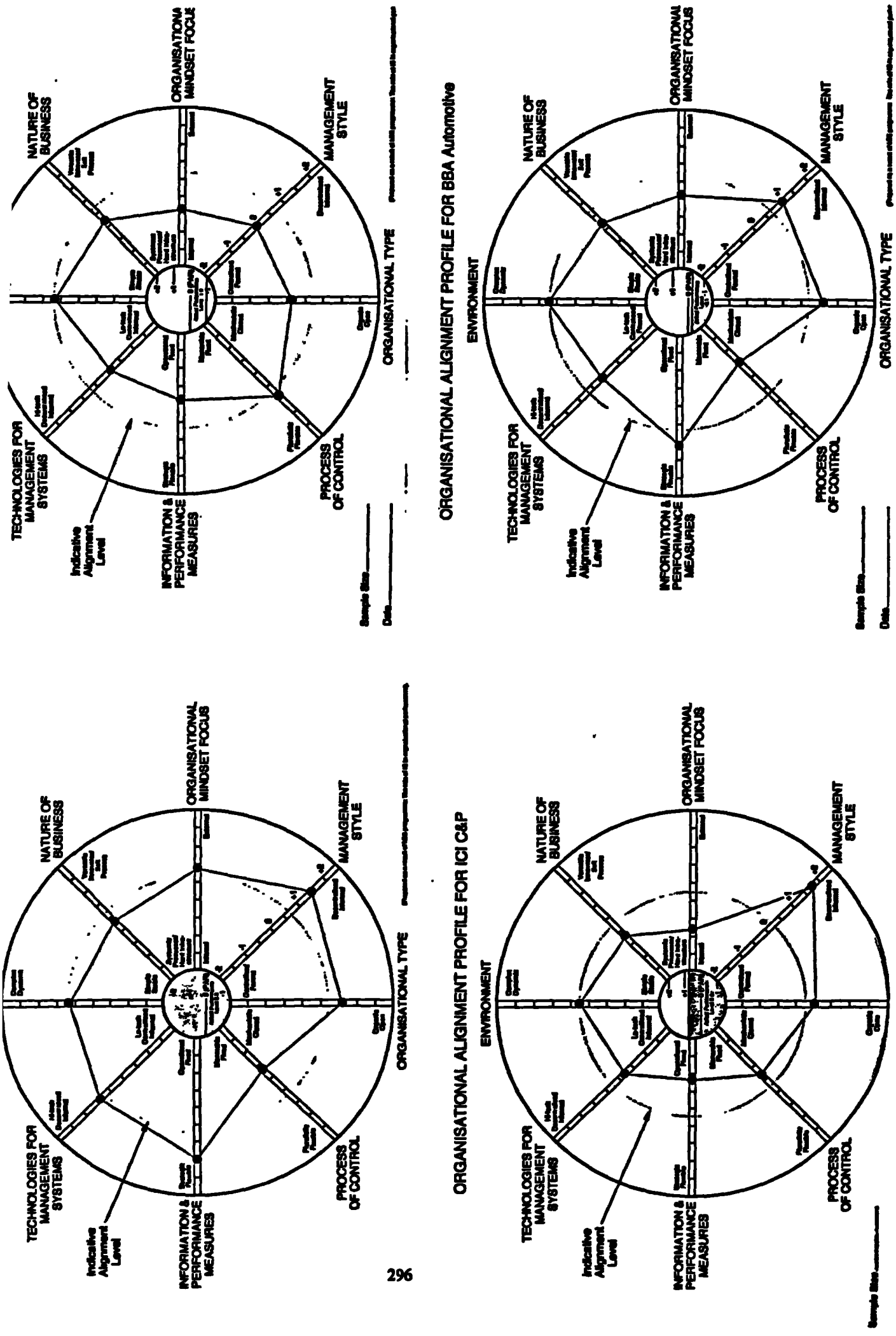
Respondents who resembled this profile are: BBA Automotive, Enterprise Oil, Extel, ICI C&P, Lloyds Register, Prudential Assurance, TSB Bank, Watson & Philip, and WH Smith. Their wheel profiles are shown in **diagrams 48 to 50**. These organisations are relatively well aligned and therefore tend to be high performers. If most of the variables lie:

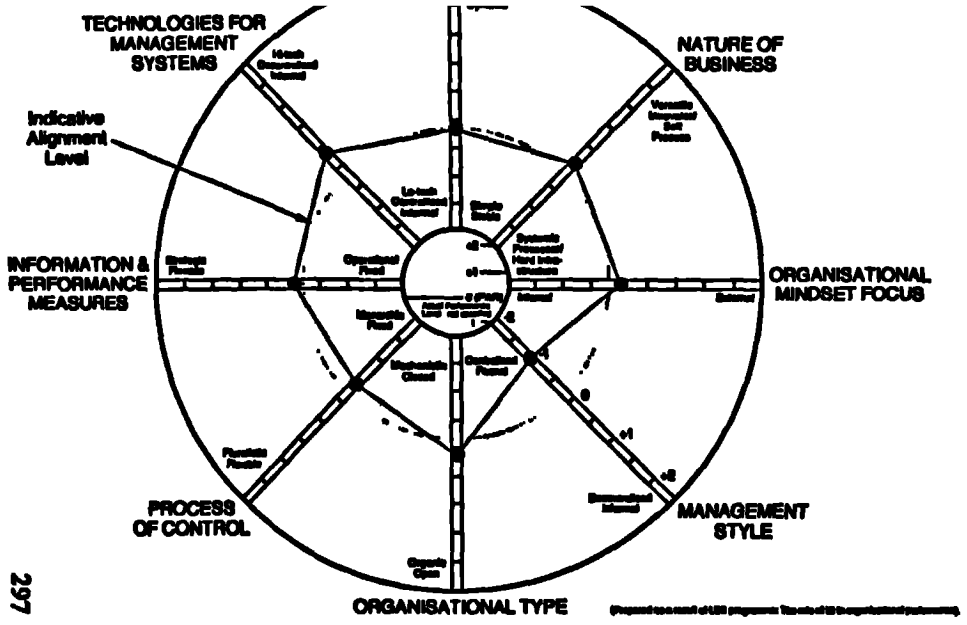
**A) outside the indicative alignment level,** then the organisation has successfully coped with the nature of its current business and environment.

**B) inside the indicative alignment level,** then the organisation still has some work to do to fully align itself with the nature of its current business and environment.

Complacency (as commented upon by **Pascale (1990)** : "nothing fails like success), especially where invisible or sudden changes in the environment or nature of the business take place, must be guarded against in such organisations. Top management in Extel, Enterprise Oil, Prudential and TSB emphasised that creative tension in their organisations was essential to "keep people on their toes". These organisations looked as if they had potential to become learning organisations, enabling them to maintain their high performance and alignment.

**Diagram 48: Wheel Profiles for "Spider's Web" Pattern- BBA Automotive, Extel, Enterprise Oil and ICI C&P**







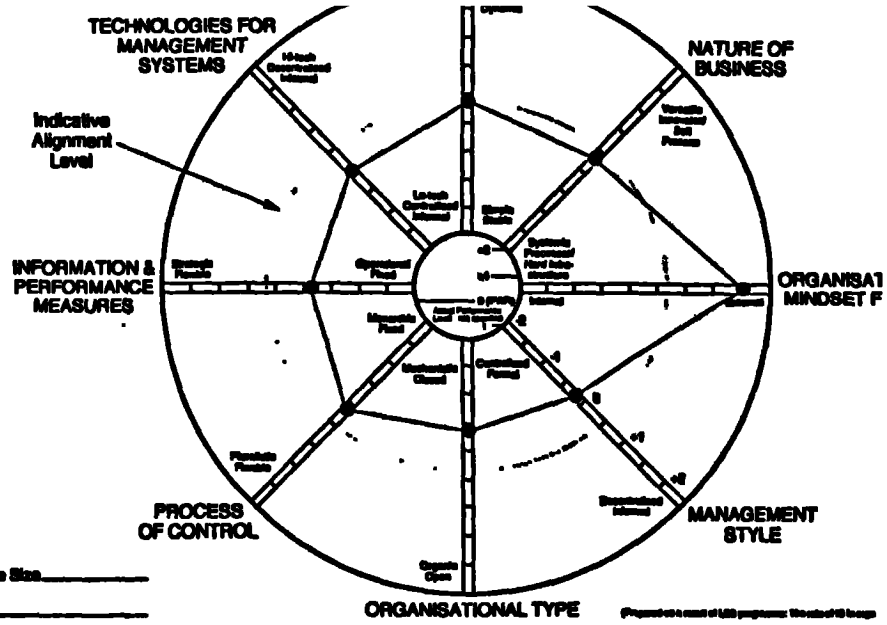
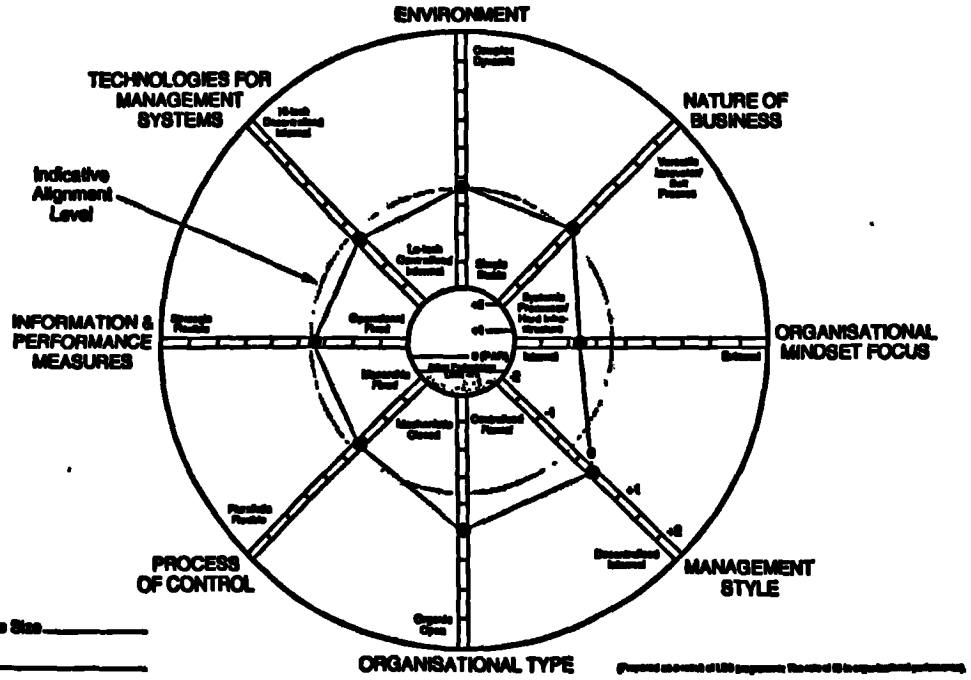
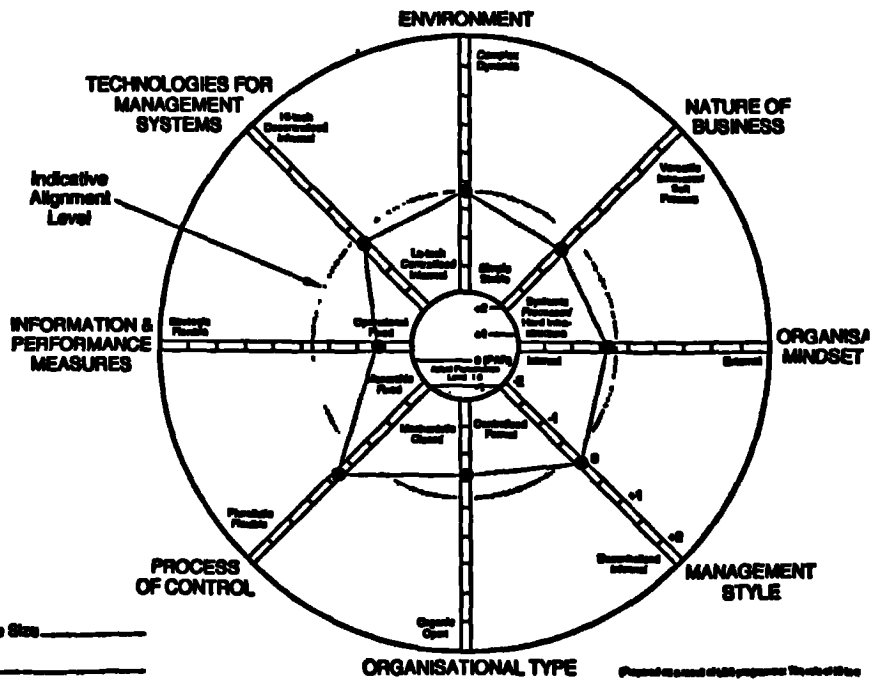




**Diagram 49: Wheel Profiles for "Spider's Web" Pattern- Lloyds Register, Prudential Assurance, TSB Bank & Watson & Philip**

ORGANISATIONAL ALIGNMENT PROFILE FOR Watson & Philip




ORGANISATIONAL ALIGNMENT PROFILE FOR Prudential Assurance



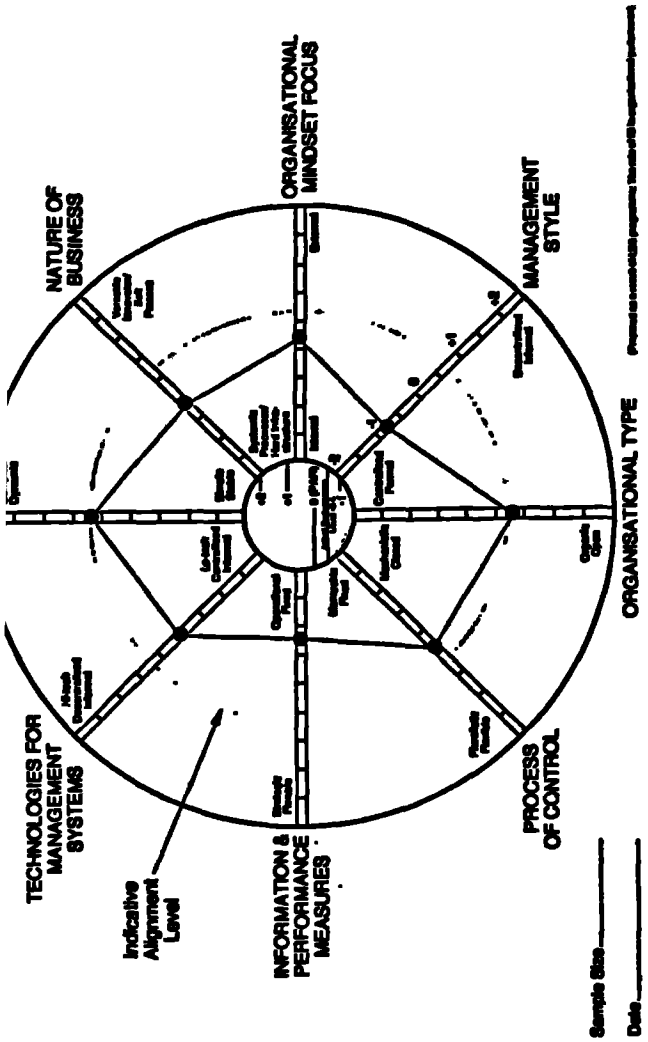



**Diagram 50: Wheel Profiles for "Spider's Web" Pattern- WH Smith**

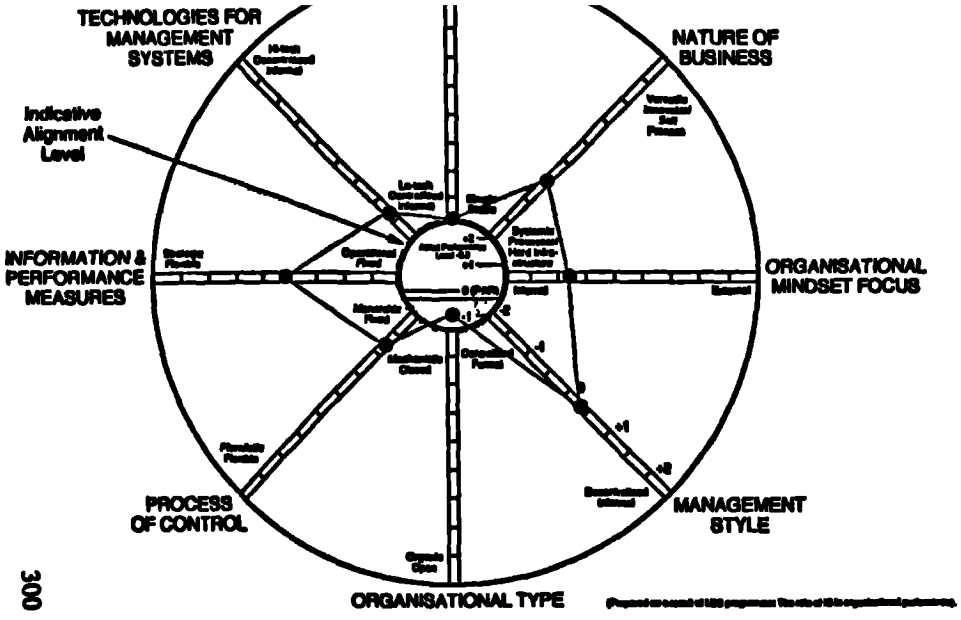
**2. IRREGULAR CORE -**

Respondents resembling this profile were: CAA, Southern Water and TWIL. Their wheel profiles are shown in **diagram 51.** This profile indicates an organisation which is largely bureaucratic in nature. As change may be taking place in the areas which "spike" out from the centre, a certain level of internal tension may be evident. If most of the variables lie:

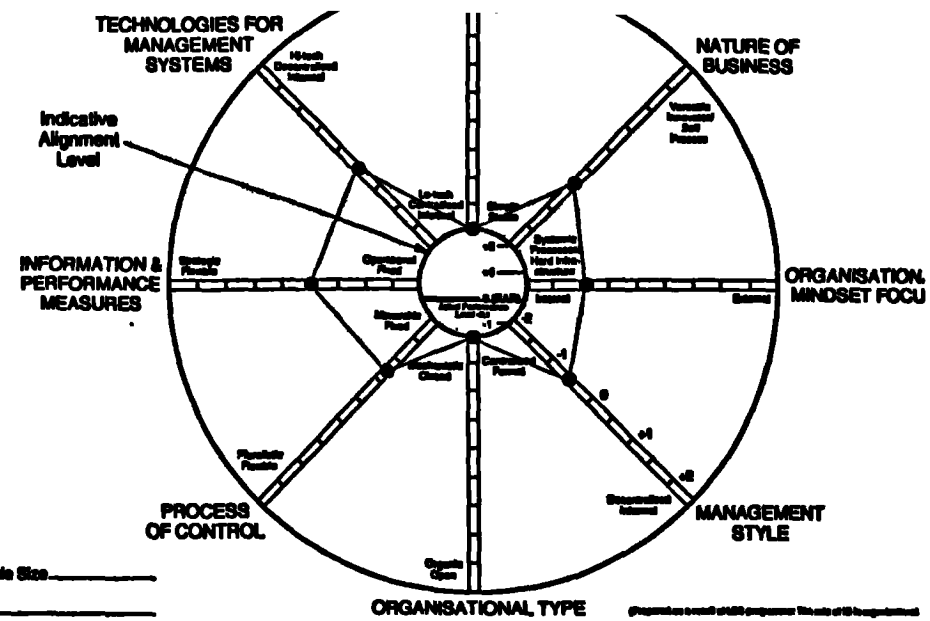
**A) outside the indicative alignment level,** then the organisation may be getting to grips with the changes occurring in the nature of its current business and environment, though one might question whether this is being done in a way which will result in future alignment.;

**B) inside the indicative alignment level,** then the organisation still has considerable work to do to align itself with the nature of its current business and environment.

There are two main challenges for this profile - first, that the required level of change may be difficult to achieve quickly enough to prevent performance deterioration, and secondly, that the tensions created by misalignment may lead to serious learning disabilities.



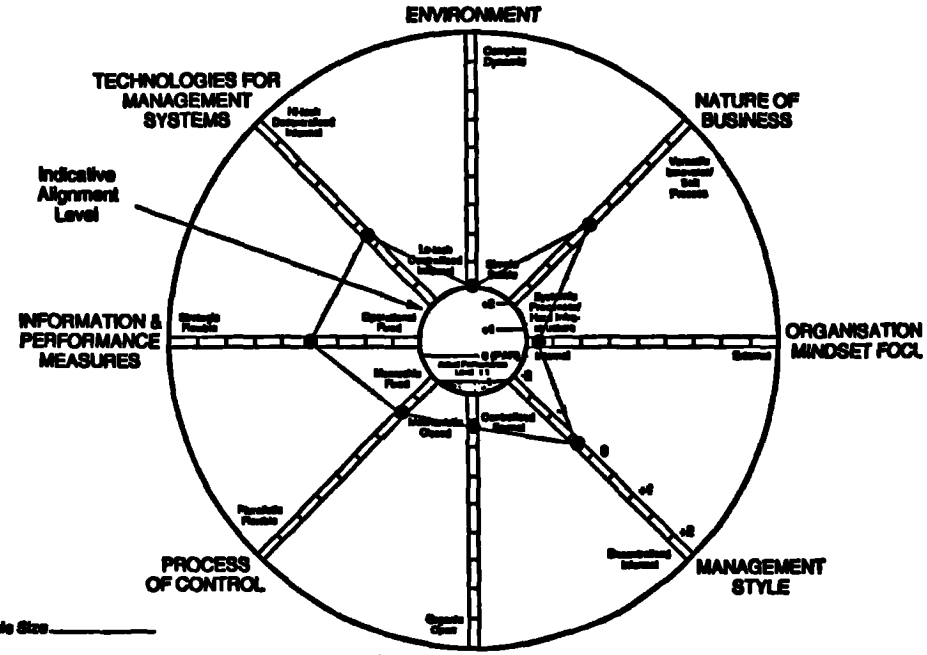



Sample Size_____

Date_____

ORGANISATIONAL ALIGNMENT PROFILE FOR Southern Water




Sample Size_____

Date_____

**Diagram 51: Wheel Profiles for "Irregular Core" Pattern- CAA, Southern Water & TWIL**

**3. WIDE & FLAT -**

The respondent with this profile was ICI Fibres, whose wheel profile is set out in **diagram 52**. Such organisations have "minds" with the capacity to change (their management teams), but their "bodies" are not yet making the change happen. Information and performance measures and organisational mindset focus will always lie outside the indicative alignment level. The challenge will be to create the right level of change in the processes of control, organisational type and management style to make change happen at all levels and to make change stick.

The challenge for wide and flat organisations is that the appearance of apparent change may mask the lack of underlying fundamental change in many key areas of the organisation.

**4. TALL & THIN-**

Respondents with this profile were: BIS Banking Systems, BUPA HI, Hill-Samuel Bank and ICI C&P, whose profiles appear in **diagram 52**. These organisations tended to be product-led with a functional emphasis. Their performance over the longer term tends to be cyclical, as they find it difficult to adapt to rapidly changing conditions, particularly in downturns or when faced with major strategic challenges. This is due to the internal focus of the organisation's mindset, and the operational fixed variables which are used to measure performance.

The challenge for this kind of organisation is to respond to customer driven and strategic variables, rather than an habitual focus on internally generated concerns which do not assist in adaptation. The functional orientation of such organisations will also tend to prevent critical information travelling to those parts of the organisation where it may be most needed. Instead, information will tend to be treated as a source of power to be guarded.

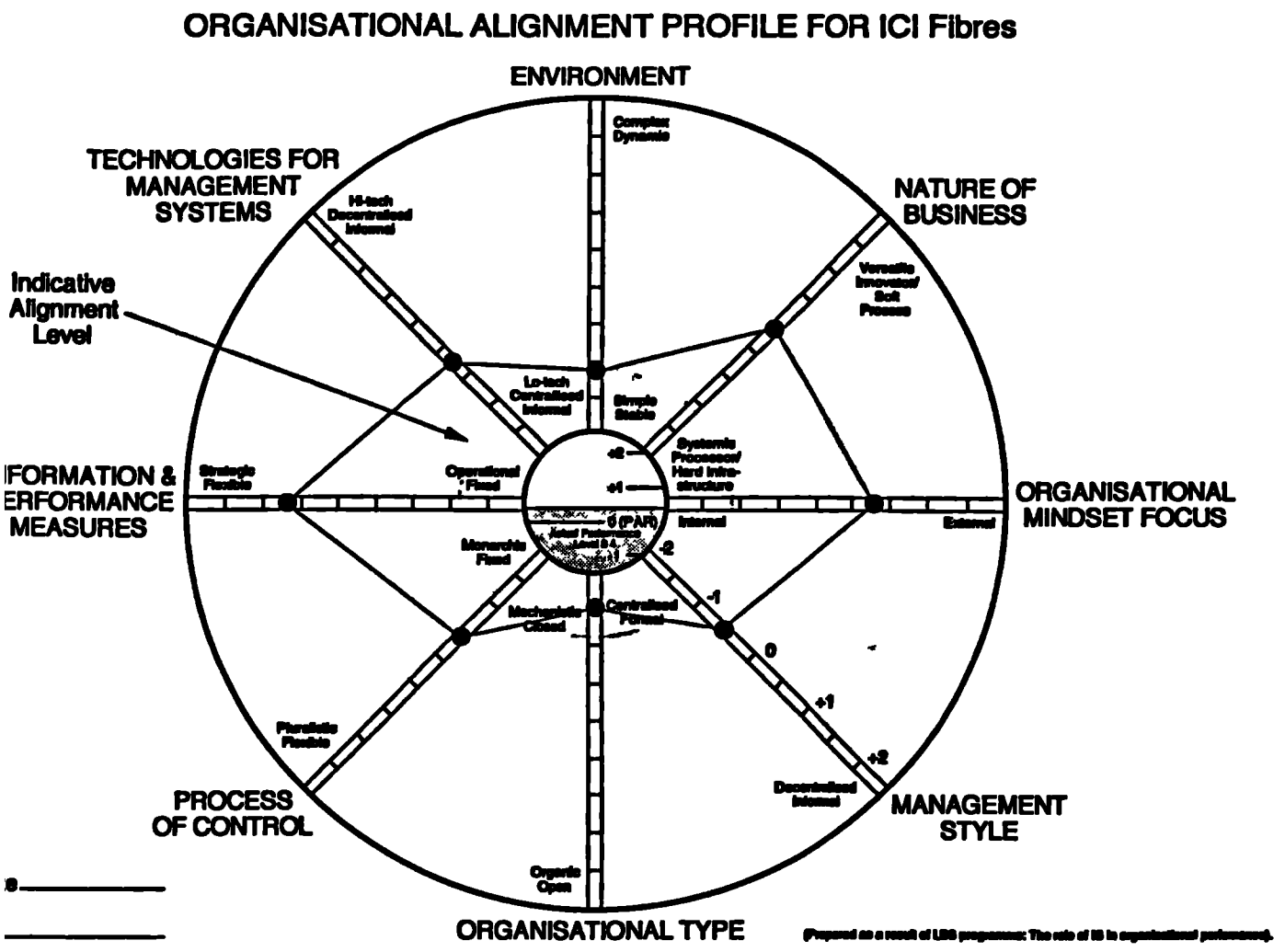
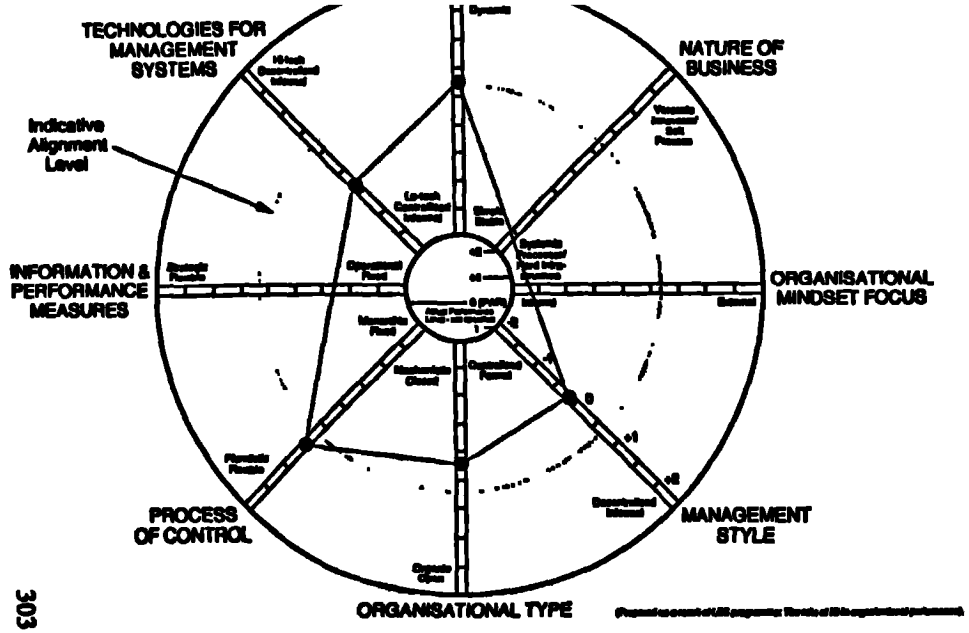



**Diagram 52: Wheel Profile for "Wide & Flat" Pattern- ICI Fibres**



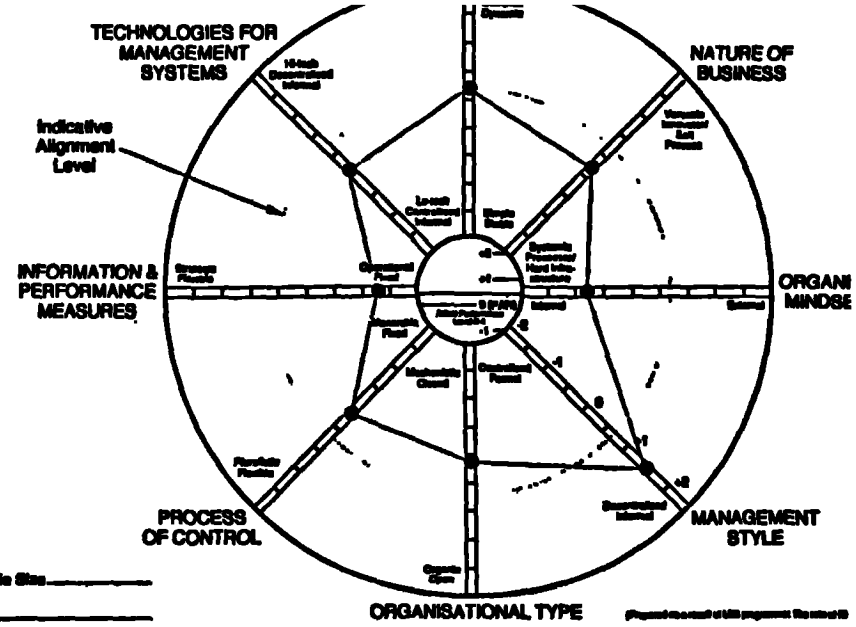
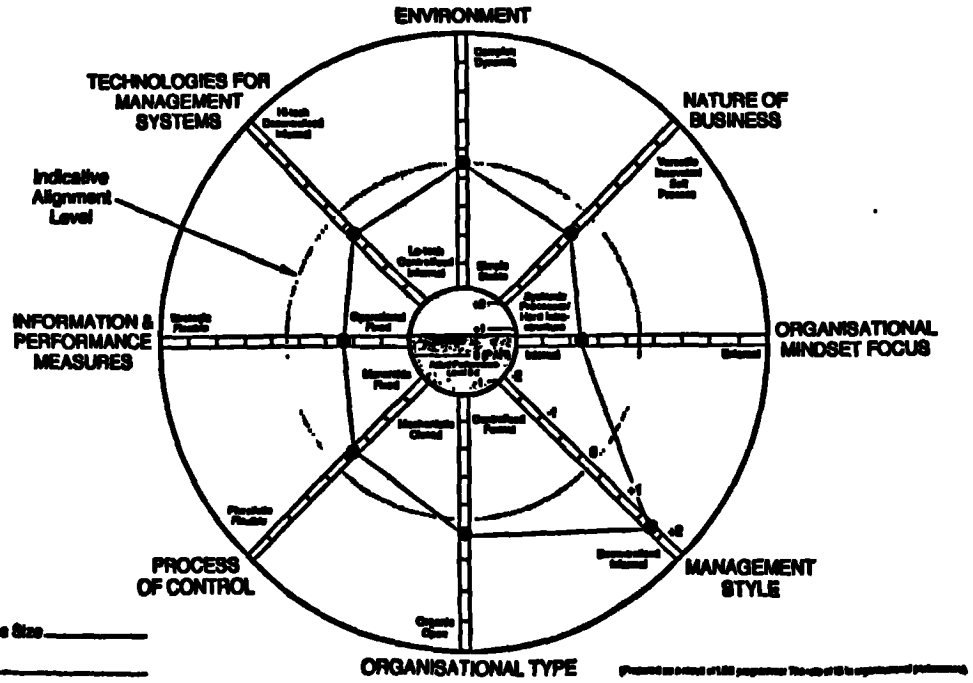



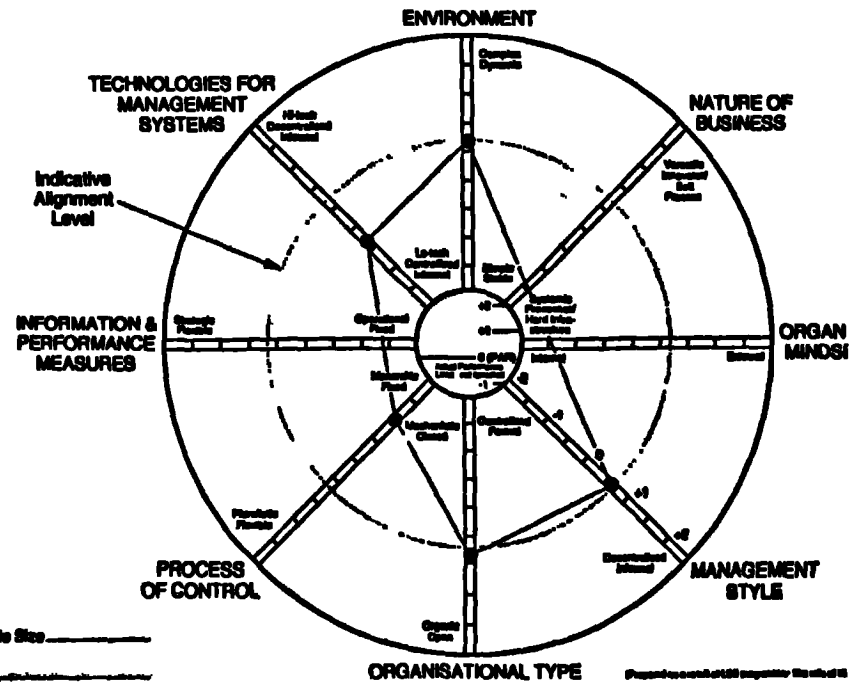



**Diagram 53: Wheel Profiles for "Tall & Thin" Pattern- BIS Banking Systems, BUPA HI, ICI C&P and Hill-Samuel Bank**

## ORGANISATIONAL ALIGNMENT PROFILE FOR ICI C&P



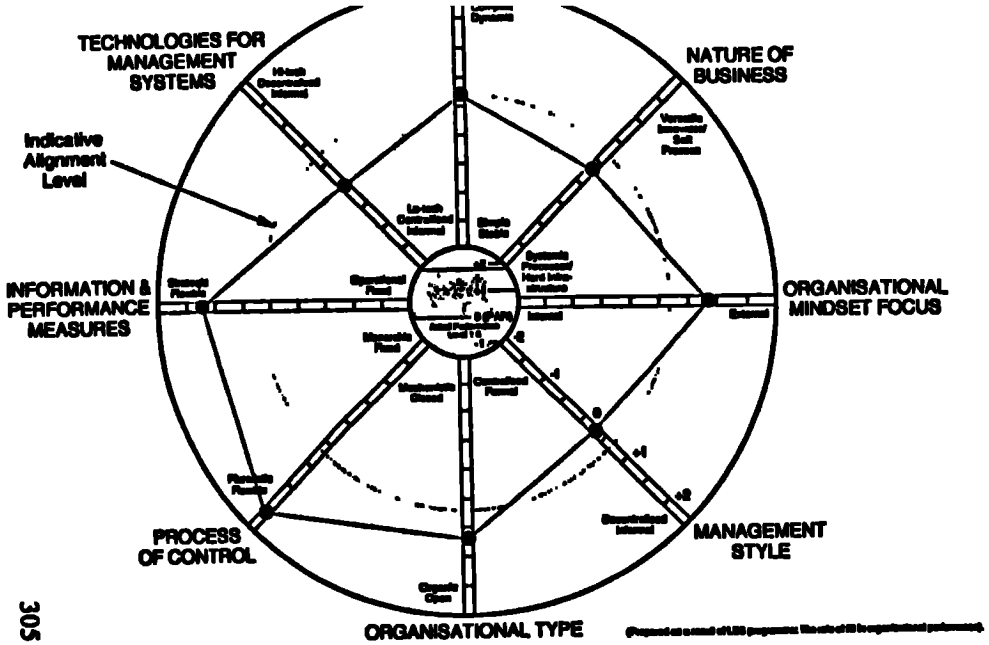

## ORGANISATIONAL ALIGNMENT PROFILE FOR BUPA HI



**5. DIAMOND-**

Respondents with this profile were: Bull HN, Rank Xerox and Rover, whose profiles appear in **diagram 54**. Such organisations tended to be above-average performers. This is because this profile reveals a balanced and flexible organisation, capable of learning quickly. Their flexibility and responsiveness is provided by an open organic culture, pluralistic flexible controls and strategic flexible information and performance measures. Technologies for management systems and management style create a degree of stability in this kind of organisation, though they are in danger of acting as "drag" factors in times of rapid change and may become a constraint on change.

The challenge for such organisations is that they may end up unleashing pressures for change which the management style and technologies for management systems will find difficulty in dealing with. "Bottom-left heavy" Diamonds (where information and performance measures and processes of control lie outside the indicative alignment level ) may find they are generating high levels of internal tension as a result of these pressures, which could become counterproductive if left unresolved.





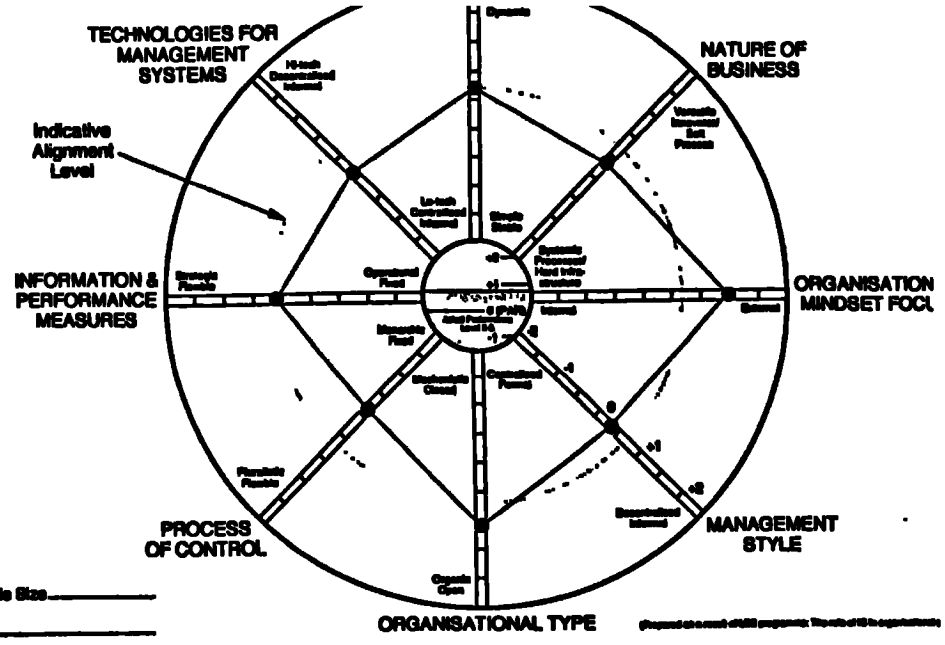
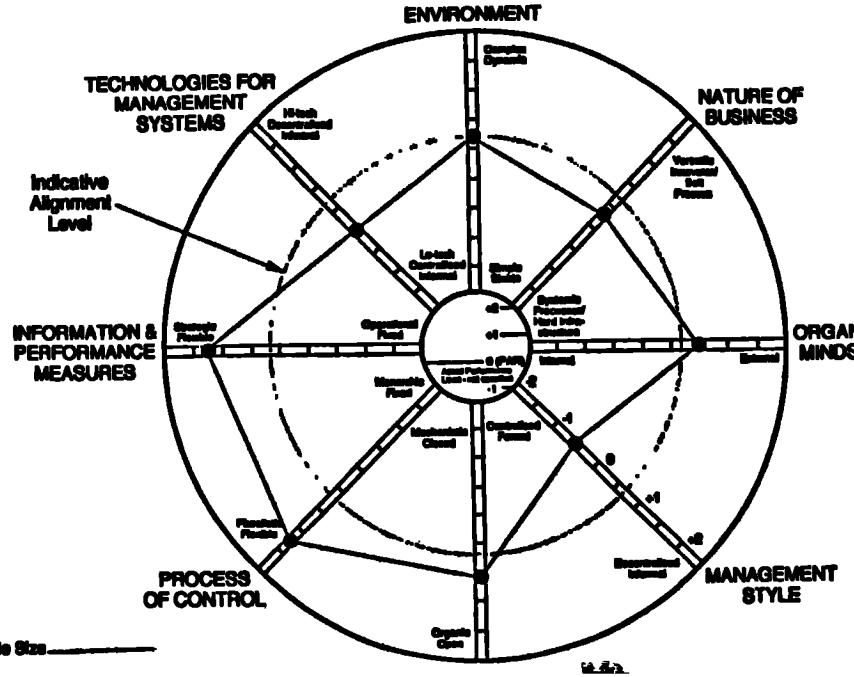




**Diagram 54: Wheel Profiles for "Diamond" Pattern- Bull HN, Rank Xerox & Rover**

ORGANISATIONAL ALIGNMENT PROFILE FOR Rank Xerox



**6. LEFT-HANDED-**

Respondents with this profile were: Shorts Aviation and Welsh Water, whose profiles appear in **diagram 55**. In such organisations the sources of change are primarily bottom-up. The internally focused organisation mindset and centralised formal management style mean that the upper echelons of the organisation provide stability and tight control. Opposed against this, the organic open organisation type, pluralistic flexible processes of control and strategic/flexible information and performance measures and high-tech, decentralised informal technologies for management systems create strong pressure towards bottom-up change, particularly in internal affairs.

One of the challenges for such organisations is to refocus themselves strategically without significant external assistance. Pressures for change generated internally may not correlate well with the changes required by the organisations environment. Strategically focussed management may also be viewed as a stumbling block by enthusiastic but misguided champions of multiple internal initiatives.

**Diagram 55: Wheel Profiles for A. "Left-Handed" Pattern- Bull HN, Rank Xerox & Rover & B. "Right-Handed" Pattern- Wedgwood**

**7. RIGHT-HANDED-**

The respondent with this profile is Josiah Wedgwood, whose profile appears in **diagram 55.** In such an organisation top-down change is the norm. The highly decentralised, informal management style and external mindset focus will lead to many change initiatives. Management may be convinced that the superior approaches and systems they are "cascading" down the organisation will invoke major changes in it.

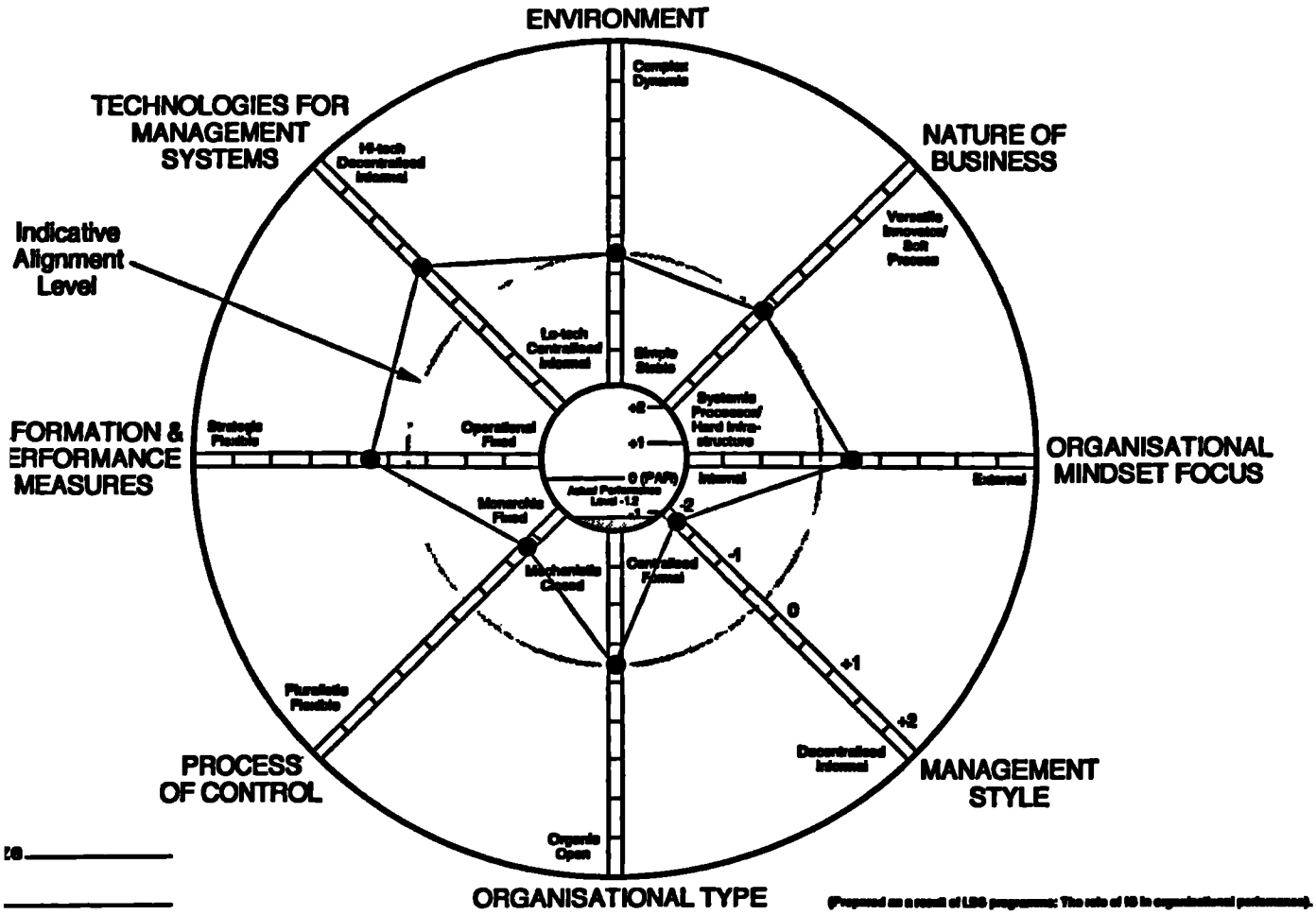
The challenge for such organisations is to change rapidly in a number of dimensions at once at all levels. The mechanistic, closed process of control, operational, fixed information and performance measures, and lo-tech, centralised formal technologies for management systems, mean that this kind of organisation will be resistant to change, as considerable effort would be required to change one of these factors, let alone all three at once. The danger is that top management may feel that they are engaging upon major change initiatives which may have some temporary impact, yet in the longer term such initiatives will have failed to create the level of change required to be successful in a rapidly changing environment.

**8. TOP HEAVY-**

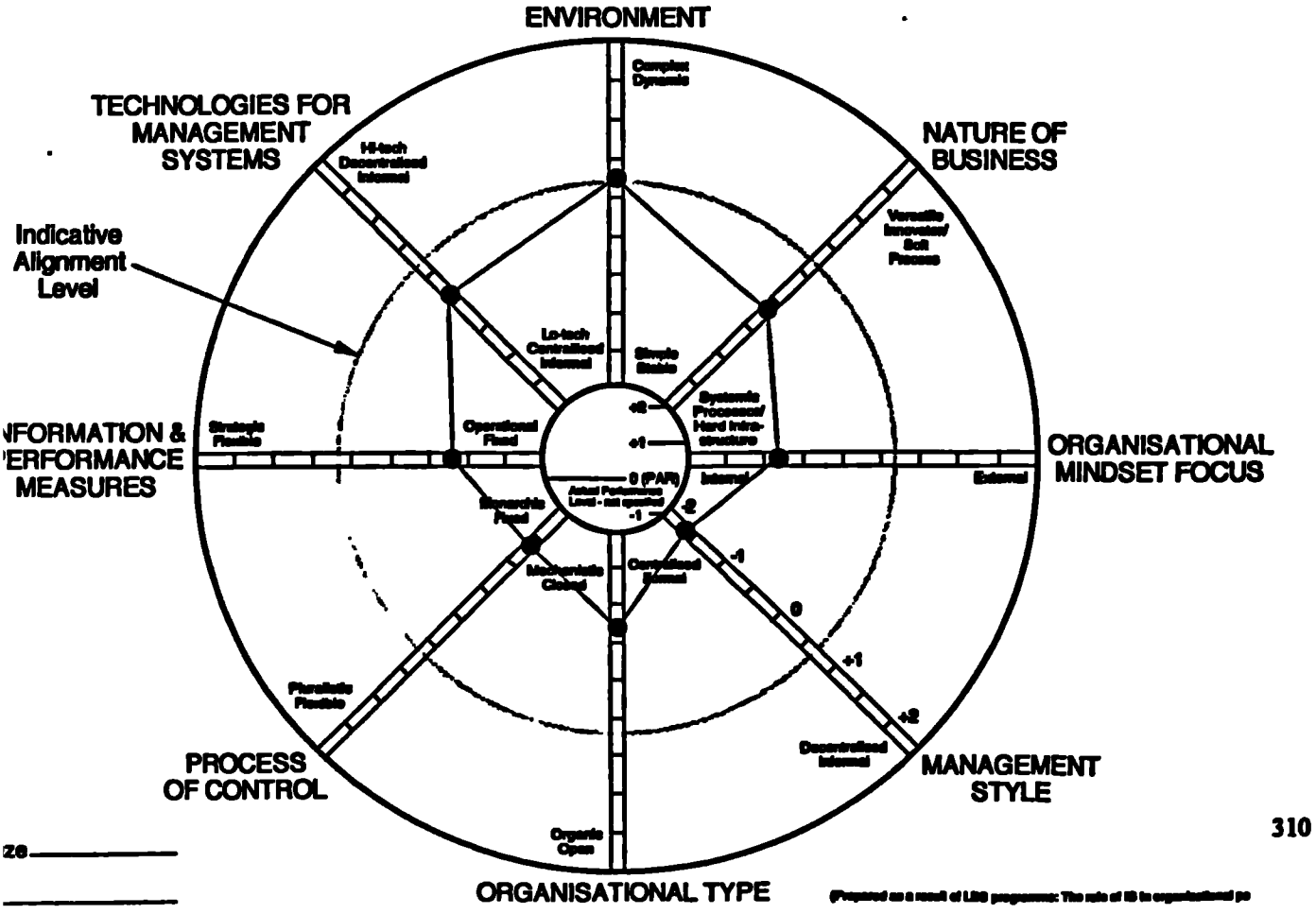
Respondents with this profile were: Sainsburys and Friends Provident, whose profiles appear in **diagram 56**. Such organisations exercise tight control over their businesses, with relatively advanced management system technologies. Their centralised formal management style, mechanistic closed organisation type and monarchic fixed process of control provide a solid, conservative set of processes which can be automated to a relatively high degree. "Top heavy" organisations are often characterised by periods of great financial success and confidence, followed by very difficult periods of readjustment. Much of their adaptation to discontinuous change may occur at the centre, and the success of such changes will depend upon the ability of the periphery to implement them successfully.

The challenge for such organisations is to make major breakthroughs in their businesses and organisations. Change tends to be incremental, using continuous improvement and quality-based approaches, as tight control and efficiency are vital to the effectiveness of their large, systematic processor infrastructures. Although maintenance learning takes place, learning for innovation will lag behind more flexible and smaller players in the industry. If the nature of the business is also moving in the versatile innovator/soft process direction, the failure to change the more fundamental assumptions about the business may create long term competitive disadvantage.

**Diagram 56: Wheel Profiles for "Tight Control" Pattern-Sainsburys and Friends Provident**




## ORGANISATIONAL ALIGNMENT PROFILE FOR Friends Provident



### 12.9.2. IMPLICATIONS FOR FUTURE ACTION

In order to find out more specific implications for future action to improve or maintain an organisation's strategic, organisational and management systems alignment, one would need to list those variables whose scores lie outside their indicative alignment level.

- How far are each of these from the indicative alignment level?
- Are these variables moving at all?
- Is the movement outward or inward?
- What steps could the management team take to create more appropriate alignment between the variables in the organisation's wheel profile?

Then one would need to list those variables whose scores lie inside the indicative alignment level and repeat questions i) through iv).

### 12.9.3. IS & MANAGEMENT SYSTEMS IMPLICATIONS

What are the implications of a particular wheel profile for the management and information systems in an organisation? Firstly, if an organisation's Technologies for Management Systems measure lies inside its indicative alignment level, then the management team should consider:

-whether their organisation is spending too much money, time and effort on centralised formal management systems (such as centralised computer, planning or financial systems and reengineering of these systems), and too little on decentralised informal management systems (such as team learning technologies, change programmes and interpersonal methods), which would provide them with the greater flexibility required in their management systems.

-whether their organisation is making sufficient use of the latest information systems technologies, and if their current technology is delivering the results required.
-in what ways they might be able to make their management systems more flexible and responsive to the changes taking place in and around the organisation
-how quickly they need to make these changes happen.

If an organisation's Technologies for Management Systems measure lies outside its indicative alignment level, then the management team should consider:
-whether their organisation is sufficiently in control of key areas of its operations, or is allowing money, time and effort to be wasted on ad hoc projects which are not aligned to the future direction of the organisation
-how they might overlay centralised formal management system technologies to create greater coherence in their management information and provide a higher level of central direction and control in the organisation through such systems.
-whether they are spending too much money on "hi-tech", without necessarily getting the benefits in the organisation and the business. Investment in areas denoted by the other spokes in the wheel which lie inside the organisation's indicative alignment level may provide a greater payback and improve the alignment of the organisation.

### 12.9.4. FURTHER USES OF THE WHEEL

The wheel provides a systematic way of measuring and visually representing several "soft" aspects of an organisation, and the changes taking place in those areas. The wheel also relates these soft variables to the harder aspects of the business and its management systems, enabling causal links between them to be identified more readily. It is a pathfinding tool for top management teams to understand more objectively the nature of

their business, organisation and management systems, and the way in which the underlying variables in these areas are changing. Most importantly, the wheel relates all of these things to the performance of the organisation over the long term, and enables management teams to identify ways of improving that performance by selecting specific wheel spokes as areas for future action and development.

As anyone who has attempted to change a major organisation knows, the change process is a long and often frustrating task. This task is made even more difficult by the intangible nature of many of the variables which the top management team are grappling with. By being able to measure these variables, the management team derive several benefits:

-the wheel provides a framework and language for cross-functional discussions to take place in an objective manner about hard-to-discuss subjects (management style, for example), enabling the management team to be proactive on these issues
-the management team can benchmark themselves against other organisations going through similar change processes, yielding greater insights into what is going on and what the next steps might be
-the management team can set realistic targets for specific changes in specific areas of the business, organisation and management systems
-progress towards these targets can be measured, enabling them to make mid-course adjustments as required.

The wheel also allows a management team to improve their understanding of the interactive nature of the eight spokes, creating a more dynamic model of what is actually happening than if they were to attempt to manage each spoke separately. This coordinated approach is much more likely to result in alignment and sustainable high performance.

## 12.10 SYNPOSIS OF FINDINGS & CONCLUSIONS

The following key points provide a final synopsis of the findings and conclusions:

A. Organisations comprise both economic (the value chain/business processes) and social processes (human activity systems based on the network of relationships between members and others). Both must be aligned to achieve superior performance.

B. Information systems are used to control, coordinate, communicate and process information in human activity systems and business processes to add greater value for stakeholders in both the value chain and the network of human relationships.

C. There are three levels at which IS design, investment and implementation decisions can be understood and improved:

**i. Context** - the environment, nature of the business and focus of the organisations mindset provide the context for human activity systems and business processes in the organisation.

**ii. Process** - the management style, organisation type, processes of control and technologies for management systems enable or constrain the human activity systems and business processes in adding value.

**iii. Content** - the relevant content of human minds and IT artifacts as they relate to the strategic intent and decisionmaking processes of the organisation is generated by the human activity systems and business processes. The information and performance measures used to measure performance are a function of this content.

D. The ENFMOPIT variables reflect key aspects of these context, process and content dimensions. The alignment of these variables leads to superior

performance of the human activity systems and business processes, enbaling the organisation to add greater value and hence realise improved strategic and financial performance.

E. The network of human relationsh ps in an organisation learns to generate and control the human activity systems and business processes which enable the addition of greater stakeholder value. This learning process is enabled or constrained by several factors:

- The style of the top management in the organisation.
- The culture (belief systems) of the organisation and the focus of its mindset.
- The processes of human control regulating work (and play).
- What is measured as performance and how (the information and performance measures).
- The nature of the technologies for management systems.
- The degree to which all these variables are aligned with the environment and nature of the business of the organisation.

F. Some organisations emphasise control over their stable operating systems as the nature of their businesses is that of a systematic processor with a hard infrastructure and their environment is either simple, stable or complex, stable. Such organisations tend to exhibit mechanistic closed cultures, centralised formal management styles, monarchic fixed processes of control and operational fixed information and performance measures. These organisations are "rock-like": highly reliable, conservative and relatively predictable.

G. Other organisations emphasise learning and experimentation in their business and environment as the nature of their business is that of a versatile innvoator with soft process and their environment is complex, dynamic. Such organisations tend to exhibit organic open cultures,

decentralised informal management styles, pluralistic flexible processes of control and strategic flexible information and performance measures. These organisations are "whirlpool-like": creating change, experimenting and often radical and unpredictable.

H. The organisations in this research varied from "rock-like" to "whirlpool-like", yet their information systems often failed to reflect such characteristics. In those organisations where the technology for management systems was aligned with the other ENFMOPIT variables, the IS payoff and longterm strategic performance was high. In poorly aligned organisations (even where T was one of the few variables aligned) performance suffered.

I. Technologies for management systems must be more coherently managed by large organisations. They must make conscious choices between the trade-offs between learning and control, while managing the associated change processes, to ensure that the organisation will be better aligned internally and externally as a result of managerial decisions. The wheel diagnostic provides a framework, which, when more fully developed, will enable managers to:

- Inform such choices fully so that decisions are made from a sufficiently broad perspective.
- Improve the quality of the decisionmaking about organisational change.
- Improve the quality of decisionmaking about IS/IT design, investment and implementation issues.

# 13. FURTHER RESEARCH

In this chapter we develop four possible lines along which further research could be conducted:

- **longitudinal research:** the 24 companies in the current sample could be revisited to observe what changes in the ENFMOPIT and performance variables had occurred since the last data was gathered
- **latitudinal research:** a wider sample of companies could be gathered to check the representativeness of the current research findings, in both the UK and other countries. The latter is particularly important, due to the cultural biases inherent in work of this kind
- **theoretical work:** exploring the further implications of the idea of the organisational mind, and organisational learning disabilities, should be pursued. This research makes it clear that there are a large number of different ENFMOPIT profiles, each with clear implications for the way in which organisational performance could be improved through more effective organisational learning.
- **interpretive studies:** a few of the high performers, median performers and poor performers could be studied in depth, to further understand the change process inside these organisations, and how changes in the ENFMOPIT variables relate to changes in performance.

It is concluded that interpretive research may be the most effective way of developing a powerful explanatory theory to describe the way in which organisations interpret, process and use information to add value and enhance their competitive position and performance.

# 13. FURTHER RESEARCH

Further research on the role of information and management systems in organisational performance could take one of several directions. Let us start with longitudinal research:

## 13.1. LONGITUDINAL RESEARCH

The ENFMOPIT and performance variables were gathered over the period 1983 to 1990. It would be interesting to see if the PIMS performance predictor (the par measure) was accurate in predicting the performance of the firms in the sample. (i.e. that overachievers would perform better than underachievers). The movement in the ENFMOPIT variables over a further 3, 5 or 7 year period would also tell us much about the durability of these variables as measures of alignment and organisational change. Finally, the correlation between the ENFMOPIT variable alignment and the financial and strategic performance of the firms in the sample over a longer period of time would either bear out the strong relationship which was identified in this research, or challenge that finding.

## 13.2. LATITUDINAL RESEARCH

The 24 firms in the sample for this research were large firms based in the UK. Their organisational cultures and environments are almost exclusively Anglo-Saxon, with the odd North-American interviewee in one multinational (Rank-Xerox). As Trompenaars (1993), and Hampden-Turner (1988) point out, there are enormous differences in the organisational cultures of firms in different parts of Europe, North-America and the Far-East, let alone those in other parts of the world. The scales upon which the MOP measures among the ENFMOPIT variables (management style, organisational type and processes of control ) are based, tend to be associated with western, and more specifically, Anglo-Saxon, cultural assumptions and practices. It would be very interesting to test these scales on different cultural groups, in order

to establish how different North American, European and Far Eastern organisations score on these scales, and whether or not certain elements are missing from the scales. It is therefore suggested that roughly 25 organisations from each of the diverse cultures in the Americas, Europe (excluding the UK), and the Far East be included in a further latitudinal survey of strategic alignment in order to establish the universality or otherwise of the initial group of ENFMOPIT variables. It would also be interesting to see whether the strong correlation between the ENFMOPIT variable alignment and strategic performance was repeated in these organisations.

### 13.3. THEORETICAL RESEARCH

The eight different wheel profile types identified in the findings and conclusions may have some predictive power about the future success of the organisations concerned, for a variety of different reasons in each case. Although future longitudinal research may identify a shift in each of these profiles and a different performance pattern for each firm, such information would not necessarily explain why a change in a particular profile was linked to a change in performance. What is needed is a theory of the "organisational mind", which can explain why a specific wheel profile is healthier than another, and why certain profile types give rise to particular organisational learning disabilities.

The idea of organisational learning disabilities was first raised (Senge, 1991) in the context of the learning organisation. Senge did not provide, (nor am I aware of any author who does), an explanation of what a learning disability is, and how one might go about diagnosing and resolving such a thing. Hodgson (1993), has raised some important possibilities for different kinds of learning disabilities, based upon dysfunctions in particular cognitive faculties resident in individuals and organisations. Though theoretical at this stage, a possible matching between the seven organisational learning disabilities

identified by Hodgson, and the eight wheel profiles, should be seriously investigated.

Furthermore, the genesis of "the organisation mind" should be explored further. Though there is a profusion of material in the fields of psychology and cognitive science to demonstrate the workings of a healthy individual mind, there is a lack of material documenting the phenomenon of the organisational mind, apart from excellent contributions by Hampden-Turner (1988) and Mitroff (1992). It is Hampden-Turner's contention that the really important information in organisations resides in relationships between human beings- the context of the relationship makes information meaningful. Without that context, the information is less meaningful, though it may still be useful after the demise of a relationship. Just as the individual human mind operates on/with information as its raw material, so does the organisational mind. We can see the result of information creation, processing and sharing to be the same in both individuals and organisations: particular patterns of behaviour, decisions and outcomes. What distinguishes the organisational mind from the individual mind is that the former operates through networks of relationships between people, while the latter operates through networks of relationships between neurons.

There are numerous other similarities one could mention: just as individual minds have "cycle times" (a few microseconds), so do organisational minds (though longer- measured in perhaps days or weeks); just as individual minds have dysfunctional patterns- schizophrenia, neuroses, and so on, so do organisational minds (some organisations appear to be divided with two or more parts warring with each other (schizophrenia), some appear to be paranoic, and so on). Kets de Vries (1984) refers to some examples of organisational paradoxes which appear to illustrate this point.

Each wheel profile may be a way of diagnosing certain conditions of the organisational mind, but in order to pursue this line of research further, a much more substantial research base centred around the workings of the organisational mind needs to be established.

## 13.4. INTERPRETIVE RESEARCH

A few of the high performers, median performers and poor performers could be studied in depth, to further understand the change process inside these organisations, and how changes in the ENFMOPIT variables relate to changes in performance. The interpretive research methods recommended by Orlikowski and Baroudi (1991) and Pettigrew (1989) would be used to establish the context, process and content dimensions of the changes which occurred in firms such as Rover and Bull UK, (high achievers and "diamond" wheel profiles), Extel and Watson & Philip (high-achievers and "spider's web" profiles), Shorts Aviation and Welsh Water (underachievers and right-handed wheel profiles), and Prudential Assurance and Enterprise Oil (median achievers and "spider's web" wheel profiles).

The objective of this interpretive approach is not only to describe the respondents, their businesses and information systems, but also to trace the development of their organisations, systems and performance through time. The view that world is not a fixed constitution of objects, but an emergent social process should be borne in mind- "an extension of human consciousness and subjective experience" (Burrell and Morgan, 1979). What we should aim to understand is how directors and managers, through their participation in social processes, enact their particular realities and endow them with meaning, and to show how these meanings, beliefs and intentions help to constitute social action which makes a difference to organisational performance through management and information systems.

The fields of strategic management, organisational behaviour and the worlds of academia, business and consultancy need an integrative, contextualist, process based approach in order to create useful knowledge for managers. If this research has created a basis for future researchers to explore the holistic way in which management teams and organisations can create their own futures, and use information and management systems to improve the performance of their organisations in this context, then it will have served its purpose.

Finally, it is hoped that a bridge has been built between the subjects of organisational learning, strategic control and strategic planning, cybernetics and systems science, which provides some practical guidelines for managers who would like to use some of the insights available to them from these disciplines.

# APPENDIX A : QUESTIONAIRE A1

London Business School

Sussex Place
Regent's Park
London NW1 4SA

8 February 1990

Dear Sir

THE ART OF INFORMATION STRATEGY IN THE TOP 500 UK CORPORATIONS

The attached survey forms part of a research programme at the London Business School into the way in which you and the 499 other major UK corporations are using and planning for information systems. The survey may look voluminous, but it is meant to be completed by 3 different people in your organization:

* the person in the corporate centre responsible for strategic planning in the corporation

* the CEO of the business unit in your corporation upon which information systems have the greatest impact

* the head of information systems in that business unit

Most of the information required to complete the questionnaires will be of the "top of the head" variety. In return for the completion of this questionnaire, you will receive a summary copy of the findings of this research programme. This includes:

* a profile of your organization's strategic position and potential

* an explanation of your organizational "type" and planning process "type", and whether the two are well matched

* indications as to how to realise your corporation's strategic potential through information systems.

The aim of this research programme is to identify which of the UK's Top 500 are successfully using information systems to achieve competitive and organizational advantage, and what their secrets of success are in planning for their information systems.

I am confident that you and your colleagues will find the hour or so you will need to complete your respective sections of the questionnaire well worthwhile.

Thank you very much for your participation. I look forward to receiving your completed survey within the next few weeks.

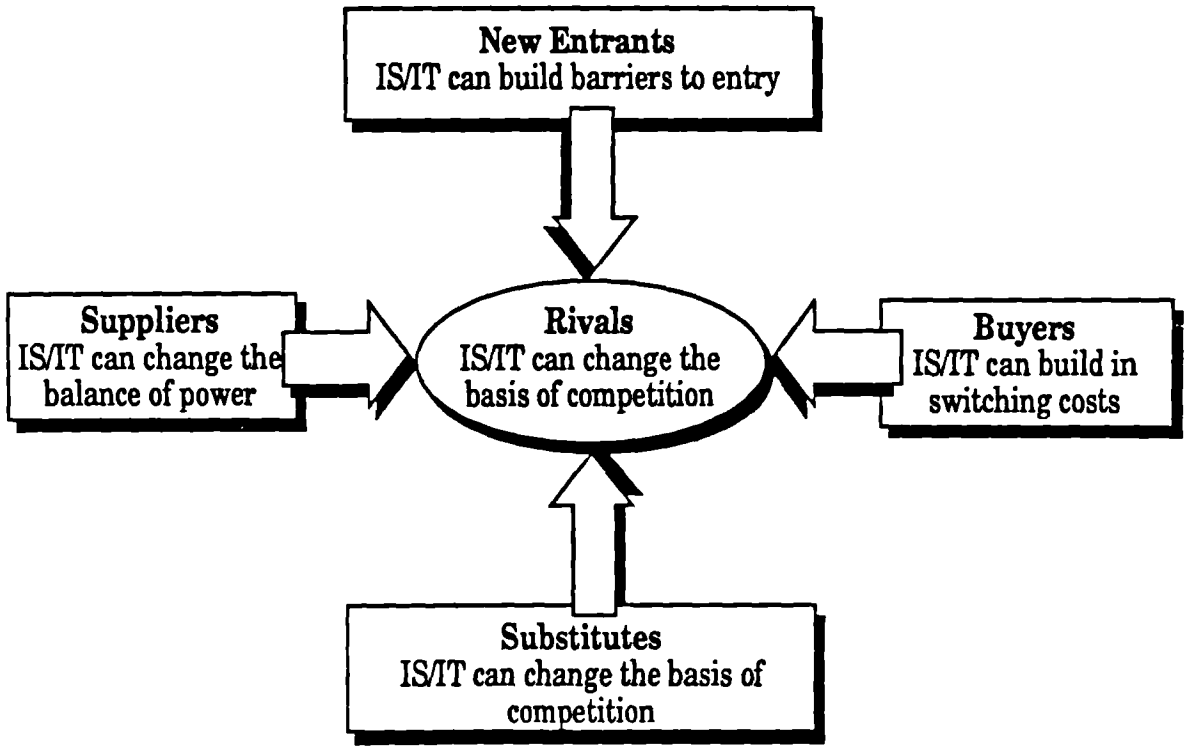
Yours sincerely

Robin Wood
Department of Information Management

Telephone 01 262 5050 Telex 27461 Fax 01 724 7875

Survey

# The Art of Information Strategy in the Top 500 UK Corporations



# Introduction to the UK Top 500 Survey

Turn Over the Page for Instructions

## WHY COMPLETE THIS QUESTIONNAIRE?

If you are the person in your organization responsible to the board for strategic planning, these information systems related challenges may be familiar to you:

- using information systems as a competitive weapon
- aligning your investment in computers, telecommunications and software with your business strategies
- providing value-for-money applications and solutions to the information needs of users within tight budgets and deadlines
- using increasingly scarce resources (people and money) to make the most of rapidly changing technologies.

The purpose of this questionnaire is to establish how information systems (IS) and IS planning can or has helped you to meet these challenges.

For the top 500 UK corporations which are the subject of this survey, succeeding in competitive, global markets requires both significant cost reduction and differentiation in their offerings in order to survive. Information technology and systems are important weapons in achieving both of these goals. Planning forms an essential part of the successful introduction of new systems.

Top management commitment and involvement, frequent review and the use of specific techniques for information systems planning linked to an effective business planning process were recently found to be key factors in the success of information systems planning in UK businesses. It is also clear from recent surveys, however, that top management is dissatisfied with the low level of business benefits systems yield in practice, when compared with the benefits predicted when the proposal to invest in new systems was made.

The successful design and implementation of new information systems yielding effectiveness and strategic advantage must start from the unique nature of each organization. In order to do this, one must use an information systems planning framework suitable for the type of organization being planned for. This research aims to identify specific organization types, and to indicate the most appropriate planning approach for each type.

In order to discern different organization types, one must take into account:

- the size, age and history of an organization, its technical systems, the nature of its environment

- the distribution of power in the organization and its culture
- the strategic position of the firm.

Once these contextual factors have been considered, it is possible to design a flexible systems infrastructure which can cope under a variety of conditions.

This questionnaire can help you answer three questions:

- **What type of organization are we, and which information systems planning approach should we use?**
- **What makes planning for information systems a success or failure in our organization?**
- **How can we specify and implement information systems infrastructures and applications which yield effectiveness and strategic advantage within the planning framework indicated?**

## WHAT YOU GET

You will receive:

- the summary findings of the results of the analysis of this questionnaire as completed by yourself and the majority of the top 500 UK corporations
- a brief analysis of your organization "type" together with
- an outline of the planning approach best suited to you.

## THE BENEFIT

A clearer understanding of how to master the challenge of using information systems as a strategic weapon in your organization should result from your participation in this survey. Because this survey addresses the three key interest groups involved in information system investment decisions:

- top management in the corporate centre
- strategic business unit management
- information systems management

the summary findings of the survey will constitute an agenda for the discussion of information systems planning issues in your organization in the future.

## INSTRUCTIONS FOR COMPLETION

There are four parts to this survey:

A. OVERVIEW OF YOUR CORPORATION

B. DIVISION/STRATEGIC BUSINESS UNIT (SBU) PROFILE

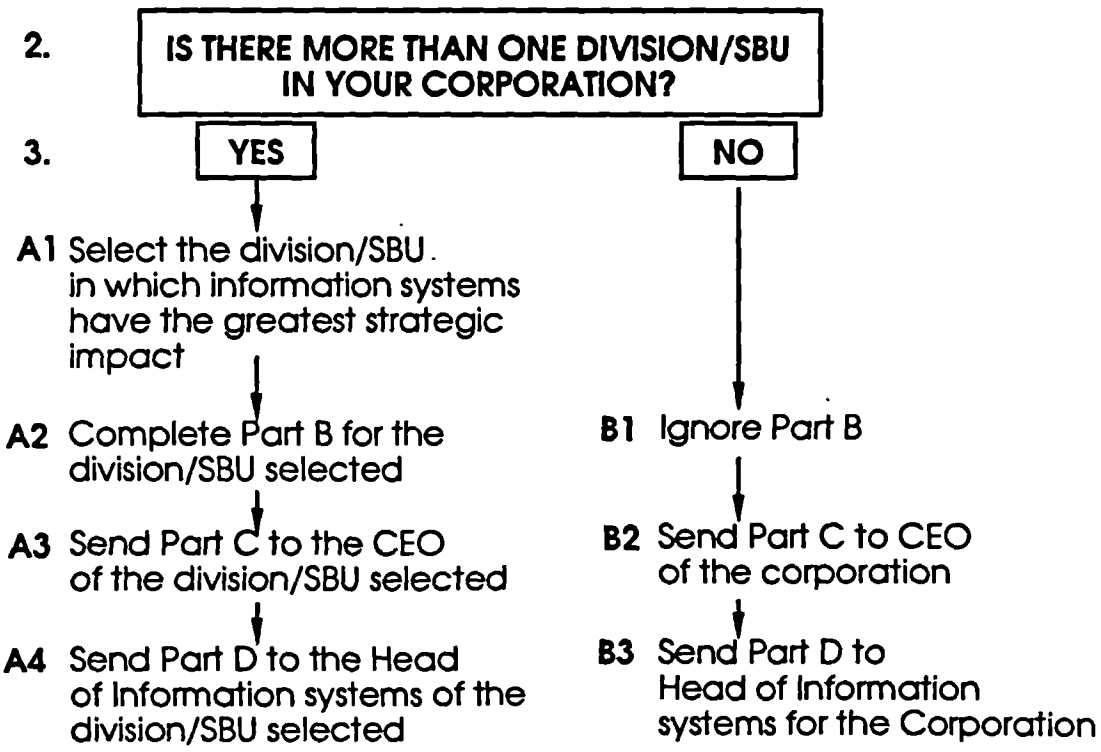
C. CHIEF EXECUTIVE OFFICER- QUESTIONNAIRE

D. HEAD OF INFORMATION SYSTEMS- QUESTIONNAIRE.

Parts A and where possible, B, should be completed by you, or the person responsible for strategic planning in the corporation as a whole. Part B should only be completed if there is more than one division/SBU in the corporation, for the particular division/SBU selected by you as the one in which information systems are most strategic. ("Strategic" can be defined both by reference to the impact on the strategic position and the impact on the bottom line of a division/SBU. This is not necessarily indicated by the current level of spend on information systems in a division/SBU, but relates mainly to future impacts).

Use the following flow chart to complete the entire survey:

**1. COMPLETE PART A. THEN ANSWER THE FOLLOWING QUESTION:**



4. Allow one week for completion of Parts C and D, then respectfully ask whether you may be of assistance in helping the CEO/information systems head to complete within the next week.

5. Return all questionnaires (Parts A and B (if applicable), C and D) to:

**Robin L Wood**
Department of Information Management
PHD Programme
London Business School
Sussex Place
Regents Park
NW1 4SA
LONDON

Please remind the Chief Executive Officer and Head of Information Systems in the division/strategic business unit you have selected, to return their questionnaires direct to you. It will help if you write your name in the space provided on the cover sheets of Parts C and D.

6. Wait for your copy of:

- the summary findings of the results of the analysis of this questionnaire as completed by yourself and the majority of the top 500 UK corporations
- a brief analysis of your organization "type" together with
- an outline of the planning approach best suited to you.

7. Use this material as an agenda to discuss how information systems investments can yield strategic advantage for your corporation.

**THANKYOU VERY MUCH FOR YOUR ASSISTANCE**

TO:

FROM:

DATE:

SUBJECT:

THE ART OF INFORMATION STRATEGY IN THE TOP 500 UK CORPORATIONS - QUESTIONNAIRE

# Part D: Questionnaire for The Head of Information Systems

Please return this Questionnaire when completed to:

**Turn Over the Page for Instructions**

## QUESTIONNAIRE FOR THE HEAD OF INFORMATION SYSTEMS

### WHY COMPLETE THIS QUESTIONNAIRE?

If you are the person in your organization responsible to the board for information systems, these challenges may be familiar to you:

- aligning your investment in computers, telecommunications and software with your business strategies
- providing value-for-money applications and solutions to the information needs of users within tight budgets and deadlines
- using increasingly scarce resources (people and money) to make the most of rapidly changing technologies.

Your chief executive officer and central staff are completing other parts of this survey, which when complete, will yield an overview of how successfully you plan for and use information systems in your business. Your assistance in completing Part D relating to your IT infrastructure, applications portfolio and information systems planning processes, is much appreciated.

For the top 500 UK corporations which are the subject of this survey, succeeding in competitive, global markets requires both significant cost reduction and differentiation in their offerings in order to survive. Information technology and systems are important weapons in achieving both of these goals. Planning forms an essential part of the successful introduction of new systems.

The purpose of this questionnaire is to establish how information systems planning can or has helped you to:

- use information technology and systems as a competitive weapon
- align your investment in computers, telecommunications and software with your business strategies
- manage information systems resources effectively
- bring business benefits to users
- gain the support and understanding of users in building your organization's information technology infrastructure.

## *The Art of Information Strategy in the Top 500 UK Corporations*

Top management commitment and involvement, frequent review and the use of specific techniques for information systems planning linked to an effective business planning process were recently found to be key factors in the success of information systems planning in UK businesses. It is also clear from recent surveys, however, that top management is dissatisfied with the low level of business benefits systems yield in practice, when compared with the benefits predicted when the proposal to invest in new systems was made.

The successful design and implementation of new information systems yielding effectiveness and strategic advantage must start from the unique nature of each organization. In order to do this, one must use an information systems plamming framework suitable for the type of organization being planned for. This research aims to identify specific organization types, and to indicate the most appropriate planning approach for each type.

In order to discern different organization types, one must take into account the size, age and history of an organization, its technical systems, the nature of its environment and the organization's strategic position. The distribution of power in the organization and its culture are also highly relevant to the success of new systems. Once these contextual factors have been considered, it is possible to design a flexible systems infrastructure which can cope under a variety of conditions.

This questionnaire can help you answer three questions:

- What type of organization are we, and which information systems planning approach should we use?
- What makes planning for information systems a success or failure in our organization?
- How can we specify and implement information systems infrastructures and applications which yield effectiveness and strategic advantage within the planning framework indicated?

### WHAT YOU GET

You will receive:

- the summary findings of the results of the analysis of this questionnaire as completed by yourself and the majority of the top 500 UK corporations
- a brief analysis of your organization "type" together with
- an outline of the planning approach best suited to you.

## THE BENEFIT

A clearer understanding of how to master the challenge of using information systems as a strategic weapon in your organization should result from your participation in this survey. Because this survey addresses the three key interest groups involved in information system investment decisions:

- top management in the corporate centre
- strategic business unit management
- information systems management

the summary findings of the survey will constitute an agenda for the discussion of information systems planning issues in your organization in the future.

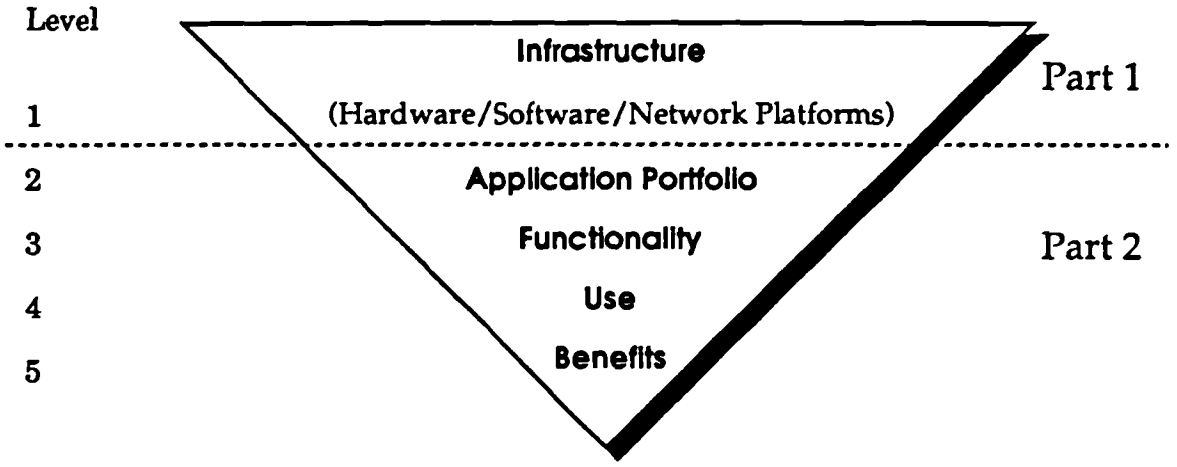
## QUESTIONNAIRE STRUCTURE

The structure of this questionnaire is designed to make it easy for you to help us understand:

- your background, and the nature of your firm and the environment in which it operates
- the information technology infrastructure you currently use
- the uses and benefits derived from that infrastructure
- how you plan for information systems and
- how successful your planning is.

To start, you are invited to describe yourself and your organization.

You are then asked to describe your infrastructure, application portfolio, system functionality, use and benefits. The two parts in this section reflect the various levels at which information systems are specified, implemented and used:




You are then asked to describe the information systems planning approach you currently use, and how successful you believe it to be.

## COMPLETING AND RETURNING THE QUESTIONNAIRE

The questionnaire should not take more than half an hour to complete at a maximum.

All responses will be treated confidentially and no individual return will be published. Aggregated results only will be reported.

Please attempt to answer all questions- if you are in doubt about any, please pass on to the next question.

If you believe that another person in your organization is better placed to complete this questionnaire, please pass it on to him or her.

Once you have completed the questionnaire, kindly return it to the person who sent it to you, as set out on the cover sheet.

It would be helpful if you could complete and return the questionnaire within the next week or so.

Once all of the results have been analysed, you will be sent a summary of the research findings together with a description of your organization "type" and the information systems planning approach indicated for your type of organization.

**COULD YOU KINDLY PROVIDE THE FOLLOWING PERSONAL DETAILS BEFORE COMPLETING THE QUESTIONNAIRE AND RETURNING IT. ALL REPLIES WILL BE KEPT COMPLETELY CONFIDENTIAL, AND RESPONSES WILL BE PUBLISHED ON AN AGGREGATE BASIS ONLY. THANKYOU.**

5.1 PERSONAL DETAILS

NAME (Dr/Mr/Mrs/Ms) TELEPHONE

JOB TITLE ADDRESS

POSTCODE

**5.1.1** NAME OF DIVISION/STRATEGIC BUSINESS UNIT:

**5.1.5** Do you report to the board of directors with responsibility for information systems/technology in your organisation?

| Yes | | No | |
|---|---|---|---|

**5.1.3.** If not, what is your relationship with the person responsible for reporting to the board on information systems/technology:

| | | |
|---|---|---|
| Immediate Subordinate<br>Immediate Supervisor<br>Other (please specify) | | |

**5.1.4.** Who manages the information systems department/function on a day to day basis in your organisation?

| | | |
|---|---|---|
| Myself<br>Immediate Subordinate<br>Immediate Supervisor<br>Other (please specify) | | |

**5.1.5** What role do you play in information systems planning:

| | | |
|---|---|---|
| My direct responsibility<br>I am regularly involved<br>I am involved occasionally<br>None at all | | |

**5.1.6.** If you do play a role, how long have you been involved in information systems planning:

| < 1 year | | 1-2 years | | 3-5 years | | 5+ years | |
|---|---|---|---|---|---|---|---|

**5.1.7** Which of these describe your career background (tick more than one if appropriate):

| | |
|---|---|
| Experience in the ranks in the IT function (programming/operating/project management) | |
| Previously a consultant (management/IT) | |
| Business background | |
| Scientific/technical background | |
| Other | |

**5.1.8.** How many years of tertiary education did you receive?

| None | | 0-3 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**5.1.9.** How many years have you been with your present company?

| <1 | | 1-2 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**5.1.10.** How many years have you been in your current position?

| <1 | | 1-2 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

## 5.2 YOUR INFORMATION TECHNOLOGY INFRASTRUCTURE

**5.2.1** Are your IS/DP services organised: ☐

**5.2.1.1** Centrally i.e. in one location ☐

**5.2.1.2** On a decentralised basis/departmentally i.e. there are IS/DP personnel in different parts of the organization?

**5.2.2** What is the amount spent on IS/DP in the organization as a whole? (Include in this amount not only the budget officially allocated to the IS/DP function, but also and estimate of "unofficial IT spend", (for example the purchase of PC's by divisions independant of IS/DP).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO £1.9M | | £2–4.9M | | £5-9.9M | | £10-19.9M | |
| £20-50M | | £50-100M | | MORE THAN £100M | | | |

**5.2.3** To whom does the IT/DP function report?

| | | | | | |
|---|---|---|---|---|---|
| Management Services | | Finance | | Planning | |
| Chief Executive | | Other (please specify) | | | |

**5.2.4** How many staff are devoted full-time to the IT/DP function in your organization?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO 50 | | 50-100 | | 100-200 | | 200-500 | |
| 500-1000 | | 1000-2000 | | 2000-5000 | | 5000 PLUS | |

## 5.3 HARDWARE

**5.3.1** How many terminals/workstations are in use in your organization currently (including microcomputers)?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO 50 | | 50-100 | | 100-200 | | 200-500 | |
| 500-1000 | | 1000-2000 | | 2000-5000 | | 5000 PLUS | |

**5.3.2** How many minicomputers/departmental computers are there in your organization? (Defined as multiuser systems costing more than £50 K, such as DEC VAX's, IBM S3X/AS400, Data General, Wang VS range, HP range and so on).

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO 5 | | 5-10 | | 10-20 | | 20-50 | |
| 50-100 | | 100-200 | | 200 PLUS | | | |

**5.3.3** How many mainframes/supercomputers are in use in your organization? (Defined as multiuser systems costing more than £500 K, with a minimum CPU of 16 MB and 32 bit architecture, such as the IBM 30X0 series, Cray MP series, Fujitsu and Hitachi IBM clones, Amdahl and so on).

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | 2-5 | | 6-10 | | 11-20 | | 20-50 | | 51 PLUS | |

**5.3.4** Do you use a:

| | | | | | |
|---|---|---|---|---|---|
| 3.2.4.1 | bureau | y | | n | |
| 3.2.4.2 | facilities manager | y | | n | |

**5.3.5** What proportion of your computing resource is sourced from this/these sources?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO 10% | | 10-20% | | 20-50% | | 50-100% | |

**5.3.6** What is your annual spend on hardware:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO £500K | | £500K-1M £1-2M | | £2-5M | | | |
| £5-10M | | £10-20M | | £20-50M | | £50M PLUS | |

## 5.4 NETWORKS

**5.4.1** How many of the following types of networks are installed in your organization:

| | |
|---|---|
| Local Area Networks | |
| Wide Area Networks | |

**5.4.2** What is your annual telecommunications spend:
(including premises equipment and line charges)

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| UP TO £50 K | | £51-100K | | £101-200K | | £201-500K | |
| £501-1000K | | £1-2M | | £3-5M | | £5M PLUS | |

**5.4.3** Are you a user of Electronic Data Interchange?

| Y | | N | |
|---|---|---|---|

## 5.5 YOUR APPLICATIONS PORTFOLIO- ITS USEFULNESS AND BENEFITS

### 5.5.1 APPLICATIONS INVENTORY

Tick off each type of application type used in your organization, and indicate whether it was developed in-house, including the estimated number of man-months it took to develop, or simply tick if it is a package:

| APPLICATION TYPE | IN-HOUSE | MAN MONTHS | PACKAGE |
|---|---|---|---|
| 5.5.1.1 Production: CIM/CAM | | | |
| 5.5.1.2 Warehousing/Inventory | | | |
| 5.5.1.3 Materials Control | | | |
| 5.5.1.4 Distribution | | | |
| 5.5.1.5 Sales/Marketing | | | |
| 5.5.1.6 Planning/Operations Research | | | |
| 5.5.1.7 Accounts/Finance | | | |
| 5.5.1.8 Design/Development-CAD | | | |
| 5.5.1.9 Payroll | | | |
| 5.5.1.10 Personnel Systems | | | |
| 5.5.1.11 Executive Information Systems | | | |
| 5.5.1.12 Treasury | | | |
| 5.5.1.13 Dealing Room Systems | | | |
| 5.5.1.14 Banking Front Office | | | |
| 5.5.1.15 Insurance- Broking Systems | | | |
| 5.5.1.16 Insurance Origination | | | |
| 5.5.1.17 Research and Development | | | |
| 5.5.1.18 Word Processing | | | |
| 5.5.1.19 Spreadsheets | | | |
| 5.5.1.20 Desk Top Publishing | | | |
| 5.5.1.21 Other (Specify) | | | |
| 5.5.1.22 Other (Specify) | | | |
| 5.5.1.23 Other (Specify) | | | |
| 5.5.1.24 Other (Specify) | | | |
| 5.5.1.25 Other (Specify) | | | |

What percentage of your software development resource uses:

| | | | |
|---|---|---|---|
| 5.5.1.26 Fourth Generation Languages | | | |
| 5.5.1.27 COBOL | | | |
| 5.5.1.28 FORTRAN | | | |
| 5.5.1.29 BASIC | | | |
| 5.5.1.30 Assembler | | | |
| 5.5.1.31 APL | | | |

How many expert systems are operational in your organization:

| 5.5.1.32 | NONE | | 1-2 | | 3-5 | | 5-10 | | 10 PLUS | |
|---|---|---|---|---|---|---|---|---|---|---|

## 5.6 BENEFITS OF INFORMATION TECHNOLOGY IN YOUR ORGANIZATION

**5.6.1** List the five most important application systems in your organization in terms of:

**5.6.1.1** Strategic Significance
(providing a competitive edge for your organization)

| |
|---|
| a |
| b |
| c |
| d |
| e |

**5.6.1.2** Value-Added
(the payback on the application- best cost/benefit ratio)

| |
|---|
| a |
| b |
| c |
| d |
| e |

**5.6.1.3** Perceived User Satisfaction

| |
|---|
| a |
| b |
| c |
| d |
| e |

**5.6.2** How are major new systems initiatives justified in your organization:

| | |
|---|---|
| Payback | |
| Return on Investment | |
| Strategic Value | |
| Other (specify) | |

## 5.7 PLANNING SYSTEMS IN YOUR ORGANIZATION

### 5.7.1 BUSINESS PLANNING PROCESSES IN YOUR ORGANISATION

**5.7.1** Is there a formal long range planning system in your organisation?

| Y | | N | |
|---|---|---|---|

**5.7.2** If yes, how often is a long range plan prepared:

| Annually | | Bi-annually | | Less Frequently | |
|---|---|---|---|---|---|

**5.7.3** How many years ahead does the long range plan forecast:

| UP TO 2 | | 3 | | 4 | | 5 | | 6 | | 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | 9 | | 10 | | MORE THAN 10 | | | | | |

**5.7.4** Who prepares the plan for your entire organization?

| Planning Director | | Finance Director | | Marketing Director | |
|---|---|---|---|---|---|
| Managing Director | | Planning Manager | | Marketing Manager | |
| Financial Manager | | Other (specify) | | | |

**5.7.5** Is there a subcommittee of the Board responsible for planning?

| Y | | N | |
|---|---|---|---|

**5.7.6** Which of the following possible parts of a plan are included in your organization's plan:

| | |
|---|---|
| 5.7.6.1 Vision Statement | |
| 5.7.6.2 Mission Statement | |
| 5.7.6.3 Situation Analysis (Economy, Markets, Technology) | |
| 5.7.6.4 Critical Success Factor Analysis | |
| 5.7.6.5 Strength/Weakness Comparison with Competitors | |
| 5.7.6.6 Opportunity/Threat Analysis | |
| 5.7.6.7 Objectives | |
| 5.7.6.8 Strategies | |
| 5.7.6.9 Actions | |
| 5.7.6.10 Milestones (planning checkpoints) | |
| 5.7.6.11 Contingency and Risk Analysis | |
| 5.7.6.12 Assumptions | |
| 5.7.6.13 Issues Critical to Success | |
| 5.7.6.14 Financial Projections | |

5.7.7 Which of the following areas receive the major emphasis in your planning process: (Score- 1=little 2=average 3=alot)

| | |
|---|---|
| 5.7.7.1 Financial Projections | |
| 5.7.7.2 Human Resource Issues and Plans | |
| 5.7.7.3 Technology Issues/Plans | |
| 5.7.7.4 Research and Development | |
| 5.7.7.5 Information Systems/Data Processing | |
| 5.6.7.6 Production Issues/Plans | |
| 5.6.7.7 Marketing and Distribution | |
| 5.6.7.8 Management Information/Accounting Systems | |
| 5.6.7.9 Product/Service Plans | |
| 5.6.7.10 Image/Advertising | |

5.7.8 How many iterations does it take to produce the final plan? In other words, how many levels of management are involved?

| | | | |
|---|---|---|---|
| Directors only | | Directors and next layer | |
| Only top management team | | Top management plus next layer | |
| Top management plus 2 layers | | Top management plus 3 layers | |
| Top management plus 4-5 layers | | Top management plus >5 layers | |

5.7.9 Is most of the content of the plan produced by the centre of the organisation, or does most of it come from the business units?

Percentage content produced by the centre:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| UP TO 20 | | 21-40 | | 40-60 | | 60-80 | | 80-100 | |

5.7.10 How often do the centre and the business units hold planning meetings?

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Quarterly | | Biannually | | Annually | | Less Frequently | |

5.7.11 Is there one planning system for the entire organisation?

| | | | |
|---|---|---|---|
| Y | | N | |

5.7.12 When are the actions/strategies/objectives set out in the plan reviewed:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Quarterly | | Biannually | | Annually | | Less Frequently | |

**5.7.13** How many planning staff are there in your organisation:

| At the centre/headquarters | | | | | | | | | | In the business units | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <5 | | 6-10 | | 11-20 | | 20-50 | | >50 | | <5 | | 6-10 | | 11-20 | | 20-50 | | >50 | |

**5.7.14** Would you characterise the planning system in your organisation as:

| "top-down" | | "bottom-up" | |
|---|---|---|---|

**5.7.15** Do you think the planning process in your organisation is effective?

| Y | | N | |
|---|---|---|---|

**5.7.16** If ineffective, why is it ineffective?

## 5.8 THE WAY YOU PLAN FOR INFORMATION SYSTEMS

### ORGANIZATIONAL EXPERIENCE WITH ISP

5.8.1 Does your organisation undertake ISP?

| YES | | NO | |
|---|---|---|---|

5.8.2 If no, is the reason that:

| | |
|---|---|
| We never did ISP and don't intend to | |
| We no longer do ISP | |
| We are considering ISP | |

5.8.3 If yes, how often do you undertake ISP:

| | | | |
|---|---|---|---|
| occasionally | | annually | |
| every 2 years | | every 3 years or more | |

5.8.4 What led to the decision to undertake ISP/cease ISP/never undertake ISP? (Please delete as appropriate)

NOTE: If your organization has never undertaken ISP, you need not answer any further questions. Thank you for your assistance.

If ISP used to be undertaken in your organisation, please answer the remaining questions in relation to the most recent attempt at ISP. We are particularly interested in understanding the pitfalls of ISP, and the lessons to be learned from unsuccessful ISP experiences.

### LINKS TO CORPORATE PLANNING

5.8.5 Is ISP undertaken:

| | |
|---|---|
| a. in isolation from the corporate planning exercise? | |
| b. as a regular part of the corporate planning cycle? | |

**5.8.6** If b., when are the parts of the business plan which may have impacts upon information systems assessed:

a. as a part of the business planning process i.e. information systems issues are considered as part of the corporate planning exercise

b. separately from the business planning exercise. i.e. after the business plan is completed.

**5.8.7** Indicate the closeness of the links between the IS plan and the business plan:

| 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|

totally isolated — inextricably tied

## ISP APPROACH

**5.8.8** Which, if any, of the following proprietary approaches to ISP is used in your organisation:

| | |
|---|---|
| Andersen Consulting's Foundation | |
| Arthur Young's IEW | |
| BIS's MODUS | |
| IBM's Business Systems Planning | |
| JMA's IEF | |
| LBMS s LEAP | |
| PA Consulting's Tetrarch | |
| SSADM | |
| Other | |

**5.8.9** Which, if any, of the following non-proprietary approaches to ISP is used in your organisation:

| | |
|---|---|
| Nolan and Norton's Stages of Growth | |
| Critical Success Factors | |
| Porter s Value Chains | |
| Other | |

**5.8.10** What are the key features of the approach/es used?

| | not a feature | a feature | |
|---|---|---|---|
| | | major | minor |
| database design | | | |
| information technology-led | | | |
| prioritises list of applications | | | |
| identification of potential packages | | | |
| quantifies business benefits | | | |
| emphasises current issues/functions | | | |
| emphasises future objectives/scenarios | | | |
| evaluation of technology and other risks | | | |

**5.8.11** What is/are the major objective/s of ISP in your organisation:

## CHOICE OF APPROACH

**5.8.12** What led to the choice of ISP approach/es described above?

**5.8.13** Have you tried any other ISP approaches? | YES | | NO | |

**5.8.14** If yes, please identify the approaches previously used and what led to their being dropped.

## STRUCTURE OF ISP TEAMS

**5.8.15** Which of the following form part of your ISP team and how frequently:

| | Never | | Always | | Occasionally | |
|---|---|---|---|---|---|---|
| a. External Consultants | | | | | | |
| b. User Department Personnel | | | | | | |
| c. Corporate Planning Personnel | | | | | | |
| d. Senior Management | | | | | | |

**5.8.16** Who typically leads the ISP team:

| | |
|---|---|
| a. Senior member of IS/DP function | |
| b. Senior manager | |
| c. Senior member of corporate planning | |
| d. User department manager | |
| e. External consultant | |
| f. Other | |

**5.8.17** What is the typical size of an ISP team:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| <2 | | 3-5 | | 6-9 | | 10+ | |

**5.8.18** What proportion of the staff in the IS/DP department are or have been involved in ISP:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0-9% | | 10-19% | | 20-29% | | 30-49% | | 50%+ | |

## ISP PROCESS

**5.8.19** What is the average elapsed time for an ISP study in your organisation:

| Currently | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| <1m | | 1-2ms | | 3-5ms | | 6ms-1yr | | 1yr+ | |
| When your organization first attempted ISP | | | | | | | | | |
| <1m | | 1-2ms | | 3-5ms | | 6ms-1yr | | 1yr+ | |

5.8.20 What is the time horizon of the ISP plan:

| <1yr | | 1-2yrs | | 3-5yrs | | 5yrs+ | |
|---|---|---|---|---|---|---|---|

5.8.21 Is the ISP process based predominantly on (tick one):

| interviews | | questionnaires | | group discussions | |
|---|---|---|---|---|---|

**INFORMATION SYSTEMS PLAN REVIEW/CHANGE**

5.8.22 How often (on average) is your IS Plan reviewed between formal planning exercises:

| Never | | Once or Twice | | Three or more times | |
|---|---|---|---|---|---|

5.8.22 In what circumstances does your organization depart from the IS plan?

5.8.23 How often do departures from the plan occur in its lifetime:

| never | | once/twice | | 3-5 times | | 6+ times | |
|---|---|---|---|---|---|---|---|

5.8.24 How many departures are sanctioned by the review process:

| All | | Most | | A few | | None | |
|---|---|---|---|---|---|---|---|

## OUTCOMES OF THE ISP PROCESS

**5.8.25** Which of the following describes a result of your ISP process, as it actually occurs in practice at the moment (tick as many as are appropriate):

| | |
|---|---|
| Prioritises IS developments | |
| Generates ideas for IS developments driven by corporate goals | |
| Prototype IS Architecture | |
| Identification of software packages | |
| Allocation of responsibility for IS developments between DP/users | |
| Identification of IT infrastructure for the organization | |
| Identification of specific IT for specific developments | |
| Identification of sources of competitive advantage through IT | |
| Generates a database architecture | |
| Generates cost and resource estimates for planned IS projects | |
| Reduces IS development costs | |
| Identifies organizational barriers to IS developments or introduction of IT | |
| A clearly documented plan capable of being revised | |
| Analysis of environmental impacts on firm and their IS implications | |
| Risk assessment of IS projects and new technologies | |
| Reduces IS development backlog | |
| Other (please specify) | |

## 5.9 DEGREE OF SUCCESS IN YOUR INFORMATION SYSTEMS PLANNING

### BENEFITS OF ISP

**5.9.1** Have the benefits of ISP in your organization ever been formally assessed?

| Yes | | No | |
|---|---|---|---|

**5.9.2** If yes, describe briefly how this assessment was conducted.

**5.9.3** In which of the following areas would you say benefits were delivered by ISP in IS operation and development. Please provide details of specific benefits in the areas you tick.

Efficiency- we produce better systems at a lower cost

*(for example:)*

Effectiveness- we produce more systems which are to user specification on time and within budget.

*(for example:)*

Competitive Advantage- we delivered systems which helped this organization compete more effectively in key areas.

*(for example:)*

**IMPACT OF ISP**

**5.9.4** How successful has ISP been in your organization from the following perspectives:

| UNSUCCESSFUL | | FAIR | | WORKED WELL | | HIGHLY SUCCESSFUL | |
|---|---|---|---|---|---|---|---|

a. from the IS/DP department viewpoint

| 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|

b. from senior management's viewpoint

| 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|

c. from middle management/user's viewpoint

| 1 | | 2 | | 3 | | 4 | | 5 | |
|---|---|---|---|---|---|---|---|---|---|

**MEASURING ISP SUCCESS**

**5.9.5** Why has ISP been unsuccessful/successful in your organization:

a. from the IS/DP department viewpoint

b. from senior management's viewpoint

c. from middle management/user's viewpoint

## FACTORS CONTRIBUTING TO SUCCESSFUL ISP

Having established the way in which you plan for information systems, and the degree of success you believe you have achieved in ISP, you now have the opportunity to indicate what you believe to be the main reasons for your success or lack of success in ISP.

Please circle the appropriate number to indicate how important you believe each factor is in successful ISP. The following codes are used:

1= not a factor in successful ISP
2= a reasonably important factor
3= very important factor
4= essential for successful ISP

### 5.9.6 Links with the Corporate Plan

| | |
|---|---|
| a. Close links between the business planning process and the ISP process | 1 2 3 4 |
| b. Same time horizons for IS plan and business plan | 1 2 3 4 |
| c. An established, successful business planning process | 1 2 3 4 |
| d. Specific sections in the business plan dealing with IT and IS implications | 1 2 3 4 |

### 5.9.7 Management/User Involvement in ISP

| | |
|---|---|
| a. ISP team led by a senior manager | 1 2 3 4 |
| b. ISP team led by a senior IS manager | 1 2 3 4 |
| c. Involvement of senior management | 1 2 3 4 |
| d. Involvement of middle/user managers | 1 2 3 4 |
| e. Involvement of senior and user managers | 1 2 3 4 |
| f. Commitment of senior management to ISP (i.e. support for organizational and other change accompanying ISP) | 1 2 3 4 |

e. Structures enabling discussion between users/DP/senior management about information systems strategies — 1 2 3 4

f. Mixed teams of users/senior managers/IS staff on ISP projects — 1 2 3 4

**5.9.8 The ISP Approach**

a. Must be simple, understandable and non-technical — 1 2 3 4

b. Should span internal boundaries in the organisation — 1 2 3 4

c. Should be tailored to the level of experience the organisation has with IT and IS — 1 2 3 4

d. Should be supported by educational programmes about IT, IS and ISP for managers and users — 1 2 3 4

e. Should cover all parts of the organisation — 1 2 3 4

f. Regular reviews of the IS plan are important — 1 2 3 4

**5.9.9 Duration of the ISP Process**

a. Should be kept as short as possible — 1 2 3 4

b. The ideal duration is:

| A few weeks | | A few months | | <6ms | | <1yr | |
|---|---|---|---|---|---|---|---|

**5.9.10 Management of the ISP Process**

a. IS/DP management must drive the ISP process — 1 2 3 4

b. The level of competence of the ISP analysts and consultants is crucial — 1 2 3 4

**5.9.11** It helps if the Chief Information Officer/ Head of IS/DP is part of the senior management team — 1 2 3 4

**5.9.12** The more experience the organisation has with IS/IT, the better the chance that ISP will be successful — 1 2 3 4

| | |
|---|---|
| **5.9.13** The IS Plan should be flexible and reviewed frequently | 1 2 3 4 |
| **5.9.14** Organisational Culture and Environment | |
| a. It is important to select an ISP approach which is suited to the organisation it will operate in | 1 2 3 4 |
| b. The following attributes of an organisation are more or less important in determining which planning approach is used: | 1 2 3 4 |
| Size of the organisation (large/small) | 1 2 3 4 |
| Business planning style (formal/informal) | 1 2 3 4 |
| Top management communication style (formal/informal) | 1 2 3 4 |
| Volatility of business environment (high/low) | 1 2 3 4 |
| Complexity of Internal IS environment (simple/complex) | 1 2 3 4 |
| Status of IT Manager/Director (high/low) | 1 2 3 4 |
| Physical proximity of IS function to top management (close/distant) | 1 2 3 4 |
| Other factors: | |
| | 1 2 3 4 |
| | 1 2 3 4 |
| | 1 2 3 4 |
| c. Attitudes to IT/IS | |
| Perceptions amongst users and senior management that IT/IS are essential for competitive advantage help ISP | 1 2 3 4 |
| Resistance to the introduction of IS/IT by users hinders successful ISP | 1 2 3 4 |

## 5.10 PITFALLS TO SUCCESSFUL ISP

Please list those factors which you believe have hindered your ISP efforts and made them less successful than they should have been, and how important each of these factors was:

| | | |
|---|---|---|
| **5.10.1** | | 1 2 3 4 |
| **5.10.2** | | 1 2 3 4 |
| **5.10.3** | | 1 2 3 4 |

**5.10.4** Do you feel your organisation has been able to use IT for competitive advantage? Why?

| Yes | | No | |
|---|---|---|---|

**Thankyou for your assistance. Please return this questionnaire to the person named on the front page.**

# APPENDIX B : QUESTIONAIRE A2

TO:

FROM:

DATE:

SUBJECT:

THE ART OF INFORMATION STRATEGY IN THE TOP 500 UK CORPORATIONS - QUESTIONNAIRE

# Part C: Questionnaire for Chief Executive Officers

Please return this Questionnaire when completed to:

**Turn Over the Page for Instructions**

## QUESTIONNAIRE FOR CHIEF EXECUTIVE OFFICERS

### WHY COMPLETE THIS QUESTIONNAIRE?

As the head of a division/strategic business unit of one of the UK's Top 500 corporations, these information systems related challenges may be familiar to you:

- using information systems as a competitive weapon
- aligning your investment in computers, telecommunications and software with your business strategies
- providing value-for-money applications and solutions to the information needs of users within tight budgets and deadlines
- using increasingly scarce resources (people and money) to make the most of rapidly changing technologies.

For the top 500 UK corporations which are the subject of this survey, succeeding in competitive, global markets requires both significant cost reduction and differentiation in their offerings in order to survive. Information technology and systems are important weapons in achieving both of these goals. Planning forms an essential part of the successful introduction of new systems.

The purpose of this questionnaire is to establish how information systems planning can or has helped you to:

- use information technology and systems as a competitive weapon
- align your investment in computers, telecommunications and software with your business strategies
- manage information systems resources effectively
- bring business benefits to users
- gain the support and understanding of users in building your organization's information technology infrastructure.

## *The Art of Information Strategy in the Top 500 UK Corporations*

A member of your corporation's central staff and the head of information systems for your division/strategic business unit are completing the other parts of this survey, which when complete, will yield an overview of how successfully you plan for and use information systems in your business. Your assistance in completing Part C relating to your business and information systems planning processes, is much appreciated.

Top management commitment and involvement, frequent review and the use of specific techniques for information systems planning linked to an effective business planning process were recently found to be key factors in the success of information systems planning in UK businesses. It is also clear from recent surveys, however, that top management is dissatisfied with the low level of business benefits systems yield in practice, when compared with the benefits predicted when the proposal to invest in new systems was made.

The successful design and implementation of new information systems yielding effectiveness and strategic advantage must start from the unique nature of each organization. In order to do this, one must use an information systems plamming framework suitable for the type of organization being planned for. This research aims to identify specific organization types, and to indicate the most appropriate planning approach for each type.

In order to discern different organization types, one must take into account the size, age and history of an organization, its technical systems, the nature of its environment and the organization's strategic position. The distribution of power in the organization and its culture are also highly relevant to the success of new systems. Once these contextual factors have been considered, it is possible to design a flexible systems infrastructure which can cope under a variety of conditions.

This questionnaire can help you answer three questions:

- **What type of organization are we, and which information systems planning approach should we use?**
- **What makes planning for information systems a success or failure in our organization?**
- **How can we specify and implement information systems infrastructures and applications which yield effectiveness and strategic advantage within the planning framework indicated?**

## WHAT YOU GET

You will receive:

- the summary findings of the results of the analysis of this questionnaire as completed by yourself and the majority of the top 500 UK corporations
- a brief analysis of your organization "type" together with
- an outline of the planning approach best suited to you.

## THE BENEFIT

A clearer understanding of how to master the challenge of using information systems as a strategic weapon in your organization should result from your participation in this survey. Because this survey addresses the three key interest groups involved in information system investment decisions:

- top management in the corporate centre
- strategic business unit management
- information systems management

the summary findings of the survey will constitute an agenda for the discussion of information systems planning issues in your organization in the future.

## COMPLETING AND RETURNING THE QUESTIONNAIRE

The questionnaire should not take more than half an hour to complete at a maximum.

All responses will be treated confidentially and no individual return will be published. Aggregated results only will be reported.

Please attempt to answer all questions- if you are in doubt about any, please pass on to the next question.

If you believe that another person in your organization is better placed to complete this questionnaire, please pass it on to him or her.

Once you have completed the questionnaire, kindly return it to the person who sent it to you, as set out on the cover sheet.

It would be helpful if you could complete and return the questionnaire within the next week or so.

Once all of the results have been analysed, you will be sent a summary of the research findings together with a description of your organization "type" and the information systems planning approach indicated for your type of organization.

**COULD YOU KINDLY PROVIDE THE FOLLOWING PERSONAL DETAILS BEFORE COMPLETING THE QUESTIONNAIRE AND RETURNING IT. ALL REPLIES WILL BE KEPT COMPLETELY CONFIDENTIAL, AND RESPONSES WILL BE PUBLISHED ON AN AGGREGATE BASIS ONLY. THANKYOU.**

**4.1 PERSONAL DETAILS**

NAME (Dr/Mr/Mrs/Ms) TELEPHONE

JOB TITLE ADDRESS

POSTCODE

**4.1.1** NAME OF DIVISION/STRATEGIC BUSINESS UNIT

**4.1.2** Which of these describe your career background (tick more than one if appropriate):

| | |
|---|---|
| Experience in the functional ranks in this division | |
| Previously a director/top executive in another firm/s | |
| Previously a consultant (management/IT) | |
| Professional background (accountancy/law, other) | |
| Scientific/technical background | |
| Other | |

**4.1.3** How many years of tertiary education did you receive?

| None | | 0-3 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**4.1.4** How many years have you been with your present company?

| <1 | | 1-2 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**4.1.5** How many years have you been in your current position?

| <1 | | 1-2 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**4.1.6.** What role do you play in information systems planning:

| | | |
|---|---|---|
| My direct responsibility<br>I am regularly involved<br>I am involved occasionally<br>None at all | | |

**4.1.7.** If you do play a role, how long have you been involved in information systems planning:

| < 1 year | | 1-2 years | | 3-5 years | | 5+ years | |
|---|---|---|---|---|---|---|---|

**4.1.8** Do you use a personal computer or a workstation in the course of your work on a regular basis?

| Yes | | No | |
|---|---|---|---|

**4.1.9** How computer literate would you say you are:

| 1 | | 2 | | 3 | | 4 | |
|---|---|---|---|---|---|---|---|
| Know very little | | Know a little bit | | Well informed | | Expert about computers | |

## 4.2 BENEFITS OF INFORMATION TECHNOLOGY IN YOUR ORGANIZATION

**4.2.1** List the five most important application systems in your organization in terms of:

| **4.2.1.2** Strategic Significance (providing a competitive edge for your organization) | |
|---|---|
| a | |
| b | |
| c | |
| d | |
| e | |

| **4.2.1.2** Value-Added (the payback on the application- best cost/benefit ratio) | |
|---|---|
| a | |
| b | |
| c | |
| d | |
| e | |

| **4.2.1.3** Perceived User Satisfaction | |
|---|---|
| a | |
| b | |
| c | |
| d | |
| e | |

**4.2.2** How are major new systems initiatives justified in your organization:

| | |
|---|---|
| Payback | |
| Return on Investment | |
| Strategic Value | |
| Other (specify) | |

## 4.3 YOUR BUSINESS PLANNING SYSTEMS

**4.3.1** Is there a formal long range planning system in your organisation?

| Yes | | No | |
|---|---|---|---|

**4.3.2** If yes, how often is a long range plan prepared:

| Annually | | Bi-annually | | Less Frequently | |
|---|---|---|---|---|---|

**4.3.3** How many years ahead does the long range plan forecast:

| UP TO 2 | | 3 | | 4 | | 5 | | 6 | | 7 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 8 | | 9 | | 10 | | MORE THAN 10 | | | | | |

**4.3.4** Who prepares the plan for your entire organization?

| Planning Director | | Finance Director | | Marketing Director | |
|---|---|---|---|---|---|
| Managing Director | | Planning Manager | | Marketing Manager | |
| Financial Manager | | Other (specify) | | | |

**4.3.5** Is there a subcommittee of the Board responsible for planning?

| Yes | | No | |
|---|---|---|---|

**4.3.6** Which of the following possible parts of a plan are included in your organization's plan:

| | |
|---|---|
| 4.3.6.1 Vision Statement | |
| 4.3.6.2 Mission Statement | |
| 4.3.6.3 Situation Analysis (Economy, Markets, Technology) | |
| 4.3.6.4 Critical Success Factor Analysis | |
| 4.3.6.5 Strength/Weakness Comparison with Competitors | |
| 4.3.6.6 Opportunity/Threat Analysis | |
| 4.3.6.7 Objectives | |
| 4.3.6.8 Strategies | |
| 4.3.6.9 Actions | |
| 4.3.6.10 Milestones (planning checkpoints) | |
| 4.3.6.11 Contingency and Risk Analysis | |
| 4.3.6.12 Assumptions | |
| 4.3.6.13 Issues Critical to Success | |
| 4.3.6.14 Financial Projections | |

**4.3.7** Which of the following areas receive the major emphasis in your planning process: (Score- 1=little 2=average 3=alot)

| | |
|---|---|
| 4.3.7.1 Financial Projections | |
| 4.3.7.2 Human Resource Issues and Plans | |
| 4.3.7.3 Technology Issues/Plans | |
| 4.3.7.4 Research and Development | |
| 4.3.7.5 Information Systems/Data Processing | |
| 4.3.7.6 Production Issues/Plans | |
| 4.3.7.7 Marketing and Distribution | |
| 4.3.7.8 Management Information/Accounting Systems | |
| 4.3.7.9 Product/Service Plans | |
| 4.3.7.10 Image/Advertising | |

**4.3.8** How many iterations does it take to produce the final plan? In other words, how many levels of management are involved?

| | | | |
|---|---|---|---|
| Directors only | | Directors and next layer | |
| Only top management team | | Top management plus next layer | |
| Top management plus 2 layers | | Top management plus 3 layers | |
| Top management plus 4-5 layers | | Top management plus >5 layers | |

**4.3.9** Is most of the content of the plan produced by the centre of the organisation, or does most of it come from the business units?

Percentage content produced by the centre:

| UP TO 20 | | 21-40 | | 40-60 | | 60-80 | | 80-100 | |
|---|---|---|---|---|---|---|---|---|---|

**4.3.10** How often do the centre and the business units hold planning meetings?

| Quarterly | | Biannually | | Annually | | Less Frequently | |
|---|---|---|---|---|---|---|---|

**4.3.11** Is there one planning system for the entire organisation?

| Yes | | No | |
|---|---|---|---|

**4.3.12** When are the actions/strategies/objectives set out in the plan reviewed:

| Quarterly | | Biannually | | Annually | | Less Frequently | |
|---|---|---|---|---|---|---|---|

**4.3.13** How many planning staff are there in your organisation:

| At the centre/headquarters | | | | | | | | | | In the business units | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <5 | | 6-10 | | 11-20 | | 20-50 | | >50 | | <5 | | 6-10 | | 11-20 | | 20-50 | | >50 | |

**4.3.14** Would you characterise the planning system in your organisation as:

| "top-down" | | "bottom-up" | |
|---|---|---|---|

**4.3.15** Do you think the planning process in your organisation is effective?

| Yes | | No | |
|---|---|---|---|

**4.3.16** If ineffective, why is it ineffective?

**4.3.17** Are you happy with the way you Information Systems are managed? Why?

| Yes | | No | |
|---|---|---|---|

**4.3.18** Have you ever formally evaluated whether your firm can achieve or has achieved direct business benefits from IT?

| Yes | | No | |
|---|---|---|---|

If yes, were those benefits significant?

## 4.4 ORGANIZATIONAL EXPERIENCE WITH INFORMATION SYSTEMS PLANNING

**4.4.1** Does your organisation undertake ISP?

| Yes | | No | |
|---|---|---|---|

**4.4.2** If no, is the reason that:

| | |
|---|---|
| We never did ISP and don't intend to | |
| We no longer do ISP | |
| We are considering ISP | |

**4.4.3** If yes, how often do you undertake ISP:

| | | | |
|---|---|---|---|
| occasionally | | annually | |
| every 2 years | | every 3 years or more | |

**4.4.3** What led to the decision to undertake ISP/cease ISP/never undertake ISP? (Please delete as appropriate)

NOTE: If your organization has never undertaken ISP, you need not answer any further questions. Thank you for your assistance.

If ISP used to be undertaken in your organisation, please answer the remaining questions in relation to the most recent attempt at ISP. We are particularly interested in understanding the pitfalls of ISP, and the lessons to be learned from unsuccessful ISP experiences.

## LINKS TO CORPORATE PLANNING

**4.4.5** Is ISP undertaken:

| | |
|---|---|
| a. in isolation from the corporate planning exercise? | |
| b. as a regular part of the corporate planning cycle? | |

**4.4.6** If b., when are the parts of the business plan which may have impacts upon information systems assessed:

| | |
|---|---|
| a. as a part of the business planning process i.e. information systems issues are considered as part of the corporate planning exercise | |
| b. separately from the business planning exercise. i.e. after the business plan is completed. | |

**4.4.7** Indicate the closeness of the links between the IS plan and the business plan:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | | 2 | | 3 | | 4 | | 5 | |
| totally isolated | | | | | | | | inextricably tied | |

## ISP APPROACH

**4.4.8** Which, if any, of the following proprietary approaches to ISP is used in your organisation:

| | |
|---|---|
| Andersen Consulting's Foundation | |
| Arthur Young's IEW | |
| BIS's MODUS | |
| IBM's Business Systems Planning | |
| JMA's IEF | |
| LBMS's LEAP | |
| PA Consulting's Tetrarch | |
| SSADM | |
| Other | |

**4.4.9** Which, if any, of the following non-proprietary approaches to ISP is used in your organisation:

| | |
|---|---|
| Nolan and Norton's Stages of Growth | |
| Critical Success Factors | |
| Porter's Value Chains | |
| Other | |

**4.4.10** What are the key features of the approach/es used?

| | not a feature | a feature | |
|---|---|---|---|
| | | major | minor |
| database design | | | |
| information technology-led | | | |
| prioritises list of applications | | | |
| identification of potential packages | | | |
| quantifies business benefits | | | |
| emphasises current issues/functions | | | |
| emphasises future objectives/scenarios | | | |
| evaluation of technology and other risks | | | |

**4.4.11** What is/are the major objective/s of ISP in your organisation:

## CHOICE OF APPROACH

**4.4.12** What led to the choice of ISP approach/es described above?

**4.4.13** Have you tried any other ISP approaches? YES ☐ NO ☐

**4.4.14** If yes, please identify the approaches previously used and what led to their being dropped

4.5 Are you satisfied that IT has yielded competitive advantage in your organization? Why?

| Yes | | No | |
|---|---|---|---|

**THANKYOU FOR YOUR ASSISTANCE. PLEASE RETURN THIS QUESTIONNAIRE TO THE PERSON NAMED ON THE FRONT COVER.**

# APPENDIX C : QUESTIONAIRE B1/B2

EFFECTIVE STRATEGIC CONTROL:

THE INFORMATION SYSTEMS CONTRIBUTION

# QUESTIONNAIRE FOR SENIOR MANAGERS

Part 2 of a London Business School Research Programme:

'The Art of Information Strategy in UK Organisations'

## *EFFECTIVE STRATEGIC CONTROL: THE INFORMATION SYSTEMS CONTRIBUTION*

### (i) BACKGROUND TO THIS RESEARCH

This is the second part of a survey started in 1990 into the impact of information systems and information technology on the strategic control of UK firms. **Part 1** was completed by the information systems directors of 22 major UK firms, about the planning and information systems in their firms, including the person responsible for information systems in your organisation.

A copy of the results of that survey is attached for your information.

This questionnaire forms the second part of the survey, and takes a broader look at the impact of information and planning systems on the performance of your company. In particular, **Part 2** explores the linkages between such systems and the extent to which they facilitate effective strategic control of your business.

### (ii) ELEMENTS OF PHASE 2 OF THE RESEARCH PROGRAMME

There are three stages to Phase 2:

(a) First, you are asked about the **benefits** you may have already achieved through the use of IT/IS

(b) Section 2 clarifies the **nature** of your business and its competitive dynamics.

(c) You are then asked to indicate which of the 43 variables listed are **mission critical** to your organisation, and what impact information systems (including planning) have had on these factors.

Information systems may have had a positive impact- improved service or increased responsiveness, for example. Or they may have had a small, or even a negative impact.

### (iii) BENEFITS TO YOU AND YOUR FIRM

The degree to which the nature of your business, its circumstances and the approach you use to manage your information systems match, may determine how effectively you can control your business and improve its performance. Upon completion of this research later this year, you will receive a copy of the final research report, together with an indication as whether there is a match/ mismatch between your control style, information systems and the nature of your business and its circumstances.

The completed questionnaires will be kept in strict confidence, and only you and the other participants will receive a copy of the results which will not reveal the identity of individual respondents.

**THANKYOU FOR COMPLETING THIS QUESTIONNAIRE. PLEASE RETURN IT TO:**

Robin L Wood, Department of Information Management
London Business School, 1 Sussex Place, Regent's Park, London, NW1 4SA.

## 1. INTRODUCTION

**Strategic control** involves the identification and control of mission **critical variables** in a business and is the key to better **business performance.**

Strategic **thinking,** management **attitudes and processes** and the availability of timely, relevant **information** all influence the extent to which firms exercise effective strategic control.

In order to facilitate effective strategic control, senior managers need **information** about their organisation, its products and markets, financial performance and the control systems they can influence or change in the business. Earlier studies suggest that managers get most of this information from sources **outside** the organisation- only 20-30% of such information is provided by internal, formal information systems.

The **role of information systems** and technology in operational and financial control has been well documented. Less is understood about IS's role in managerial and strategic control, despite major advances in the use of decision support and executive information systems in recent years.

Strategic control research suggests that some control strategies and styles fit particular organisations and their circumstances better than others. 22 large UK corporations are participating in research to identify the role formal information systems play in the process of strategic control. The characteristics and competitive dynamics of a business and the nature of its control systems must match to enable effective strategic control.

The control paradox appears to explain why formal systems which emphasise **financial control** suit simple, stable business circumstances; and why informal systems which emphasise planning and **action control** /facilitation are more likely to fit complex, dynamic business circumstances.

Tradeoffs between control system **coverage, functionality, complexity** and **flexibility** enable effective strategic control through the matching of control type to the circumstances of the business and the information needs flowing therefrom.

In the following few pages, you are asked to tell us about the **nature** of your business, its **current circumstances,** and the **role** information systems have played (if any) in helping you to exert effective **strategic control** over mission critical variables in your business.

## 2. GENERAL BENEFITS OF INFORMATION SYSTEMS IN YOUR BUSINESS

Which of the following business benefits have your computer and telecommunication systems helped you achieve in your business during the past five years? (whether these systems were essential to your efforts in an area, or simply facilitated/ supported your efforts).

| MARKETING | SIGNIFICANT BENEFITS | LIMITED BENEFITS | NOT APPLICABLE |
|---|---|---|---|
| **Customers** | | | |
| Better customer service generally | ☐ | ☐ | ☐ |
| Marketing/distribution systems which increase customer loyalty | ☐ | ☐ | ☐ |
| **Logistics** | | | |
| Improved after-sales support and service | ☐ | ☐ | ☐ |
| A more flexible delivery/ distribution system | ☐ | ☐ | ☐ |
| Faster, more cost-effective logistics eg. reduced stock levels, Just-in-Time | ☐ | ☐ | ☐ |
| **PRODUCTION** | | | |
| Increased product innovation eg. more successful new products | ☐ | ☐ | ☐ |
| Reduced lead times from drawing board to distribution | ☐ | ☐ | ☐ |
| A more flexible production system eg. being able to switch production resources between product runs more easily | ☐ | ☐ | ☐ |
| High capacity utilisation | ☐ | ☐ | ☐ |
| Operating cost reductions | ☐ | ☐ | ☐ |
| Better quality products and processes | ☐ | ☐ | ☐ |

| MANAGEMENT/ADMINISTRATION | SIGNIFICANT BENEFITS | LIMITED BENEFITS | NOT APPLICABLE |
|---|---|---|---|
| Improved communications in the firm | ☐ | ☐ | ☐ |
| Better planning eg. more accurate plans, and a more effective planning process | ☐ | ☐ | ☐ |
| Better strategy formation/implementation | ☐ | ☐ | ☐ |
| Improved financial control eg. better margins and cost management | ☐ | ☐ | ☐ |
| Improved strategic control eg. tighter focus on business mission, greater control over projects | ☐ | ☐ | ☐ |
| Greater autonomy for operating units eg. more authority/ responsibility for business unit management | ☐ | ☐ | ☐ |
| Greater management productivity | ☐ | ☐ | ☐ |
| Administrative cost reductions | ☐ | ☐ | ☐ |
| More tightly controlled costs | ☐ | ☐ | ☐ |
| **THE ORGANISATION** | | | |
| A more flexible organisation | ☐ | ☐ | ☐ |
| A more responsive organisation | ☐ | ☐ | ☐ |
| A flatter organisational structure e. fewer levels in the hierarchy | ☐ | ☐ | ☐ |
| A more entrepreneurial organisation | ☐ | ☐ | ☐ |

## 3. YOUR COMPANY'S CIRCUMSTANCES

Please indicate below the circumstances your company presently operates in by tickingthe appropriate descriptor. For example, there may be many important linkages between the businesses in your company, so you would circle: "MANY".

We are not looking for "exact" answers- what matters is how complex/diverse/uncertain you believe your business to be, from the experience of you and your colleagues over the past five years.

| | |
|---|---|
| 3.1 Number of important linkages between your businesses (vertical or horizontal integration) | MANY ☐ SOME ☐ FEW ☐ |
| 3.2 Number of "bet your company decisions" (irrevocable, major investments the failure of which would be critical to the viability of your firm) | MANY ☐ SOME ☐ FEW ☐ |
| 3.3 Level of diversity ( the number of different businesses under the umbrella of your firm/group) | HIGH ☐ MED ☐ LOW ☐ |
| 3.4 Level of uncertainty (reflected by your ability to plan ahead for more than a few months/year at a time with any degree of accuracy) | HIGH ☐ MED ☐ LOW ☐ |
| 3.5 Rate of change (rate of new product innovation, new entrants into the industry, new substitutes for your products/services) | HIGH ☐ MED ☐ LOW ☐ |
| 3.6 Number of easily measured sources of advantage (things which put you ahead of your competitors) | MANY ☐ SOME ☐ FEW ☐ |
| 3.7 Number of multiple, complex, hard to measure sources of advantage | MANY ☐ SOME ☐ FEW ☐ |
| 3.8 Average time-lag between investments and paybacks for major projects | LONG > 2 YRS ☐ AVG 1-2 YRS ☐ SHORT < 1 YR ☐ |

## 4. MISSION CRITICAL VARIABLES AND THE IMPACT OF INFORMATION SYSTEMS

Over the past three decades, research indicates that many variables have a direct influence on business performance. In this section you are asked to:

(i) indicate how critical each of these variables is to the success of your business, (under the column headed "factor rating") and

(ii) estimate how important information systems are in helping your firm to achieve the level of control you would like over each of the factors you attempt to control (under the column headed "IT/IS Contribution").

(i) USE THE FOLLOWING SCALE TO CHOOSE A NUMBER FOR EACH FACTOR, AND THEN ENTER THAT NUMBER UNDER THE HEADING "FACTOR RATING":

***SCALE***

5= factor **critical** to better performance

4= factor **essential** to better performance

3= factor **important** to better performance

2= factor **useful**- can't hurt performance

1= factor **irrelevant** to performance

(ii) USE THE FOLLOWING SCALE TO CHOOSE A NUMBER FOR THE IMPACT IT/IS HAS HAD ON EACH FACTOR, AND THEN ENTER THAT NUMBER UNDER THE HEADING "IT/IS CONTRIBUTION":

***SCALE***

5= IT/IS currently **critical** to efforts in this area

4= IT/IS currently **essential** or **potentially critical** to efforts in area

3= IT/IS currently **important** or **potentially essential** to efforts in area

2= IT/IS currently **nice to have** or **potentially important** in this area

1= IT/IS **irrelevant** to this area

If you can think of any examples of instances where IT/IS has had a major impacton any success factor, please note them under the heading "Specific IT/IS Impact".

| A. PEOPLE • *FACTOR TO ASSESS/DEVELOP* | Factor Rating | IT/IS Contribution | Specific IT/IS Impact |
|---|---|---|---|
| A1. Leadership | | | |
| A2. Good management | | | |
| A3. Integrity (good business ethics) | | | |
| A4. A bias for action | | | |
| A5. Involvement (hands-on culture) | | | |
| A6. Entrepreneurial qualities | | | |
| A7. Selection/evaluation criteria and methods | | | |
| A8. Culture appropriate to firm's situation | | | |

• FACTOR TO MONITOR/IMPROVE

## B. ORGANISATIONAL CONFIGURATION

| | Factor Rating | IT/IS Contribution | Specific IT/IS Impact |
|---|---|---|---|
| B1. Decentralisation (many autonomous units) | | | |
| B2. Flatness of organisational structure (lean staff) | | | |
| B3. Organisational structure appropriate to context eg. simple or complex | | | |

## C. ORGANISATIONAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| C1. Service: responsiveness/speed | | | |
| C2. Service quality | | | |
| C3. Ability to innovate/ adapt quickly | | | |
| C4. Closeness to the customer/ market orientation | | | |
| C5. Value-driven (emphasis on value-added/performance) | | | |
| C6. High relative quality (making products that work) | | | |

## D. PRODUCTS/MARKETS

| • *FACTOR TO ASSESS/DEVELOP* | Factor Rating | IT/IS Contribution | Specific IT/IS Impact |
|---|---|---|---|
| D1. Focus on core competences (stick to the knitting) | | | |
| D2. Diversification with an overall business logic/management style | | | |
| D3. Good marketing management | | | |
| D4. Identifying new product/market opportunities | | | |

• ***FACTOR TO MONITOR/IMPROVE***

| | | | |
|---|---|---|---|
| D5 High relative market share | | | |
| D6 Globalisation (global products/ manufacturing/resourcing) | | | |
| D7. High industry/market growth rate | | | |
| D8. Level of industry concentration | | | |
| D9. Rate of industry/market innovation | | | |
| D10. Customer power in industry/market | | | |
| D11. Logistical complexity of industry/ distribution channels | | | |

## E. OPERATING STRUCTURE • *FACTOR TO MONITOR/ IMPROVE*

| | Rating | Contribution | IT/IS Impact |
|---|---|---|---|
| E1. Investment intensity (Fixed costs relative to variable) | | | |
| E2. Levels of fixed assets to liquid assets in firm | | | |
| E3. High capacity utilisation | | | |
| E4. High productivity | | | |

## F. CONTROLS/SYSTEMS •*FACTOR TO ASSESS/DEVELOP*

| | | | |
|---|---|---|---|
| F1. Effective financial controls | | | |
| F2. Tightly controlled costs | | | |
| F3. Good information and control systems | | | |
| F4. Effective strategic controls (using milestones to measure progress towards long-term performance goals) | | | |
| F5. Effective formal planning systems | | | |
| F6. Effective strategy formation processes | | | |
| F7. Simultaneous loose-tight properties (tight financial/loose action controls) | | | |
| F8. Good match between management style and type of control system | | | |

***THANKYOU FOR COMPLETING THIS QUESTIONNAIRE- PLEASE POST IT TO US AT YOUR EARLIEST CONVENIENCE.***

# APPENDIX D : QUESTIONAIRE C1/C2

## COMPANY PROFILE:

# EFFECTIVE STRATEGIC CONTROL: THE INFORMATION SYSTEMS CONTRIBUTION

**Phase 2 of a London Business School Survey of Major UK Corporations**

**Questionnaire Completion Date:**

***ORGANIGRAM***

**CHMN:**

**CEO:**

| Marketing | Finance | Production | IT/IS |
|---|---|---|---|
| | | | |

| Unit/Division1 | Unit/Division2 | Unit/Division3 | Unit/Division4 |
|---|---|---|---|
| | | | |

**NOTES**

# INTRODUCTION

This questionnaire forms the **second part** of a survey into the role of information systems in the **effective strategic control** of major UK corporations. **Part one** described the **information systems** infrastructure, applications, and systems benefits in the company; it also examined the company's **planning systems,** including information systems planning, and the critical success factors in ISP in the company.

In **part two** of this research we are seeking to understand senior management's perceptions of the **benefits of information systems** to their firms, by establishing what managers perceive to be the **mission-critical variables** in their firm, and what **impact** information systems have on such variables. We are now investigating the links between such mission-critical variables, the **mission control systems,** and the **strategic position, organisation type** and **performance** of:
(name of company)_____

Effective strategic control is one of the more important factors in the performance of organisations. **Strategic control** is the process of ***identifying*** and ***controlling*** the ***mission-critical variables*** in an organisation.

The central hypothesis of this research is that **effective strategic control** is enabled by a ***match*** between the **control systems** in a company (of which information systems form a critical part), and several other factors:

- the **nature of the business** and its **circumstances,**
- the **organisation type** of a company and
- its **strategic potential.**

The aim of this research is to demonstrate some **significant relationships** between these factors and the nature of the firm's control systems. Such an analysis would provide a **provisional diagnosis** of the extent to which the control systems are matched or mismatched to the firm, enabling managers to **pinpoint specific actions** which can be taken to **remedy any mismatch,** and improve the effectiveness of the firm's control systems and, hopefully, its performance.

You and/or some of your colleagues have already completed/are in the process of completing a questionnaire detailing the nature of your business and its circumstances, the mission-critical variables in the business and the impact of information systems on those variables. We are now going to try to understand what **kind of organisation** you are working for, and what the **strategic position** of your organisation is.

This information will then be **combined** with the answers provided in the other parts of this research, to provide a comprehensive of your organisation and its systems, and the match/mismatch between them.

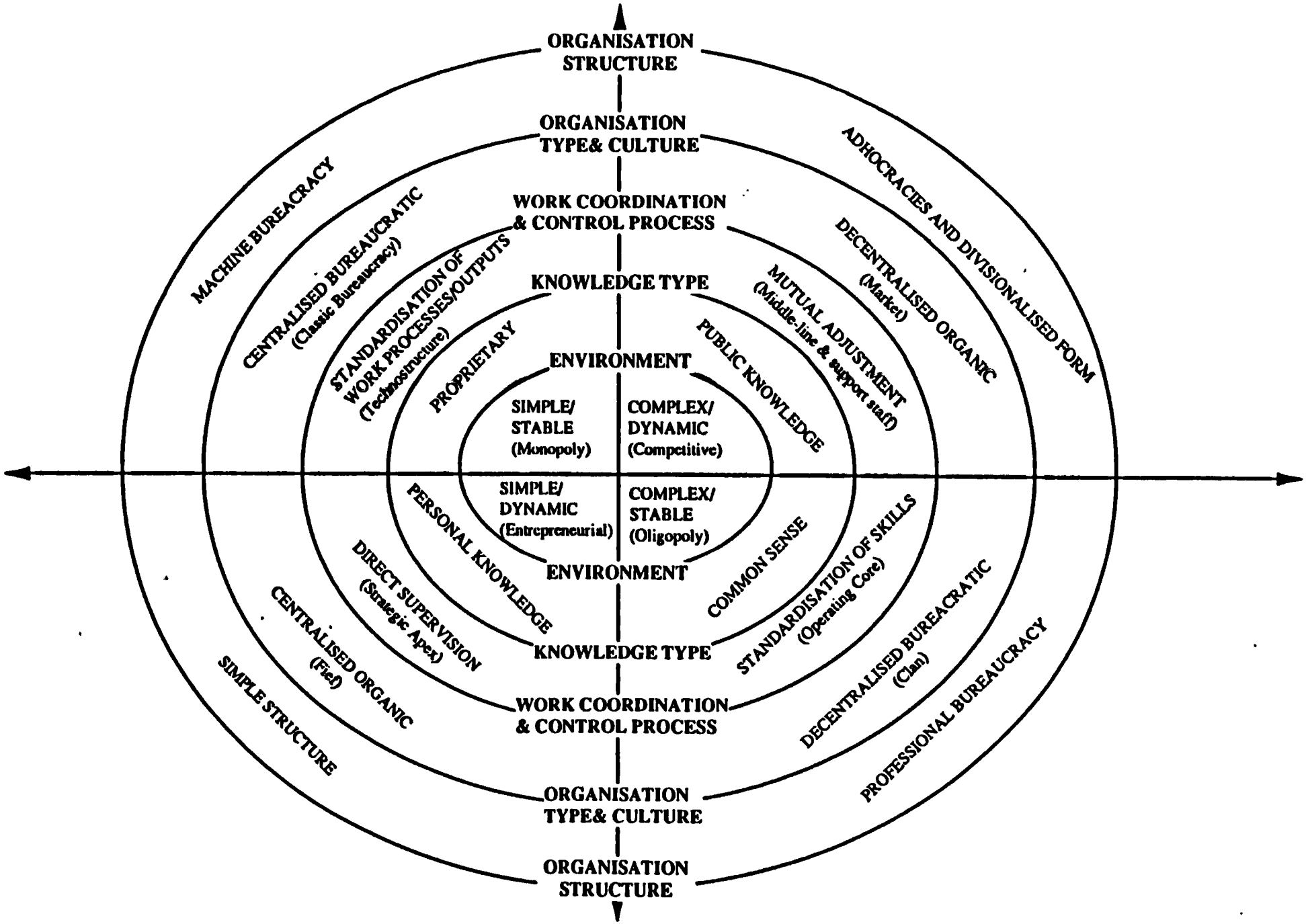
All information provided by you will be kept in strict confidence, and you will receive a summary of the research results once they are completed.

# ORGANISATION TYPE

The following diagram represents the different aspects of organisations, from their environment to their structure. Each "pure type" is listed in each of the four quadrants. Not all organisations are pure types, but can be a mixture of types. Indicate, by circling the particular type in each of the 5 categories (environment, knowledge type, work coordination and control processes, organisations type and culture and organisation structure), which attributes best describe your firm.

**NOTES:**

# ORGANISATION TYPE SELECTC . DIAGRAM



## CONTROL STYLE

The following descriptions of the way in which management can exert control over a business may be more or less appropriate to your organisation. Please indicate which description you think is most appropriate to your firm:

### ORGANISATION STRUCTURE & OVERLAP MANAGEMENT

Multiple perspectives, coordination — Clear responsibilities

5 4 3 2 1 0 1 2 3 4 5

### PLANNING PROCESS

Detailed planning reviews — Entrepreneurial decision-making

5 4 3 2 1 0 1 2 3 4 5

### THEMES, THRUSTS & SUGGESTIONS

Strong leadership — Business autonomy

5 4 3 2 1 0 1 2 3 4 5

### OBJECTIVES

Long-term strategic objectives — Short-term financial objectives

5 4 3 2 1 0 1 2 3 4 5

### MONITORING & CONTROLS

Flexible strategies — Tight controls

5 4 3 2 1 0 1 2 3 4 5

### RESOURCE ALLOCATION

Part of long-term strategy — Project-based; short payback criteria

5 4 3 2 1 0 1 2 3 4 5

## NOTES

# CONTROL PROCESSES

Which of the following best describes the way in which the control processes in your organisation operate:

| | | |
|---|---|---|
| | **CONTROL PROCESS** | |
| Analytical/Formal | 5 4 3 2 1 0 1 2 3 4 5 | Intuitive |
| | **CONTROL ELEMENT FOCUS** | |
| Planning | 5 4 3 2 1 0 1 2 3 4 5 | Monitoring |
| | **OBJECTIVES CONSTRAINTS** | |
| Tight/Fixed | 5 4 3 2 1 0 1 2 3 4 5 | Loose/Tentative |
| | **OBJECTIVES TIME FRAME** | |
| Short Term | 5 4 3 2 1 0 1 2 3 4 5 | Long Term |
| | **ROLE ATTRIBUTES** | |
| Authority/Responsibility | 5 4 3 2 1 0 1 2 3 4 5 | Initiative/Collaboration |
| | **ROLE CONSTRAINTS** | |
| Position/Resources | 5 4 3 2 1 0 1 2 3 4 5 | Power/Personality |
| | **ROLE PERCEPTIONS** | |
| Parochial | 5 4 3 2 1 0 1 2 3 4 5 | Holistic |
| | **ROLE RELATIONSHIPS** | |
| Directing | 5 4 3 2 1 0 1 2 3 4 5 | Facilitating |
| | **MATCHING PEOPLE TO ROLES** | |
| Specific Skills/Knowledge | 5 4 3 2 1 0 1 2 3 4 5 | Wide Competences |
| | **REWARDS** | |
| Personal Performance | 5 4 3 2 1 0 1 2 3 4 5 | Team Related |
| | **CULTURE** | |
| Conservative | 5 4 3 2 1 0 1 2 3 4 5 | Radical |
| | **ORGANISATION STRUCTURE** | |
| Simple/Decentralised | 5 4 3 2 1 0 1 2 3 4 5 | Complex/Centralist |

Relatively formal strategic control processes are indicated in:
- diverse companies with few important linkages between business in their portfolios
- businesses where competitive advantage depends upon a relatively small number of identifiable and measurable variables and in
- businesses that do not face high levels of uncertainty and rapid change

More informal strategic control processes are suitable in:
- less diverse companies, especially if there are important linkages between businesses in the portfolio
- businesses where the sources of competitive advantage are hard to identify and measure and in
- businesses that operate in unpredictable and fast-changing environments

# APPENDIX E : QUESTIONAIRE D1/D2

# STRATEGIC POTENTIAL OF: _____

## A. RESPONDENT DETAILS

1. NAME OF RESPONDENT: _____

2. POSITION: _____

3. ADDRESS: _____

_____

_____

4. TELEPHONE: _____ 5. FAX: _____

## B. COMPANY PERFORMANCE & STATISTICS

| | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 |
|---|---|---|---|---|---|---|
| 1. Turnover: £ '000 | | | | | | |
| 2. Net Operating Profit after Tax | | | | | | |
| 3. Employees | | | | | | |
| 4. Acquisitions (no) | | | | | | |
| 5. R&D budget | | | | | | |

## C. MARKET ATTRACTIVENESS

1. GROWTH- Real Annual Market Growth Rate (%per annum) ☐

2. CUSTOMER POWER/LOGISTICAL COMPLEXITY-
Number of Immediate Customers making up 50% of Sales ☐

Absolute size of average customer purchase in £ ☐

3. MARKETING COST- Marketing expenditure divided by revenue ☐

4. INNOVATION- % Revenue derived from new product sales in 1989
(a new product is defined as one introduced in the past two years) ☐

5. CONCENTRATION- Combined turnover of 4 largest companies
in your industry divided by total industry size ☐

**NOTES:**

# STRATEGIC POTENTIAL OF: _____

## D. COMPETITIVE STRENGTH

1. MARKET SHARE- % Market Share of company [ ]

2. RELATIVE SHARE- Company market share divided by combined market share of 3 largest competitors [ ]

3. RELATIVE QUALITY- How do your companies products/services compare with those of your major competitors? (Score: 5 = superior, 1 = inferior)

PRICE [ 1 2 3 4 5 ] QUALITY [ 1 2 3 4 5 ]

4. BARRIERS TO ENTRY- Are there any barriers to entry in your business e.g. patents, capital costs. How strong are they? (5 = very strong; 1 = non-existent)

[ 1 2 3 4 5 ]

5. CUSTOMER FOCUS- How focussed is your company on one or more sectors of the market. (Use % of revenue in a market segment as an indication)

| Market Segment | % of Revenue | Market Segment | % of Revenue |
|---|---|---|---|
| | | | |
| | | | |

## E. CAPITAL AND PRODUCTION STRUCTURE

1. Capital intensivity: $\frac{\text{Net Fixed Assets + Working Capital (at net book value)}}{\text{Revenue}}$ = [ ]

2. Fixed Capital Intensity: $\frac{\text{Gross Book Value of Fixed Assets}}{\text{Revenue}}$ = [ ]

3. Operating Effectiveness: $\frac{\text{Net Income + Capital Costs + Employee Costs}}{\text{Number of Employees}}$ = [ ]

4. Value-added: $\frac{\text{Net Income + Capital Costs + Employee Costs}}{\text{Revenue}}$ = [ ]

5. Management Value-added:

$$\frac{\text{Revenue-Purchases-Taxes-Shareholder Returns-Operations Costs- Management Costs}}{\text{Management Costs}} = \text{[ ]}$$

6. Capacity Utilisation: $\frac{\text{Total Production/Operating Capacity in 1989}}{\text{1989 Production/Operating Output}}$ = [ ]

# Questionnaire: Part A Overview of The Corporation

Please return this Questionnaire when completed to:

**Turn Over the Page for Instructions**

*The Art of Information Strategy in the Top 500 UK Corporations*

Could you kindly provide the following personal details before completing the questionnaire and returning it. All replies will be kept competely confidential, and responses will be published on an aggregate basis only. Thankyou.

## 2 YOU AND YOUR ORGANIZATION- SOME VITAL STATISTICS

### 2.1 PERSONAL DETAILS

NAME (Dr/Mr/Mrs/Ms) TELEPHONE

JOB TITLE ADDRESS
2.1.1.

POSTCODE

**2.1.2.** Do you report to the board of directors with responsibility for Strategic planning in your organisation?

Yes No

**2.1.3.** If not, what is your relationship with the person responsible for reporting to the board on strategic planning:

| | | |
|---|---|---|
| Immediate Subordinate<br>Immediate Supervisor<br>Other (please specify) | | |

**2.1.4.** Who manages the strategic planning department/function on a day to day basis in your organisation?

| | | |
|---|---|---|
| Myself<br>Immediate Subordinate<br>Immediate Supervisor<br>Other (please specify) | | |

**2.1.5.** What role do you play in information systems planning:

| | | |
|---|---|---|
| My direct responsibility<br>I am regularly involved<br>I am involved occasionally<br>None at all | | |

**2.1.6.** If you do play a role, how long have you been involved in information systems planning:

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| < 1 year | | 1-2 years | | 3-5 years | | 5+ years | |

**2.1.7.** Which of these describe your career background (tick more than one if appropriate):

| | |
|---|---|
| Experience in the functional ranks in this firm | |
| Previously a consultant (management/IT) | |
| Professional background (accountancy, law) | |
| Scientific/technical background | |
| Other | |

**2.1.8.** How many years of tertiary education did you receive?

| None | | 0-3 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**2.1.9.** How many years have you been with your present company?

| <1 | | 1-2 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**2.1.10.** How many years have you been in your current position?

| <1 | | 1-2 | | 3-5 | | 5+ | |
|---|---|---|---|---|---|---|---|

**WOULD YOU KINDLY COMPLETE SECTIONS 2.2 AND PART B (IF APPLICABLE)**

## 2.2 CORPORATE PROFILE

**EXPLANATORY NOTE: THE WORDS "FIRM" OR "ORGANIZATION" REFER TO THE ORGANIZATION/S FOR WHICH YOU ARE DIRECTLY RESPONSIBLE FOR THE STRATEGIC PLANNING FUNCTION.**

### GENERAL INFORMATION

**2.2.1.** Which industry/industries does your firm operate in (at least ten percent of your turnover should be the cut-off point to tick an industry):

| | |
|---|---|
| Construction, mining, agriculture | |
| Utilities (electricity, gas, water, communications, heating) | |
| Health, Education | |
| Entertainment (incl. recreation, hotels) | |
| Banking, Finance, Insurance | |
| Professional Services (e.g. real estate, business services, consultancy, legal and DP services) | |
| Continuous Manufacturing (e.g. oil, steel) | |
| Batch Manufacturing (e.g. vehicles, machinery) | |
| Transport and Storage | |
| Wholesale and Retail | |

**2.2.2** What was the turnover in million pounds sterling of your organization five years ago, last year and in the most recent financial year:

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1982: | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | | 1000+ | | |
| 1987: | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | | 1000+ | | |
| 1988: | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | | 1000+ | | |

**2.2.3.** How many thousand employees work in your firm now; last year; five years ago?

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1982: | <1 | | 1-2 | | 3-5 | | 6-10 | | 11-20 | |
| | 21-50 | | 50-100 | | >100 | | | | | |
| 1987: | <1 | | 1-2 | | 3-5 | | 6-10 | | 11-20 | |
| | 21-50 | | 50-100 | | >100 | | | | | |
| 1988: | <1 | | 1-2 | | 3-5 | | 6-10 | | 11-20 | |
| | 21-50 | | 50-100 | | >100 | | | | | |

**2.2.4.** Does the chief executive of your organization report to a head office?

| | | | |
|---|---|---|---|
| Yes (go to 2.2.5.1.) | | No (go to 2.2.5.2.) | |

**2.2.5.1.** If yes, what is its:

**2.2.5.1.1** Size (estimated number of employees)

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <10 | | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | | 1000+ | |

**2.2.5.1.2** Nationality

| | |
|---|---|
| British | |
| European | |
| American | |
| Japanese | |
| Australasian | |
| Other | |

**2.2.5.2.** If no, you must be "head office". What is the size and nationality of the corporate centre you work in:

**2.2.5.2.1** Size (estimated number of employees)

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <10 | | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | | 1000+ | |

**2.2.5.2.2.** Nationality

| | |
|---|---|
| British | |
| European | |
| American | |
| Japanese | |
| Australasian | |
| Other | |

**2.2.6** How many offices/own branches does your firm have inside the UK:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total | None | | 1-3 | | 4-9 | | 10-19 | | 20-49 | |
| | 50-99 | | 100-199 | | 200-499 | | 500+ | | | |
| Southeast | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Midlands | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Wales | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Scotland | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |

2.2.7 How many offices/own branches does your firm have outside of the UK:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| | 50-99 | | 100-199 | | 200-499 | | 500+ | | | |
| Europe | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| N America | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Japan | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Australasia | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |

**2.2.8** How many firms are there in your industry i.e. companies with whom you compete, or who offer similar products/services?

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Just us | | 2-5 | | 6-10 | | 10-20 | | 20-50 | | 50-100 | | 100+ | |

**2.2.9** Is your firm big, medium or small compared to the other firms in the industry?

| Big | | Medium | | Small | |
|---|---|---|---|---|---|

**2.2.10** Are the two other firms closest in size to yours:

| | | |
|---|---|---|
| Much bigger | (more than twice your turnover) | |
| Much the same size | (same turnover roughly) | |
| Much smaller | (less than half your turnover) | |

**2.2.11** How many new products/services did your company launch in 1988? Was this more or less than in 1987?

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1988: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |
| 1987: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |

**2.2.12** How many new branches did your company open and close in 1988? Was this more or less than in 1987?

Branches opened:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1988: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |
| 1987: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |

Branches closed:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1988: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |
| 1987: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |

**2.2.13** Did you acquire any other firm/s in 1988? If so, how many and what size turnover were they?

| Number of firms acquired | None | | 1-5 | | 5-10 | | 10-20 | |
|---|---|---|---|---|---|---|---|---|
| Average size (pds million turnover) | <10 | | 11-50 | | 51-100 | | 100+ | |

**2.2.14** Was your firm acquired by another firm in the last five years?

| Yes | | No | |
|---|---|---|---|

**2.2.15** What was your firm's capital expenditure in 1988 (in pounds million)?

| None | | 1-3 | | 4-9 | | 10-19 | | 20-49 | |
|---|---|---|---|---|---|---|---|---|---|
| 50-99 | | 100-199 | | 200-499 | | 500+ | | | |

**2.2.16** What was your firm's research and development budget in 1988 (in pounds million)?

| None | | 1-3 | | 4-9 | | 10-19 | | 20-49 | |
|---|---|---|---|---|---|---|---|---|---|
| 50-99 | | 100-199 | | 200-499 | | 500+ | | | |

# Questionnaire: Part B Divisional/Strategic Business Unit Profile

Please return this Questionnaire when completed to:

**Turn Over the Page for Instructions**

## 3.1 DIVISIONAL/STRATEGIC BUSINESS UNIT PROFILE

**EXPLANATORY NOTES:**

- THE "DIVISION/STRATEGIC BUSINESS UNIT" REFERRED TO IS THE ONE UPON WHICH INFORMATION SYSTEMS HAVE THE GREATEST IMPACT IN YOUR CORPORATION.

- THIS IS THE BUSINESS UNIT/DIVISION FOR WHICH YOU WILL BE SENDING PART S C AND D TO THE CHIEF EXECUTIVE OFFICER AND HEAD OF INFORMATION SYSTEMS FOR COMPLETION.

- A STRATEGIC BUSINESS UNIT HAS CLEARLY DEFINABLE PRODUCT/MARKET BOUNDARIES, OR IS BASED OROUND A SPECIFIC TECHNOLOGY. SBU'S ARE NORMALLY TERMED "DIVISIONS" IN THE UNITED KINGDOM.

The questions set out in this section are based in part upon the Profit Imapct of Market Strategy (PIMS) database of the Strategic Planning Institute. The answers to thes questions will allow us to compare the division/strategic business unit to the "average" firm in the PMS database, as well as to classify this division according to the categories defined in the research on which this survey is based.

If figures are not available to provide answers for each product/service area, take an educated guess or score the division/SBU as a whole.

The findings in this section will then be matched against the replies of the divisional/SBU CEO and head of information systems (in Parts C and D.) This exercise will then yield a match/mismatch diagnosis of your strategic planning and information systems planning processes and your business type.

## 3.1 STRATEGIC POSITION OF THE DIVISION/STRATEGIC BUSINESS UNIT

### MARKET CHARACTERISTICS

**3.1.1.** Which industry/industries does the division/strategic business unit operate in (at least ten percent of your turnover should be the cut-off point to tick an industry):

| | |
|---|---|
| Construction, mining, agriculture | |
| Utilities (electricity, gas, water, communications, heating) | |
| Health, Education | |
| Entertainment (incl. recreation, hotels) | |
| Banking, Finance, Insurance | |
| Professional Services (e.g. real estate, business services, consultancy, legal and DP services) | |
| Continuous Manufacturing (e.g. oil, steel) | |
| Batch Manufacturing (e.g. vehicles, machinery) | |
| Transport and Storage | |
| Wholesale and Retail | |

**3.1.2** How many discrete products/services are offered in this division/SBU, and what are they?

| | Brief description of main activity |
|---|---|
| PRODUCT/SERVICE AREA 1 | |
| PRODUCT/SERVICE AREA 2 | |
| PRODUCT/SERVICE AREA 3 | |
| PRODUCT/SERVICE AREA 4 | |
| PRODUCT/SERVICE AREA 5 | |
| DIVISION/SBU AS A WHOLE | |

**3.1.3** What is the (real) annual market growth rate (in percentage terms), for the markets in which this division/SBU operates. (Circle the appropriate answers):

| | - DECLINE | | | 0 STATIC | | | + GROWTH | | |
|---|---|---|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | -20 | -10 | 0 | 5 | 10 | 20 | 30 | 40 | 50+ |
| PRODUCT/SERVICE AREA 2 | -20 | -10 | 0 | 5 | 10 | 20 | 30 | 40 | 50+ |
| PRODUCT/SERVICE AREA 3 | -20 | -10 | 0 | 5 | 10 | 20 | 30 | 40 | 50+ |
| PRODUCT/SERVICE AREA 4 | -20 | -10 | 0 | 5 | 10 | 20 | 30 | 40 | 50+ |
| PRODUCT/SERVICE AREA 5 | -20 | -10 | 0 | 5 | 10 | 20 | 30 | 40 | 50+ |
| DIVISION/SBU AS A WHOLE | -20 | -10 | 0 | 5 | 10 | 20 | 30 | 40 | 50+ |

**3.1.4** What is the level of customer power over the division/strategic business unit - as measured by:

The number of immediate customers which make up 50% of your sales? (Circle the appropriate answers)

| | Number of immediate customers | | | | | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 2 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 3 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 4 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 5 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| DIVISION/SBU AS A WHOLE | 5 | 10 | 100 | 1000 | 5000 | 10000+ |

The absolute size of the average customer purchase in pounds sterling?

| | SMALL | | MEDIUM | | | LARGE |
|---|---|---|---|---|---|---|
| | POUNDS STERLING | | | | | |
| PRODUCT/SERVICE AREA 1 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 2 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 3 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 4 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| PRODUCT/SERVICE AREA 5 | 5 | 10 | 100 | 1000 | 5000 | 10000+ |
| DIVISION/SBU AS A WHOLE | 5 | 10 | 100 | 1000 | 5000 | 10000+ |

**3.1.5** What is the level of complexity of distribution of your customers in each of the product/services areas, as measured by the ratio of your marketing expenditure to your revenue in percentage terms?

| | COMPLEX | | AVERAGE | | | SIMPLE |
|---|---|---|---|---|---|---|
| | Percentage marketing/sales | | | | | |
| PRODUCT/SERVICE AREA 1 | 75 | 60 | 45 | 30 | 15 | 5 |
| PRODUCT/SERVICE AREA 2 | 75 | 60 | 45 | 30 | 15 | 5 |
| PRODUCT/SERVICE AREA 3 | 75 | 60 | 45 | 30 | 15 | 5 |
| PRODUCT/SERVICE AREA 4 | 75 | 60 | 45 | 30 | 15 | 5 |
| PRODUCT/SERVICE AREA 5 | 75 | 60 | 45 | 30 | 15 | 5 |
| DIVISION/SBU AS A WHOLE | 75 | 60 | 45 | 30 | 15 | 5 |

**3.1.6** What is the rate of innovation in each product/service area, as measured by the percentage of revenue derived from new product sales?

| | RAPID | | | MODERATE | | NONE |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 100 | 80 | 60 | 40 | 20 | 0 |
| PRODUCT/SERVICE AREA 2 | 100 | 80 | 60 | 40 | 20 | 0 |
| PRODUCT/SERVICE AREA 3 | 100 | 80 | 60 | 40 | 20 | 0 |
| PRODUCT/SERVICE AREA 4 | 100 | 80 | 60 | 40 | 20 | 0 |
| PRODUCT/SERVICE AREA 5 | 100 | 80 | 60 | 40 | 20 | 0 |
| DIVISION/SBU AS A WHOLE | 100 | 80 | 60 | 40 | 20 | 0 |

**3.1.7** How concentrated is your industry, as measured by the combined turnover of the four largest companies in your industry divided by the total industry size?

| | FRAGMENTED | | | | | CONCENTRATED | |
|---|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 2 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 3 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 4 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| DIVISION/SBU AS A WHOLE | 10 | 20 | 30 | 40 | 60 | 80 | 100 |

## COMPETITIVE POSITION

**3.1.8** What is the percentage market share of each product/service area?

| | LOW | | | MEDIUM | | | | HIGH | |
|---|---|---|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 2 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 3 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 4 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 5 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| DIVISION/SBU AS A WHOLE | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |

**3.1.9** What is the relative market share of each product/service area, as measured by your market share divided by the combined share of your three largest competitors?

| | LOW | | | MEDIUM | | | | HIGH | |
|---|---|---|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 2 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 3 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 4 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 5 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| DIVISION/SBU AS A WHOLE | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |

**3.1.10** How would you rate the value for money (relative quality versus relative price) of each product/service area, as measured against competitors in each area.

| | INFERIOR | | | OK | | SUPERIOR | |
|---|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| PRODUCT/SERVICE AREA 2 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| PRODUCT/SERVICE AREA 3 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| PRODUCT/SERVICE AREA 4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| PRODUCT/SERVICE AREA 5 | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| DIVISION/SBU AS A WHOLE | -3 | -2 | -1 | 0 | 1 | 2 | 3 |

**3.1.11** Are their entry barriers in any of the product/service areas? If so, how strong are they? (A patent or high initial capital requirements provide very strong barriers, for example)

| | NONE | | SOME | | STRONG | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 2 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 3 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 4 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| DIVISION/SBU AS A WHOLE | 0 | 1 | 2 | 3 | 4 | 5 |

**3.1.12** How focussed are each of the product/service areas on any particular customer group/segment of the market? In other words, how concentrated are the clients into particular segments?

| | SCATTERED | | | | FOCUSSED | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 2 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 3 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 4 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| DIVISION/SBU AS A WHOLE | 0 | 1 | 2 | 3 | 4 | 5 |

## CAPITAL AND PRODUCTION STRUCTURE

**3.1.13** How capital intensive are each of the product/service areas, measured by dividing net fixed assets plus working capital (at net book value) by revenue?

| | HEAVY | | | | LIGHT | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 2 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 3 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 4 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| DIVISION/SBU AS A WHOLE | 0 | 1 | 2 | 3 | 4 | 5 |

**3.1.14** What is the fixed capital intensity of each product/service area, as measured by dividing the gross book value of fixed assets by revenue?

| | FIXED | | | WORKING | | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 2 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 3 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 4 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| DIVISION/SBU AS A WHOLE | 0 | 1 | 2 | 3 | 4 | 5 |

**3.1.15** What is the operating effectiveness of each area, as measured by value-added per employee (net income plus capital costs plus employee costs divided by number of employees). This is a relative measure - compare each area to the other areas.

| | LOW | | | HIGH | | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 2 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 3 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 4 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| DIVISION/SBU AS A WHOLE | 0 | 1 | 2 | 3 | 4 | 5 |

**3.1.16** What was the average percentage capacity utilisation for each area during the last financial year.

| | LOW | | | MEDIUM | | | | HIGH | |
|---|---|---|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 2 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 3 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 4 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| PRODUCT/SERVICE AREA 5 | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |
| DIVISION/SBU AS A WHOLE | 0 | 5 | 10 | 20 | 30 | 40 | 60 | 80 | 100 |

**3.1.17** What was the value added in each area in the last financial year (net income plus capital costs per employee costs divided by revenue)? This is a relative measure - compare each area to the other areas.

| | LOW | | | | HIGH | |
|---|---|---|---|---|---|---|
| PRODUCT/SERVICE AREA 1 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 2 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 3 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 4 | 0 | 1 | 2 | 3 | 4 | 5 |
| PRODUCT/SERVICE AREA 5 | 0 | 1 | 2 | 3 | 4 | 5 |
| DIVISION/SBU AS A WHOLE | 0 | 1 | 2 | 3 | 4 | 5 |

## 3.2 PROFILE OF THE DIVISION/STRATEGIC BUSINESS UNIT

**3.2.1** What was the turnover in million pounds sterling of your organization five years ago, last year and in the most recent financial year:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1982: | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | 1000+ | |
| 1987: | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | 1000+ | |
| 1988: | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | 1000+ | |

**3.2.2.** How many thousand employees work in your firm now; last year; five years ago?

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1982: | <1 | | 1-2 | | 3-5 | | 6-10 | | 11-20 | |
| | 21-50 | | 50-100 | | >100 | | | | | |
| 1987: | <1 | | 1-2 | | 3-5 | | 6-10 | | 11-20 | |
| | 21-50 | | 50-100 | | >100 | | | | | |
| 1988: | <1 | | 1-2 | | 3-5 | | 6-10 | | 11-20 | |
| | 21-50 | | 50-100 | | >100 | | | | | |

**3.2.3.** What is the size and nationality of the centre of the division/strategic business unit

**3.2.2.1** Size (estimated number of employees)

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| <10 | | 10-49 | | 50-99 | | 100-199 | | 200-499 | | 500-1000 | | 1000+ | |

**3.2.3.2** Nationality

| | |
|---|---|
| British | |
| European | |
| American | |
| Japanese | |
| Australasian | |
| Other | |

**3.2.4** How many offices/own branches does the division/strategic business unit have inside the UK:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total | None | | 1-3 | | 4-9 | | 10-19 | | 20-49 | |
| | 50-99 | | 100-199 | | 200-499 | | 500+ | | | |
| Southeast | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Midlands | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Wales | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Scotland | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |

**3.2.5** How many offices/own branches does your division/strategic business unit have outside of the UK:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Total | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| | 50-99 | | 100-199 | | 200-499 | | 500+ | | | |
| Europe | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| N America | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Japan | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |
| Australasia | None | | 1-3 | | 4-9 | | 10-19 | | 20+ | |

**3.2.6** How many firms are there in your industry i.e. companies with whom you compete, or who offer similar products/services?

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Just us | | 2-5 | | 6-10 | | 10-20 | | 20-50 | | 50-100 | | 100+ | |

**3.2.7** Is your firm big, medium or small compared to the other firms in the industry?

| | | | | | |
|---|---|---|---|---|---|
| Big | | Medium | | Small | |

**3.2.8** Are the two other firms closest in size to yours:

| | | |
|---|---|---|
| Much bigger | (more than twice your turnover) | |
| Much the same size | (same turnover roughly) | |
| Much smaller | (less than half your turnover) | |

**3.2.9** How many new products/services did the SBU launch in 1988? Was this more or less than in 1987?

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1988: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |
| 1987: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |

**3.2.10** How many new branches did your company open and close in 1988? Was this more or less than in 1987?

Branches opened:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1988: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |
| 1987: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |

Branches closed:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1988: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |
| 1987: | None | | 1-5 | | 5-10 | | 10-20 | | 20+ | |

**3.2.11** Did the SBU acquire any other firm/s in 1988? If so, how many and what size turnover were they?

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Number of firms acquired | None | | 1-5 | | 5-10 | | 10-20 | |
| Average size (pds million turnover) | <10 | | 11-50 | | 51-100 | | 100+ | |

**3.2.12** Was division/strategic business unit acquired by another firm in the last five years?

| | | | |
|---|---|---|---|
| Yes | | No | |

**3.2.13** What was the division/strategic business unit's capital expenditure in 1988 (in pounds million)?

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| None | | 1-3 | | 4-9 | | 10-19 | | 20-49 | |
| 50-99 | | 100-199 | | 200-499 | | 500+ | | | |

**3.2.14** What was the division/strategic business unit's research and development budget in 1988 (in pounds million)?

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| None | | 1-3 | | 4-9 | | 10-19 | | 20-49 | |
| 50-99 | | 100-199 | | 200-499 | | 500+ | | | |

**NOW SEND SECTIONS C AND D FOR COMPLETION TO THE CHIEF EXECUTIVE OFFICER AND HEAD OF INFORMATION SYSTEMS FOR THE DIVISION/ STRATEGIC BUSINESS UNIT**

# APPENDIX F : VARIABLE LISTING

# MISSION CRITICAL VARIABLES

## APPENDIX F: MISSION CRITICAL VARIABLE LISTING

**i. People**

Leadership

Good Management

Integrity/Ethics

Bias For Action

Involvement

Entrepreneurial

Selection/Evaluation

Appropriate Culture

**ii. Organisational Configuration**

Decentralisation

Flatness

Appropriate Structure

**iii. Organisational Characteristics**

Service: Speed

Service: Quality

Innovation

Customer Orientation

Value-driven

High Relative Quality

**iv. Products/Markets**

Core Competence Focus

Diversification

Good Marketing Management

Opportunity Identification

High Relative Market Share

Globalisation

High Industry/Market Growth Rate

Level Of Industry Concentration

Rate Of Market/Industry Innovation

Customer Power

Logistical Complexity

**v. Operating Structure**

Investment Intensity

Fixed/Liquid Asset Ratios

High Capacity Utilisation

High Productivity

**vi. Control Systems**

Effective Financial Controls

Tightly Controlled Costs

Good Information & Control Systems

Effective Strategic Controls

Effective Formal Planning Systems

Effective Strategy Formation Process

Loose/Tight Properties

Management Style/Control System Match

# APPENDIX G : TECHNOLOGIES FOR MANAGEMENT SYSTEMS

## APPENDIX G: LISTING OF SUB-VARIABLES INCORPORATED IN "TECHNOLOGIES FOR MANAGEMENT SYSTEMS" VARIABLE

The variables used for the "T" measure are grouped into several categories and sub-categories:

### A. IS/IT INFRASTRUCTURE- RELATIVE SCALE, CENTRALISATION AND MATURITY RATING:

i. centralisation

- central control of IS/IT in organisation
- ratio of central IS staff to IS staff in units
- ratio of terminals/PC's in centre to terminals/PC's in units

ii. scale relative to the business

- IS/IT spend as % of turnover
- IS/IT staff as % of total staff
- ratio of telecommunications spend to value-added
- ratio of terminals/PC's to total staff
- processing power (in MIPS) as a % of added value

iii. technical maturity

- facilities management as a % of total computing resource
- ratio of intelligent (including PC's) to dumb terminals
- number of local and wide area networks in use

- extent of EDI use
- number of expert systems/AI applications
- applications developed with fourth generation languages and IPSE's as a % of total applications portfolio

## B. APPLICATIONS PORTFOLIO SCALE AND PACKAGE TO IN-HOUSE

i. total man-months in both package and in-house applications

ii. ratio of package software applications to in-house developed applications

## C. BUSINESS PLANNING EFFECTIVENESS RATING

i. business planning process effectiveness rating

- management rating of own planning system effectiveness

ii. planning process decentralisation

- ratio of plan content produced by units to plan content produced by centre
- ratio of planning staff in units to planning staff in centre
- management rating of planning process as bottom-up to top-down

iii. plan structure and content comprehensiveness

- planning horizon (number of years)
- number of plan elements used in planning approach(14 possible elements such as situation analysis, mission, financial projections and so on)
- level of coverage of ten functional areas by plan, such as human resources, production and so on
- consistency of planning approach across organisation

iv. planning process frequency and depth

- frequency with which long-range plan prepared
- number of levels of management involved in plan preparation
- frequency of business planning meetings involving centre and units
- frequency of review of plan actions, strategies and objectives

**D. INFORMATION SYSTEMS PLANNING EFFECTIVENESS RATING**

i. use of ISP and managerial perceptions of its effectiveness

ii. ISP frequency and review

- frequency of ISP exercises

- frequency of review of ISP

- frequency of departures from plan

- number of plan departures sanctioned by review process

iii. ISP and business planning integration

- nature of coupling between ISP and business planning

- closeness of ISP/business planning integration

iv. ISP expertise and team size

v. time horizon for ISP plus inverse of duration of elapsed time for ISP exercise

**E. INFORMATION SYSTEMS BENEFIT ASSESSMENT**

i. Marketing

-better customer service

- more flexible logistics

-faster, lower cost logistics

-more convenient customer channels

-better logistics support

- higher rate of innovation

ii. Production

- better quality products/processes

- high capacity utilisation

- more flexible production system

- lower lead times for design

iii. Management/Administration

- improved financial control
- tightly controlled costs
- operating cost reductions
- adminstrative cost reductions
- better planning
- improved strategic control
- greater management productivity
- high quality strategies

iv. Organisation

- more responsive organisation
- better intra-firm communications
- more flexible organisation
- flatter organisation
- greater autonomy for operating units
- a more entrepreneurial firm

# APPENDIX H : COMPANY FINANCIAL PROFILES

| THE ROLE OF INFORMATION SYSTEMS IN ORGANISATIONAL PERFORMANCE | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FINANCIAL PROFILES OF 24 RESPONDENTS FOR FINANCIAL YEAR ENDING 1989 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| RESPONDENT | FINANCIAL SUMMARY | | | | | | | | | | | KEY BUSINESS RATIOS | | | | |
| | £k | £k | | £k | £k | FIVE YEAR GROWTH RATIOS | | | | | | PROFITABILITY RATIOS % | | | | |
| | | | | | Share | | | | | | | Return on: | | | | Pre Tax |
| | Turnover | Pre Tax | Number of | Value- | holders | Turnover | Pre-Tax | Total | Capital | Employees | | | Total | Sharehldr | | Profit |
| | | Profits | Employees | added | Funds | | Profits | Assets | Employed | Remun | Nos | Capital | Assets | Funds | | Margin |
| BBA Automotive | 314700 | 21000 | 6497 | 120416 | 86400 | 20 | 311 | N/A | -34 | 6 | -21 | 22 | 9 | 24 | | 7 |
| BIS Banking Systems | 21719 | 3913 | 232 | 10684 | 5860 | 276 | 527 | N/A | 1032 | 212 | 111 | 66 | 30 | 67 | | 18 |
| Bull HN | 225210 | -1300 | 2761 | 29408 | 24958 | | | | | | | | | | | |
| BUPA HI | 742289 | 7152 | 6352 | 107833 | 302901 | 106 | -58 | N/A | 21 | 200 | 122 | 2 | 1 | 2 | | 1 |
| CAA | 300964 | 6281 | 6477 | 250000 | 180000 | | | | | | | | | | | |
| Enterprise Oil | 337100 | 148800 | 374 | 161511 | 548600 | 26 | 33 | N/A | 208 | 379 | 243 | 9 | 8 | 27 | | 44 |
| Extel | 32098 | 3719 | 711 | 20765 | 69 | N/A | 126 | N/A | 3768 | N/A | N/A | 148 | 14 | 5390 | | 12 |
| Friends Provident | 976000 | 608000 | 2637 | 608000 | 633000 | 152 | 121 | N/A | 267 | 166 | 80 | 7 | 7 | N A | | 62 |
| HSMB | 350000 | -59800 | 10000 | -60000 | 261200 | N/A | N/A | N/A | 271 | N/A | N/A | 9 | -1 | -14 | | N/A |
| ICI C&P | 4672000 | 560000 | 35470 | 1354880 | | | | | | | | | | | | |
| ICI Fibres | 696000 | 25000 | 8700 | 208800 | | | | | | | | | | | | |
| Lloyds Register | 188000 | 98000 | 3019 | 98000 | | | | | | | | | | | | |
| Prudential Assurance | 3077300 | 304000 | 13597 | 1169374 | 371800 | 75 | 229 | N/A | 74 | N/A | N/A | 1 | 1 | 82 | | 10 |
| Rank Xerox | 445307 | 182 | 4437 | 123630 | 167379 | 54 | -98 | N/A | -14 | 53 | 2 | 0 | 0 | 0 | | 0 |
| Rover Group | 3430000 | 167000 | 40000 | 788900 | 1572300 | -8 | 0 | N/A | 36 | -99 | -99 | 12 | 8 | 12 | | N/A |
| Sainsburys | 5915100 | 375100 | 88283 | 600000 | 1106443 | | | | | | | | | | | |
| Shorts Aviation | 218505 | -353712 | 7837 | -194375 | -529384 | 8 | N/A | N/A | N/A | 57 | 18 | N/A | -109 | N/A | | -162 |
| Southern Water | 225800 | 60100 | 2790 | 143790 | 677000 | N/A | N/A | N/A | N/A | N/A | N/A | 9 | 8 | 9 | | 27 |
| TSB Bank | 1476000 | 76000 | 25885 | 549060 | 1812000 | N/A | -37 | N/A | 258 | N/A | N/A | 3 | 0 | 4 | | N/A |
| TWIL | 80460 | 4667 | 1153 | 23117 | 1957 | 15 | 2 | N/A | -11 | 23 | -10 | 23 | 11 | 239 | | 6 |
| Wedgwood- Josiah | 148910 | 14488 | 6279 | 85623 | 32771 | 43 | 5 | N/A | 57 | 41 | 3 | 31 | 13 | 44 | | 10 |
| Watson & Philip | 252835 | 5019 | 1552 | 19295 | 15878 | 72 | 209 | N/A | 134 | 122 | 75 | 30 | 10 | 32 | | 2 |
| Welsh Water | 219600 | 46000 | 4133 | 164700 | 781000 | | | | | | | | | | | |
| WH Smith | 1940500 | 99200 | 34842 | 851140 | 281000 | | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | VALUE-ADDED RATIOS | | | |
| REVENUE RATIOS | | | GEARING RATIOS | | | PRODUCTIVITY RATIOS | | | | | | | | |
| Turnover /Total Assets % | Turnover /Fixed Assets | Working Capital/ Turnover% | Total Debt/Net Worth % | Long-term Debt/Net Worth % | Interest /Pre-int Profit % | Wages/ Turnover % | Profit/ Employee | Turnover Employee | Capital Employed /Employee | Total Assets/ Employee | Profit /Value-added % | Value-added/ Turnover% | Value-added/ Employee | Value-added /Empl Remun |
| 141 | 5 | 7 | 69 | 9 | 23 | 24 | 3232 | 48438 | 14653 | 34431 | 17 | 38 | 18534 | 2 |
| 164 | 1551 | 27 | 41 | 0 | 7 | 28 | 16866 | 93616 | 25491 | 57086 | 37 | 49 | 46056 | 2 |
| 94 | 2 | -53 | 46 | 0 | 53 | 9 | 1126 | 116859 | 48100 | 124057 | 7 | 15 | 16976 | 2 |
| 19 | 0 | 214 | 122 | 121 | 20 | 3 | 397861 | 901337 | N/A | N/A | 92 | 48 | 431848 | 16 |
| 124 | 2 | -47 | -580 | -10 | 3 | 39 | 5231 | 45145 | 3526 | 36418 | 18 | 65 | 29207 | 2 |
| 12 | N/A | 56 | N/A | N/A | N/A | 4 | 230565 | 370118 | N/A | N/A | N/A | N/A | N A | N/A |
| N/A | N/A | N/A | 1842 | 63 | -64 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 11 | 94 | 18 | 132 | 16 | 0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N A |
| 182 | 8 | 26 | 20 | 0 | 85 | 20 | 41 | 100362 | 38579 | 55112 | 0 | 28 | 27864 | 1 |
| 0 | 0 | N/A | 45 | 0 | 11 | N/A | N/A | 0 | N/A | N/A | -23 | N/A | 13034215 | -530 |
| 67 | 3 | -121 | N/A | N/A | -14 | 45 | -45134 | 27881 | -23507 | 41385 | 182 | 89 | 24802 | 2 |
| 29 | 0 | -11 | 1 | 0 | 25 | 17 | 21541 | 80932 | 244229 | 280717 | 42 | 64 | 51538 | 4 |
| N/A | N/A | N/A | 38 | 20 | 32 | N/A | 2936 | N/A | 94843 | 968785 | 14 | N/A | 21212 | 2 |
| 189 | 5 | 7 | 1168 | 914 | 14 | 18 | 4048 | 69783 | 17649 | 36943 | 20 | 29 | 20050 | 2 |
| 130 | 3 | 1 | 162 | 42 | 10 | 40 | 2307 | 23716 | 7390 | 18215 | 17 | 58 | 13637 | 1 |
| 520 | 15 | 0 | 15 | 6 | 8 | 4 | 3234 | 162909 | 10852 | 31312 | 26 | 8 | 12433 | 2 |

# APPENDIX I : DATA ANALYSIS AND STATISTICAL RESULTS

# Appendix I- Explanation of Statistical Appendices

**Appendix I1- ENFMOPTBR Cross Tabulation** (FNDGBIG1.XLS)
The cross-correlation between the normalised ENFMOPIT variables and the B (IS/IT benefits) and R (Return on Investment -PIMS par measure) is set out in this table. No cross correlation exceeds +1 or -1, demonstrating the statistical correctness of the analysis done on these variables.

**Appendix I2- Graph of ENFMOPITBR Cross Tabulation** (FNDGBIG1.XLC)
A radar graph of the table set out in Appendix I1.

**Appendix I3- Normalised Values of the ENFMOPIT Variables** (ENFMOPIT.XLS)
The normalised values of the ENFMOPIT variables together with the normalised 5 year profit growth, PIMS par ROI deviation and PIMS par productivity figures are set out for each participant in the research. The standard deviation of zero for the normalised scores is a test of the correctness of the normalisation procedure.

**Appendix I4- Multiple Regression Analysis of ENFMOPIT Variables** (ALGNMT2)
A multiple regression analysis of the alignment of the ENFMOPIT variables against both the PIMS par ROI and the PIMS par productivity measures is shown for the eighteen participants for whom accurate PIMS par ROI scores were available. The #NA message next to the R2, F-statistic and SS reg/res rows is a standard feature of Excel statistical calculations, indicating that the limit for multiple regression calculations for these measures is a maximum of two output variables.

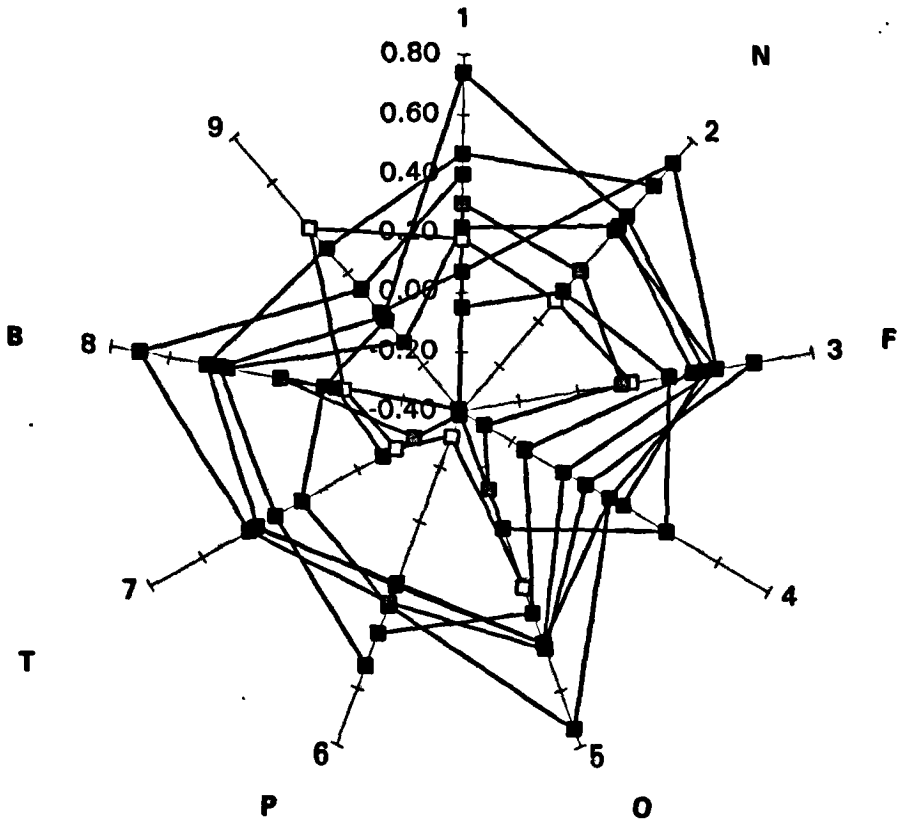
**Appendix I5- Correlation of Focus of Top Management's Mindset with other ENFMOPIT Variables** (FNDGI1.XLS)
**This table illustrates the way in which correlations for each of theENFMOPITBR variables were calculated. Individual correlations between pairs of the variables were run across the bottom row of the table, while below that are tests of combinations of variables using linear estimates (a form of multiple regression) to test for significant relationships between one variable and a group of other variables are shown.**

**Appendix I6- Original Questionnaire Inputs for ENFMOPI Variables**
The source data for the normalised scores used to calculate the normalised ENFMOPIT variables for purposes of alignment tests is shown here.

**Appendix I7- Original Questionnaire Inputs for T Variable**
The source data comprising over 400 raw input scores for calculation of the T score is shown here.

| ENFMOPTBR CROSS TABULATION | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | E | N | F | M | O | P | T | B | R |
| E | 1.00 | 0.40 | 0.47 | 0.18 | 0.74 | 0.30 | 0.22 | 0.07 | -0.01 |
| N | 0.40 | 1.00 | 0.60 | 0.09 | 0.45 | 0.29 | 0.42 | 0.70 | 0.13 |
| F | 0.47 | 0.60 | 1.00 | 0.18 | 0.43 | 0.23 | 0.39 | 0.47 | 0.31 |
| M | 0.18 | 0.09 | 0.18 | 1.00 | 0.23 | -0.31 | -0.15 | | 0.40 |
| O | 0.74 | 0.46 | 0.43 | 0.23 | 1.00 | 0.52 | 0.32 | 0.43 | 0.01 |
| P | 0.30 | 0.22 | 0.15 | -0.31 | -0.12 | 1.00 | -0.22 | 0.22 | -0.39 |
| T | 0.22 | 0.42 | 0.39 | -0.15 | 0.32 | 0.40 | 1.00 | 0.40 | -0.10 |
| B | 0.07 | 0.70 | 0.47 | | 0.43 | 0.22 | 0.40 | 1.00 | 0.03 |
| R | -0.05 | 0.13 | 0.31 | 0.40 | 0.02 | -0.39 | -0.10 | 0.03 | 1.00 |

## Cross Tabulation of Correlations between ENFMOPTBR Variables




- Environment Type
- Nature of Business
- Focus of Mindset
- Management Style
- Organisation Type
- Processes of Control
- Technologies for Mgt Systems
- Benefits of IS
- ROI Par PIMS Performance

| OVERALL ALIGNMENT | Environment | Nature | External vs | Management | Organisation | Process | Information | Technology | Info Systems | 5 YEAR | AVG | Relative | Deviation | Act/Par |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ENFMOPIT | Complex vs | of the | Internal | Style | Type | of Control | & | Score | Benefit | PRETAX | PROFIT | Profit | from Par | Productivity |
| VARIABLES | Stable | Business | Focus | (normalised) | (normalised) | (normalised) | Performance | (normalised) | (normalised) | PROFIT | GROWTH | Growth | ROI | (normalised) |
| | (normalised) | (normalised) | (normalised) | MOPIT | MOPIT | MOPIT | Measures | TTTRANK2 | ISBENFIT | GROWTH | | (normalised) | (normalised) | |
| | MOPIT | CONTPROF2 | MCVIELT1 | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| BBA Automotive | 0.7 | 0 2 | 0.1 | 1.1 | 1.1 | -0 5 | -0.9 | 0.1 | 1.1 | 311.0 | 77.8 | 1 5 | -0 2 | -0 1 |
| BIS Banking Systems | 0.7 | 0 2 | -0.7 | 1.5 | 0.1 | 0.1 | -1.1 | 0.1 | -1.3 | 527 0 | 131 8 | 2 9 | 0 1 | 0 4 |
| Bull HN | 0 7 | 0 3 | 1 5 | 0 3 | 1.1 | -0.1 | 0.6 | 0.1 | 0.6 | -11 0 | -2 8 | -0.7 | -0 4 | 0 8 |
| BUPA HI | 0 7 | | | 0.6 | 0.9 | -1.0 | 0.0 | -0.3 | | -58.0 | -14 5 | -1 0 | | |
| CAA | -2 0 | -0 3 | -0.9 | -0.5 | -2.0 | -0.7 | 1.0 | 0 0 | 0 0 | 120 6 | 30 2 | 0 2 | -0 6 | -0 1 |
| Enterprise Oil | 0.7 | 0.2 | -0 4 | 0 0 | 0.1 | 0.9 | -0.4 | -0.1 | -0.1 | 33 0 | 8 3 | -0 4 | 0 1 | -1.0 |
| Extel | 0.7 | 0.3 | 1.4 | 1.5 | 1.1 | -0.3 | -0.8 | 0.9 | 1.5 | 126 0 | 31.5 | 0 3 | 2 3 | 2 3 |
| Friends Provident | 0.7 | -0 1 | -0 8 | -1.6 | -0.7 | -1.4 | -1.8 | 0.1 | -0 8 | 121.0 | 30.3 | 0.2 | | |
| HSMB | 0 7 | | | -0.1 | 0.2 | 1.0 | 1.4 | -0.3 | | -40 0 | -10 0 | -0 9 | | |
| ICI C&P | 0.3 | -0 2 | -0.7 | 1.7 | 0.5 | -0.1 | 0.0 | -0.2 | -0.8 | -50.0 | -12 5 | -0 9 | 0 2 | 0 8 |
| ICI Fibres | -1 1 | 0 4 | 0.7 | -0.5 | -1.5 | -0.4 | -0.7 | -0.2 | 1.2 | -50 0 | -12 5 | -0 9 | -0 1 | 0 4 |
| Lloyds Register | 0 4 | 0 3 | 2 0 | -0.2 | -0.4 | 0.1 | 0.0 | 0.0 | -0.1 | 100 0 | 25 0 | 0 1 | | |
| Prudential Assurance | -0 2 | -0 5 | -0.4 | 0.0 | -0.6 | 0.3 | 2.0 | -0.4 | -1.4 | 229.0 | 57.3 | 0.9 | 0 0 | -1.0 |
| Rank Xerox | 0 7 | 0 3 | 1.0 | -0.5 | 1.1 | 1.7 | 0.1 | 0.0 | 1.7 | -98.0 | -24 5 | -1 2 | | |
| Rover | 0.7 | 0.3 | 1 4 | 0.3 | 1.2 | 2.1 | -0.6 | 0.0 | 1.7 | 300.0 | 75.0 | 1.4 | -0 1 | 1 8 |
| Sainsburys | -0 2 | -0.2 | 0.1 | -1.8 | -0.2 | -1.3 | 1.5 | -0.1 | -1.0 | 235 0 | 58.8 | 1.0 | 0 6 | -1 2 |
| Shorts | 0 7 | -0.1 | -1.1 | -1.7 | 0.6 | 1.8 | -0.8 | 0.6 | 0 2 | -2 3 | -0.6 | -0 6 | -3 2 | 0 8 |
| Southern Water | -2 0 | 0.0 | -1.8 | -0.4 | -1.4 | -1.1 | -0.7 | -0.3 | 0 0 | 20 0 | 5.0 | -0.5 | 0 2 | -1 1 |
| TSB Bank | -0 2 | 0 1 | 0 0 | -1.1 | 0.1 | -0.4 | 0.2 | 0.4 | 0 0 | -37 0 | -9 3 | -0 8 | | |
| TWIL | -2 0 | -0 5 | -0.8 | 0.4 | -2.3 | -1.2 | -0.4 | 0.1 | -1.3 | 2.0 | 0.5 | -0 6 | 0 0 | -0 3 |
| Watson & Philip | -0 2 | -0.1 | -0.8 | 0.4 | 0.5 | -0.3 | 0.1 | -0.4 | -0 3 | 209 0 | 52 3 | 0 8 | 0 5 | -0 5 |
| Wedgwood-Josiah | 0 7 | -0 2 | 0 6 | 1.4 | -0.4 | -0.7 | -0.8 | -0.9 | -1.1 | 5.0 | 1 3 | -0 6 | 0 4 | -0 3 |
| Welsh Water | -2.0 | -0 2 | -0.6 | -0.1 | 0.3 | 1.2 | 1.4 | 0.8 | 0.9 | 50 0 | 12 5 | -0 3 | 0 2 | -1 1 |
| WH Smith | 0 7 | -0.1 | 0.2 | -0.7 | 0.8 | 0.4 | 0.7 | 0.0 | -0.7 | 83.0 | 20 8 | 0 0 | -0 1 | -0 4 |
| | | | | | | | | | | | | | | |
| **Average** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | **0.0** | | **0.0** | **0.0** | **88.6** | **22.1** | **0.0** | **0.0** | **0.0** |
| **Std deviation** | **1.0** | **0.3** | **1.0** | **1.0** | **1.0** | **1.0** | | **0.4** | **1.0** | **149.6** | **37.4** | **1.0** | **1.0** | **1.0** |

| THE ROLE OF INFORMATION SYSTEMS IN ORGANISATIONAL PERFORMANCE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | |
| | OVERALL ALIGNMENT | Strategic vs | External vs | Environment: | Management | Organisation | Process | Technology | Info Systems | Deviation | Act/Par |
| | | Operational | Internal | Complex vs | Style | Type | of Control | Score | Benefit | from Par | Productivity |
| | | Alignment | Focus | Stable | (normalised) | (normalised) | (normalised) | (normalised) | (normalised) | ROI | (normalised) |
| | | (normalised) | (normalised) | (normalised) | MOPIT | MOPIT | MOPIT | TTTRANK2 | ISBENFIT | (normalised) | |
| | | CONTPROF2 | MCVIELT1 | MOPIT | | | | | | | |
| | | | | | | | | | | | |
| 1 | BBA Automotive | 0.2 | 0.1 | 0.7 | 1.1 | 1.1 | -0.5 | 0.1 | 1.1 | -0.2 | -0.1 |
| 2 | BIS Banking Systems | 0.2 | -0.7 | 0.7 | 1.5 | 0.1 | 0.1 | 0.1 | -1.3 | 0.1 | 0.4 |
| 3 | Bull HN | 0.3 | 1.5 | 0.7 | 0.3 | 1.1 | -0.1 | 0.1 | 0.6 | -0.4 | 0.8 |
| 4 | CAA | -0.3 | -0.9 | -2.0 | -0.5 | -2.0 | -0.7 | 0.0 | 0.0 | -0.6 | 0.1 |
| 5 | Enterprise Oil | 0.2 | -0.4 | 0.7 | 0.0 | 0.1 | 0.9 | -0.1 | 0 1 | 0 1 | 1.0 |
| 6 | Extel | 0.3 | 1.4 | 0.7 | 1.5 | 1.1 | -0.3 | 0.9 | 1.5 | 2.3 | 2.3 |
| 7 | ICI C&P | -0.2 | -0.7 | 0.3 | 1.7 | 0.5 | -0.1 | -0.2 | -0.8 | 0.2 | 0.8 |
| 8 | ICI Fibres | 0.4 | 0.7 | -1.1 | -0.5 | -1.5 | -0.4 | -0.2 | 1.2 | -0.1 | 0.4 |
| 9 | Prudential Assurance | -0.5 | -0.4 | -0.2 | 0.0 | -0.6 | 0.3 | -0.4 | -1.4 | 0.0 | -1.0 |
| 10 | Rover | 0.3 | 1.4 | 0.7 | 0.3 | 1.2 | 2.1 | 0.0 | 1.7 | -0.1 | 1.8 |
| 11 | Sainsburys | -0.2 | 0.1 | -0.2 | -1.8 | -0.2 | -1.3 | -0.1 | -1.0 | 0.6 | -1.2 |
| 12 | Shorts | -0.1 | -1.1 | 0.7 | -1.7 | 0.6 | 1.8 | 0.6 | 0.2 | 3.2 | 0.8 |
| 13 | Southern Water | 0.0 | -1.8 | -2.0 | -0.4 | -1.4 | -1.1 | -0.3 | 0.0 | 0.2 | -1.1 |
| 14 | TWIL | -0.5 | -0.8 | -2.0 | 0.4 | -2.3 | -1.2 | 0.1 | -1.3 | 0.0 | -0.3 |
| 15 | Watson & Philip | -0.1 | -0.8 | -0.2 | 0.4 | 0.5 | -0.3 | -0.4 | -0.3 | 0.5 | -0.5 |
| 16 | Wedgwood-Josiah | -0.2 | 0.6 | 0.7 | 1.4 | -0.4 | -0.7 | -0.9 | -1.1 | 0 4 | -0.3 |
| 17 | Welsh Water | -0.2 | -0.6 | -2.0 | -0.1 | 0.3 | 1.2 | 0.8 | 0.9 | 0.2 | 1.1 |
| 18 | WH Smith | -0.1 | 0.2 | 0.7 | -0.7 | 0.8 | 0.4 | 0.0 | -0.7 | -0.1 | -0.4 |
| | | | | | | | | | | | |
| | Mult Reg Dev Par | -0.42 | 0.03 | -0.40 | 0.56 | 0.39 | -0.77 | 0.58 | 0.79 | -0.08 | |
| | Std error | 0.45 | 0.62 | 0.29 | 0.42 | 0.21 | 0.47 | 0.32 | 1.33 | 0.21 | |
| | R2 | 0.63 | 0.83 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |
| | F-statistic | 1.95 | 9.00 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |
| | SS reg/res | 10.78 | 6.22 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |
| | | | | | | | | | | | |
| | Mult Reg Act/par Prod | 0.49 | 0.98 | 0.08 | -0.62 | 0.34 | 0.71 | 0.19 | -0.32 | 0.05 | |
| | Std error | 0.41 | 0.57 | 0.26 | 0.39 | 0.20 | 0.43 | 0.29 | 1.21 | 0.19 | |
| | R2 | 0.69 | 0.76 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |
| | F-statistic | 2.55 | 9.00 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N A | |
| | SS reg/res | 11.80 | 5.20 | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |
| | | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | #N/A | |

| | FNERBOTPM | MCV Focus | Nat Bus | Environment | PAR score | IS Benefits | Organisation | TechMgtSys | ProcCtrl | Mgt Style |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Southern Water | -1.8 | 0.0 | -2.0 | 0.2 | 0.0 | -1.4 | -0.4 | -1.1 | -0.4 |
| 2 | Shorts | -1.1 | -0.1 | 0.7 | -3.2 | 0.2 | 0.6 | 0.5 | 1 8 | -1.7 |
| 3 | CAA | -0.9 | -0.3 | -2.0 | -0.6 | 0.0 | -2.0 | 0.0 | -0.7 | 0.5 |
| 4 | TWIL | -0 8 | -0.5 | -2.0 | 0 | -1.3 | -2.3 | -0.6 | -1.2 | 0.4 |
| 5 | Friends Provident | -0.8 | -0.1 | 0.7 | 0.5 | -0.8 | -0.7 | 0.1 | -1.4 | -1.6 |
| 6 | Watson & Philip | -0.8 | -0.1 | -0.2 | 0.0 | -0.3 | 0.5 | -0.9 | -0.3 | 0.4 |
| 7 | ICI C&P | -0.7 | -0.2 | 0.3 | 0.2 | -0.8 | 0.5 | -0.6 | -0.1 | 1.7 |
| 8 | BIS Banking Systems | -0.7 | 0.2 | 0.7 | 0.1 | -1.3 | 0.1 | 0.1 | 0.1 | 1.5 |
| 9 | Welsh Water | -0.6 | -0.2 | -2.0 | 0.2 | 0.9 | 0.3 | 0.0 | 1.2 | -0.1 |
| 10 | Prudential Assurance | -0.4 | -0.5 | -0.2 | 0.0 | -1.4 | -0.6 | -0.4 | 0.3 | 0.0 |
| 11 | Enterprise Oil | 0 4 | 0.2 | 0.7 | 0.1 | -0.1 | 0.1 | -0.3 | 0.9 | 0.0 |
| 12 | TSB Bank | 0.0 | 0.1 | -0.2 | 0.0 | 0.0 | 0.1 | 1.0 | -0.4 | -1.1 |
| 13 | BUPA HI | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.9 | -0.7 | -1.0 | 0.6 |
| 14 | HSMB | 0.0 | 0.0 | 0.7 | 0.0 | 0.0 | 0.2 | -0.6 | 1.0 | -0.1 |
| 15 | BBA Automotive | 0.1 | 0.2 | 0.7 | -0.2 | 1.1 | 1.1 | -0.7 | -0.5 | 1.1 |
| 16 | Sainsburys | 0.1 | -0.2 | -0.2 | 0.6 | -1.0 | -0.2 | -0.7 | -1.3 | -1.8 |
| 17 | WH Smith | 0.2 | -0.1 | 0.7 | -0.1 | -0.7 | 0.8 | -0.4 | 0.4 | -0.7 |
| 18 | Wedgwood Josiah | 0.6 | -0.2 | 0.7 | 0.4 | -1.1 | -0.4 | -0.6 | -0.7 | 1.4 |
| 19 | ICI Fibres | 0.7 | 0.4 | -1.1 | -0.1 | 1.2 | -1.5 | -0.7 | -0.4 | -0.5 |
| 20 | Rank Xerox | 1.0 | 0.3 | 0.7 | 0.0 | 1.7 | 1.1 | 0.1 | 1.7 | -0.5 |
| 1 | Rover | 1.4 | 0.3 | 0.7 | -0.1 | 1.7 | 1.2 | 0.9 | 2.1 | 0.3 |
| 2 | Extel | 1.4 | 0.3 | 0.7 | 2.3 | 1.5 | 1.1 | 0.6 | -0.3 | 1.5 |
| 3 | Bull HN | 1.5 | 0.3 | 0.7 | -0.4 | 0.6 | 1.1 | 0.8 | -0.1 | 0.3 |
| 4 | Lloyds Register | 2 0 | 0.3 | 0.4 | 0.0 | -0.1 | -0.4 | 0.4 | 0.1 | -0 2 |
| | **correlF/nebotpmi** | | **0.5965** | **0.4711** | **0.3140** | **0.4677** | **0.4277** | **0.3932** | **0.2305** | **0.1793** |
| | | | | | | | | | | |
| | | **linestF/n** | | **linestF/neb** | | **linestF/nebotpm** | | **linestF/ner** | | |
| | | **2.24** | **0.00** | **0.29** | **0.31** | 0.03 | 0.07 | 0.287968761 | 0.2794711 | |
| | | 0 64195213 | 0.1600664 | 0.238401765 | 0.1792446 | 0.19 | 0.24 | 0.18 | 0.17 | |
| | r2 | 0.35580872 | 0.78 | 0.52 | 0.73 | 0.57 | 0.77 | 0.49 | 0.74 | |
| | | 12.151347 | 22.00 | 5.18 | 19.00 | 2.50 | 15.00 | 6.28 | 20.00 | |
| | | 7.47198309 | 13.53 | 10.96 | 10.04 | 12.00 | 9.00 | 10.19 | 10.81 | |
| | | **linestF/ne** | | **linestF/nebo** | | | | | | |
| | | 0 26309522 | 1.82 | -0.25 | 0.44 | | | | | |
| | | 0.17364512 | 0.68 | 0.30 | 0.30 | | | | | |
| | r2 | 0.41928935 | 0.76 | 0.54 | 0.73 | | | | | |
| | | 7.58129402 | 21.00 | 4.24 | 18.00 | | | | | |
| | | 8.80507636 | 12.19 | 11.35 | 9.65 | | | | | |
| | | | | | | | | | | |

# APPENDIX J:

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