The Alignment of Business and Information Strategies

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Declaration Concerning Length of Thesis

This thesis is less than 100,000 words in length, exclusive of tables, appendices and references.

Marianne Broadbent

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ABSTRACT

The aim of the study was to explore the nature and extent of alignment of business and information strategies, and organizational factors which might be related to that alignment. The study was undertaken in two parts: an extensive literature analysis to identify possible factors and models of alignment, followed by empirical case study based research examining factors which might be related to the alignment of business and information strategy in some large information intensive organizations.

The conceptual frameworks for the study were drawn from the literatures of strategy development, organizational design, and theories and practices of information systems and services. The literature review and analysis for this study was purposely extensive in order to encompass a wide range of conceptual and research based literatures about the management of information systems and services which would inform the study.

The literature review revealed burgeoning interest in the area of business and information strategy alignment from different, though often narrow, paradigms. At the same time there was a paucity of rigorous, empirically-based and cumulative studies of direct relevance to the research question.

Areas of potential importance to the alignment of business and information strategy, drawn from the conceptual and research based literature, were examined in a hypothesis-generating empirical case study analysis of four of Australia's five largest firms in the financial services sector. Case study research design was used because of the lack of a cumulative theoretical base, the need to examine complex phenomena in depth, the terminological problems in the information systems and services area, and the sensitive nature of the data which needed to be collected.

The research design involved multiple sources of evidence collected in a structured manner from a small number of organizations in the same industry. The aim was to develop well-grounded hypotheses about organizational factors which might be important in the alignment of business and information strategies. The financial services area was selected as the critical and 'leading edge' industry where attempts at such alignment were likely to be most evident. The financial services area is very information intensive and highly dependant on information technology as its core technology.
Data gathering in the firms involved clusters of senior business and information managers in each firm in written responses and focused interview sessions. These were aimed at identifying the strategic orientation of the firm, strategic planning and decision making processes, information and information technology planning processes, uses of information for comparative advantage by each firm, and perceptions of the major information problems, assets and areas for further investment. In this study, the 'use of information for comparative advantage' included both the use of information technology (the conduit) and the use of information resources (the content) which were seen to provide some comparative advantage over competitors.

Access was obtained to extensive confidential documentation concerning strategic planning processes and outcomes, together with material related to organizational structures. Five years of Annual Reports were reviewed for their discussion of strategy and subjected to a content analysis of references to information technology.

Grounded hypotheses focus on the positive relationship of business and information strategy alignment with clarity and consistency in strategic orientation; the level of consensus amongst senior managers concerning the strategic orientation of the organization; the nature of, and experience in, firm-wide strategic planning processes; the level of consensus amongst senior managers concerning organizational strengths and weaknesses; the level of senior manager understanding of and experience in information and information technology planning. An overriding finding to emerge from the study was that in order for there to be information and business strategy alignment, the direction and focus of a firm's corporate and business strategies, and hence developmental priorities, needs to be clear and to be understood. Without this prerequisite inappropriate choices are more likely to be made in the development and implementation of information strategy.

This study makes a contribution to the research base of information management and in particular to business and information strategy alignment in a number of ways: through its multidisciplinary approach to the literature review and analysis; the study's focus on organization-wide strategic planning approaches; the development of the notion of information-based comparative advantage as the operationalisation of business and information strategy alignment in information intensive industries and the inclusion of both Information and Information Technology-based advantages; the inclusion of clusters of both senior business and information managers in the empirical study, and its indepth analysis of an information intensive industry.
1. INTRODUCTION AND OVERVIEW

1.1 Focus of the Study

The aim of the study was to explore the alignment of business and information strategies, and organizational factors which might contribute to that alignment. Business and information strategy alignment focuses on the extent to which business objectives are supported and stimulated by information strategies.

The study was undertaken in two parts: an extensive range of conceptual and research-based literature was examined to provide theoretical frameworks for the exploration of the question: 'What organizational factors might contribute to the better alignment of business and information strategies?'. This was followed by an empirical analysis of recent information-based developments and business planning processes in some large organizations with the aim of generating well-grounded hypotheses related to the alignment of business and information strategy.

This chapter provides an introduction to the study and an overview of its conceptual bases, terminological frameworks and the focus of the major research questions.

1.2 Background

In discussing information and telecommunications in post-industrial society, Bell (1979:163) refers to the 'revolution in the organization and processing of information and knowledge'. A major factor in this revolution, which has proceeded apace in the past decade, is the transformation taking place through the concatenation of information processing and communication technologies.

Developments in information processing technologies and telecommunications have led to significant changes in many areas of work, in the nature of goods and services now available, and in the way in which those goods and services are produced. These developments have affected many production and service areas, and, in particular, the management of information systems, resources and services in organizations (Horton and Marchand, 1982; Horton, 1985b; Treacy, 1985; Branchecau and Wetherbe, 1987; Emery, 1987).
The strategic value of information and information technology to an enterprise has received increasing attention both in research literature and management practice (Porter and Millar, 1985; Broadbent and Koenig, 1988). Rapid developments in hardware and software that support information processing and storage, together with the increasing sophistication of information users, have given organizations the facility to use information in ways not considered practical a decade ago. These developments have presented new opportunities and threats to organizations for using information in decision making and as a strategic weapon. The 'strategic' dimension of information technology is now of great significance, even to small organizations (Moynihan, 1988).

At the same time global competition has become increasingly important and the environment in which businesses operate has become more volatile (Ghoshal and Seok, 1986; Lorange, Scott Morton and Ghoshal, 1986). The speed of information transmission has extended the reach of businesses into every corner of the globe (Kanter, 1989). Success in global markets requires that organizations have increased strategic awareness and a concept of strategy that incorporates information as a major focus (Raymond, 1989). These phenomena make it more important for businesses to monitor their environments, and to integrate both internal and external information into strategic processes.

There has been a shift of interest from technological considerations in information systems and services to examining managerial and organizational questions, the extent to which information systems and services are embedded in organizational processes, and the different information service requirements in different types of organizations and industries (McFarlan, 1984a; Boynton and Zmud, 1987).

Information technology has the capacity to change organizational forms such that the 'new organization' is information and knowledge-based and will be composed largely of specialists (Drucker, 1988). The 'dynamic network' form, where major components can be assembled or reassembled, is both a cause and result of the changing nature of competition (Miles and Snow, 1986). The process of management itself has become information intensive (Moore, 1988).

Thus, there is a cluster of factors which have heightened the strategic importance of managing information in and by organizations and which have, at the same time, provided more sophisticated tools and technologies both to assist in and to stimulate this process. Fundamental to the achievement of effective information management
by firms is the alignment of business and information strategies. 'Harnessing information for competitive advantage' has been seen as a key issue in corporate planning for the 1990s and information is now seen as a corporate resource (B.Taylor, 1986).

The need for organizations to link business and information strategies has been highlighted in studies in a number of countries during the past four years. In a 1987 survey of over 220 of Australia and New Zealand's largest companies, Information Systems Managers ranked the 'alignment of information systems and business goals' as their highest management concern (Broadbent and others, 1988; 1989). Similar findings resulted from an Australian Delphi study the following year, where 'improving IS strategic planning' was listed first in the top ten issues for Information Systems methodologies (Watson, 1989). In 1990, the ability to 'align business and information systems strategies' was the area with the greatest gap between the current and required skills of Australian Information Systems Managers (Broadbent and others, 1990).

Information systems planning has been consistently identified as the major issue of concern in regular US-based studies of Information Systems Managers (Hartog and Herbert, 1986; Brancheau and Wetherbe, 1987). Galliers compared information systems planning practices in the United Kingdom and Australia in 1985 and 1986 and reported that very little of current practice incorporates competitiveness considerations (Galliers, 1988a). Concerns of chief executives in Ireland related to the management of information technology included the linking of information technology and business strategies (Moynihan, 1988).

This study seeks to examine how key firms are achieving alignment, to identify factors which might be related to such alignment, and to develop a grounded model of alignment between business and information strategy.

1.3 Conceptual and Literature Bases

In focusing on organizational factors which might be related to business and information strategy alignment and the use of information for comparative advantage, this study crosses disciplinary boundaries and draws on theories of organizational design, theories and practices of information systems and services provision and the context of strategy development.
The study's conceptual and literature bases drew firstly on the literatures of organizational theory and information theory, which provided the overriding theoretical and conceptual frameworks within which to explore the research questions. These are explored more fully in Chapter Two. Strategy development is examined later in this chapter.

Chapter Three examines a cluster of mainly practice-oriented literatures which together constitute the broad area of information management. These literatures encompass five main areas:

1. the planning and management of automated information systems which have a particular focus on hardware and software technological requirements.

2. information for strategic management and planning which focuses on one level of information service requirement.

3. the strategic uses of information and information technology, which draws on areas one and two above in clearly identifying a particular purpose for information services.

4. information management as it has evolved from information resources management, which attempts to integrate each of the above three areas.

5. strategic development and information services

These literatures have overlapping, though often narrow or specific orientations; but each provided particular insights into organizational factors which might be related to the alignment of business and information strategies. They present a web of ideas on the evolution and consideration of information strategy, and extensive recent interest in, and anecdotal comment, about the uses of information technology for strategic advantage. However, at the time of designing the empirical component of this study, there was a paucity of evidence from soundly based, published research on the ways in which leading edge information intensive firms sought to align their business and information strategies, and organizational factors which supported such alignment.
1.4 Empirical Study Framework

Areas of potential importance to the alignment of business and information strategy were drawn from the conceptual and research based literature, and then examined in a hypothesis-generating empirical case study analysis of four of Australia's five largest firms in the financial services sector. Case study research design was used because of the lack of a cumulative theoretical base, the need to examine complex phenomena in depth, the terminological problems in the information systems and services area, and the sensitive nature of the data which needed to be collected.

The research design involved the collection in a structured manner of multiple sources of evidence from a small number of organizations in the same industry. The aim was to develop well-grounded hypotheses about organizational characteristics which might be important in the alignment of business and information strategies. Only one industry was examined in order to minimise the effect of contextual differences. The financial services area was selected as the critical and 'leading edge' industry where attempts at such alignment were likely to be most evident, as this area is very information intensive and highly dependant on information technology as its core technology.

Data gathering in the firms involved clusters of senior business and information managers in each firm in written responses and focussed interview sessions. These were aimed at identifying the strategic orientation of the firm, strategic planning and decision making processes, information and information technology planning processes, uses of information for comparative advantage by each firm, and perceptions of the major information problems, assets and areas for further investment. In this study, the 'use of information for comparative advantage' included both the use of information technology (the conduit) and the use of information resources (the content), which were seen to provide some comparative advantage over competitors.

Access was obtained to extensive confidential documentation concerning strategic planning processes and outcomes, together with material related to organizational structures. Five years of Annual Reports were reviewed for their discussion of strategy and subjected to a content analysis of references to information technology. Publicly available data for each firm provided further inputs.
Chapters Six to Nine present the data obtained from each of the fully participating banks. This is followed by a comparative analysis of the firms in Chapter Ten and the findings and conclusions in Chapter Eleven. The results from Bank Five, which was not a full participant in the study, are contained in Appendix 5.

1.5 Strategy Development

This study is set in the context of strategy development. Strategy has been defined as that which is planned or intended in relation to the determination and achievement of long term goals and major objectives (See for example, Chandler, 1962; Andrews, 1971, 1980; Schendel and Hofer, 1979). In a business context, strategy is usually seen as the 'organized deployment of resources to achieve specific objectives against competition from rival organizations' (James, 1985:11). As such it is intentional and deliberate, and there has been an increasing need for, and emphasis on, businesses to articulate their strategies in a more explicit manner (Henderson, 1984).

However, just as intended strategy may not be realised, strategies can develop without the formulation of explicit intent. Mintzberg and Waters (1982; 1984) distinguished between 'intended' and 'realized' strategies. Strategies which are 'realized' may have been brought about deliberately through a process of formulation followed by implementation, or they may have emerged in response to an evolving situation (Mintzberg, 1987). These latter type, 'emergent' strategies, are those which appear without clear intent, where a pattern can be detected in a stream of decisions or actions (Mintzberg and Waters, 1982; Mintzberg, 1987).

![Types of Strategies](image)

(After Mintzberg, Brunet and Waters, 1986:4)
This notion of 'realized strategy', as shown in Figure 1.1, is particularly pertinent to the information services area where developments in the information industry itself may make it inappropriate to pursue some intended strategies while others emerge.

Organizational structures and processes should be set in the context of the strategy that the organization has decided to follow (either overtly or by a less articulated process of evolution). While it seems logical that strategy should precede structure, the interaction of strategy and structure at the organizational level, particularly in the information services area needs to be recognized (Fredrickson, 1986; Leifer and White, 1987; Henderson and Sifonis, 1987). The iterative approach to the interaction of strategy and structure is consistent when strategy is seen as the 'commitment of resources' (Henderson, 1984).

Strategy links an organization's internal arrangements and its treatment of its environment (Lawrence and Dyer, 1983:296) and is aimed directly at altering the strength of the enterprise relative to its competitors (Ohmae, 1982). The essence of strategy becomes the purposeful management of change so that the firm can achieve competitive advantages in every business in which it is engaged (Hax and Majluf, 1988). Three processes may be seen to contribute to strategy formation according to Bower and Doz (1979): the cognitive processes of individuals on which understandings of the environment of strategy are based; the social and organizational processes by which perceptions are channelled and commitments developed; and, the political processes by which the power to influence purpose and resources is shifted.

This study of information and business strategy alignment takes cognisance of the views of key individuals and their perception of the environment of strategy, and the organizational decision-making processes through which perceptions are channelled and commitments are developed. Strategy formation is seen as a multifaceted and situational process that is contingent on the firm's specific characteristics and environmental conditions (Hax and Majluf, 1988). The dimensions that should be considered in delineating a strategy formation process responsive to the firm's needs, as listed by Hax and Majluf, are integral to this research. These focus on the role of the senior management, the way in which strategy is communicated and the levels of participation in strategy formation, the consensus built around intended courses of actions and the linkage of strategy to
the pattern of actions in the past. Effective strategic planning is integrated into core management processes (Webster, Reif and Bracker, 1989) and is a vital management discipline (Porter, 1987).

1.6 Levels of Strategy

Strategy operates at a number of levels within organizations. Large organizations are usually comprised of a number of major units of business activity, and constitute a collection of businesses (Hedley, 1977). These relatively self-contained entities are known as 'strategic business units' or 'single business units' (SBUs) and may be based on a product group, geographic territory, major function or hierarchical layer (Winski, 1984). In this study the term 'single business unit' or SBU will be used. This will avoid terminological confusion with other uses of the words 'strategy'.

Three inter-dependant levels of strategy can be identified in organizations comprised of a number of business units: corporate strategy, business strategy and functional level strategy (Ginsberg and Venkatraman, 1985; Grant and King, 1982; Hax and Majluf, 1984; Hofer and Schendel, 1978). Corporate strategy is the use of all the firm's resources to pursue a corporate objective and examines the question of 'what is the business of this organization or corporation?' (Ginsberg and Venkatraman, 1985). Business strategy, on the other hand, is concerned with achieving specific objectives within a particular business, in the context of corporate objectives.

Functional strategies are aimed at strengthening the specific functional performance required to succeed in a given industry and should be distinguished from operational improvements (Ohmae, 1982). Functional strategies in this sense require a thorough understanding of customers (their needs and objectives and their geographic and demographic distribution) and of competitors (their behaviour and relative strengths and weaknesses). Functional level strategy focuses on maximising resource productivity in particular functional areas (Ginsberg and Venkatraman, 1985) in relation to the performance of competitors.

Information services can be seen as one functional area in an organization (along with others, such as marketing, finance or production). However, unlike some functional areas, the information services function is likely to reside in a number of
different (and sometimes disparate) organizational units and its manifestations may not be as tangible as, for example, manufacturing functions. The strategic importance of the information function will vary with industry and with business strategy and, thus, with the interaction and information input which are necessary and possible in other functional areas.

Figure 1.2 depicts interlinked functional strategies at the SBU level where the business unit is part of a divisionalized corporate structure. The nature of a firm's corporate and business strategies should determine the linkages between information strategies at and between corporate and business unit levels, and the consequent firm-wide information infrastructure required.

Figure 1.2 Interaction of strategy levels and types
The design and management of information systems and services should reflect, support and stimulate the strategic priorities of the firm. The question of 'What is the task of the information system?' should be preceded by the more general question of 'What is the basis for the organization’s effectiveness?'. For market driven organizations, including most private sector firms, this second question can be translated into 'How do you compete?' (See Figure 1.3). The 'fit' between business and information strategy should be defined in terms of the alignment of the answers to those questions.

Figure 1.3  Defining the Task of Information Strategy

<table>
<thead>
<tr>
<th>General Business/ Organisational Strategy</th>
<th>How do you compete?</th>
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<tr>
<td>Information Strategy</td>
<td></td>
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<tr>
<td></td>
<td>What is the task of the IS?</td>
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Drawing on the above strategy development literature, this study defines information strategy as patterns which can be detected in a series of actions aimed at strengthening the performance of information resources, information technology and personnel in order for the organization to succeed.

In the context of 'realized strategy', these patterns can be seen in the existence, nature and extent of the uses of information and information technology which provide some comparative advantage. In information intensive industries, such 'realized' information strategy is aimed at providing an advantage to an organization over its competitors and may be essential for survival. These uses of information and information technology may have evolved as part of a formal planning process (and are, thus, deliberate outcomes), or they may have emerged in spite of, or alongside, those formal processes (as indicated in Runge, 1985, and Earl and Runge, 1987). This study has sought to identify how firms have gained some information-based advantages over competitors, how these developments came
about and what organizational factors might have contributed to the better alignment of their business and information strategies.

1.7 Information Services Terminology

At the present time, the information systems and services area is a minefield of terminological confusion. Words and phrases are often context and sometimes paradigm dependant, leading to difficulties and inconsistencies in understanding and interpreting findings in apparently related studies from different paradigms. This section seeks to chart and document the terminological base which will be used in this study.

Information services in an organization can be seen as the manifestation of the process of information management. Information management is the 'process of acquiring, organizing and manipulating collections of data elements to add value to them to meet specific user needs' (Brinberg, 1983:5). This definition is similar in concept to Taylor's notion of information systems as formal sets of 'organized activities that add value to messages being processed' (R.Taylor, 1986:202). Those 'organized activities' usually involve people, the messages and a method of processing or adding value to messages.

In many contexts, however, the term 'information systems' implies use of automated information processing only, with insufficient regard for the nature and content of the 'messages' being processed. Thus, the broader term 'information services' is used throughout and incorporates automated information systems. Where 'information systems' is used it refers to automated information systems. In this study, the term 'information services' encompasses information personnel, information resources, information technology and information systems.

'Information' is defined as 'a symbol or string of symbols which have potential for meaning' which have in some way been recorded for future use (after Debons and others, 1981, and Levitan, 1982). In less conceptually based writings, this is referred to as the 'stuff' of information, or in Levitan's terms 'information resources' (Levitan, 1982). Information may or may not be dependant on information technology for its formatting and/or transmission. This definition of information, then, covers such diverse items as databases, reports, books, sets of standards, journals and maps. While the focus in this study is on the content
aspects of information in the organization, implicit in this is the notion that information resources are aimed at informing individuals and, thus, changing their picture of the universe. This is the process or receiver side of information, after Debons and others (1981).

'Information technology' is the application of computer and communications technology in the collection, storage, processing and dissemination of information (After the definition in Information technology in Australia. [Australia. Department of Science and Technology, 1984]). The focus here is on the technological conduit for the information content.

'Information systems' are formal sets of organized activities that add value to messages being processed and use information technology in doing so. Information technology, thus, provides the tools for the development of information systems.

The importance of distinguishing between 'information' and 'information technology' where strategic applications are concerned has recently been emphasised by King (King and others, 1986) who identified different uses for each by organizations: a strategic use of information technology may be identified where organizations are using information technology to provide the same information more quickly; the use of important new information or of available information in new ways may constitute a strategic use of information (resources). Many of the latter instances may involve the use of information technology in their delivery. The potential overlap in what may be classified as 'information' and 'information technology' is acknowledged, but these distinctions were validated in an empirical study by King and co-researchers (King, Grover and Hufnagel, 1988).

In this study, 'Information-Based Comparative Advantage' (IBCA) refers to the use of 'information' and/or 'information technology' which provide a comparative advantage to an organization over its competitors. Information-based advantages would be expected to be particularly important in industries which are information intensive and where information technology is the core technology of the business. Information-based advantages vary across industries and Section 5.3 describes how this notion was operationalized in the empirical study in the finance industry.

The term 'information personnel' covers a range of individuals whose work involves the handling and management of information and information technology
for others. The 'Information Systems and Technology Manager' (IS/T Manager) in the organization is the 'highest ranking executive with primary responsibility for management of information systems and technology (After Synnott, 1987a:21). The term 'chief information officer' (CIO) is often given to this position in the literature. However, such nomenclature describes a set of responsibilities, not a frequently occurring title (Brumm, 1988).

'Information managers' in organizations were identified as those who head organizational units where the major focus is the development and management of services for other units within the organization. Other individuals who work in that unit and whose responsibilities entail handling information for others at least 50% of the time, are referred to as 'information workers'. A major occupational survey of information personnel (Debons and others, 1981) identified up to 20 such units which existed in organizations. While not every organization would have all of these units in an identifiable form, large organizations could be expected to operate up to ten such units.

While information managers and information workers are defined as those who, respectively, head and work in information services units, there may be many other individuals within an organization whose work involves the handling of information resources for others either within the unit in which they operate or for other units of the organization. In this study, the term 'information specialists' was used to denote those whose work involves handling information for others at least 50% of the time, but who do not work in designated 'information service units'.

This study involves data collection from selected senior business and information managers, who are referred to collectively as 'executive managers'. 'Executive managers', in large organizations, are those designated heads of organizational units whose reporting line to the chief executive officer includes no more than one intervening manager (Hansell and others, 1985).

Specific definitions drawn from this section are listed in Section 4.3 in the chapter on Research Design. Section 1.8 outlines the key research question of this study and then the refinement of this question which provided the focus for the empirical investigation.
1.8 Research Questions

While the linking of automated information systems strategy to corporate strategy may be traced back to Kriebel (1968) and Whisler (1970), the past decade has seen the development of many products and processes which have increased the potential strategic relevance of technology to organizations and heightened the importance of the link between business strategy and information strategy.

This study sought to explore factors related to the alignment of business and information strategy. The key question addressed in this research is:

Are there organizational factors which might be related to the alignment of business and information strategies? If so, what are these factors?

A range of possible factors emerged from an extensive review of a group of literatures on the management of information systems and services. These factors focussed on the strategic planning processes of organizations, the involvement of information personnel in strategic planning and decision making, executive management support for information-related developments, and the organizational arrangements for information services. These arrangements included the scope of responsibility and accountability of the Information Systems and Technology Manager, and the nature and extent of links between business and information service units and amongst different types of information service units.

Strategy development literature identified some support for the proposition that higher levels of planning competence and sophistication are a positive factor in firm performance. However, the importance of consensus amongst senior managers was an unresolved issue.

These potentially important factors were grouped into three categories in a Preliminary Alignment Model: strategy, organizational and information services context factors.

An empirical investigation, using a case-study approach, then systematically examined the importance of these factors in the alignment of business and information strategy. Evidence for the alignment of business and information strategy was sought in the nature and extent of a firm's use of information for comparative advantage.
The research questions for the empirical part of the study were:

Is there evidence to support the development of a hypothesis about the relationship between the nature and extent of a firm’s information-based comparative advantage and

1. its strategic planning processes
2. its strategic planning outcomes
3. the extent and nature of information technology consideration in firm-wide strategic planning
4. the complementarity of organizational structures and decision processes to strategic orientations
5. executive manager agreement on the strengths and weaknesses of the organization
6. executive manager support for information service developments
7. organizational arrangements for information services
8. concern with different types and levels of information requirements

1.9 Summary

This study sought to explore the alignment of business and information strategies and the organizational factors which might contribute to that alignment. A wide ranging review of relevant literature identified factors which could be related to such alignment. These factors were grouped into a Preliminary Alignment Model. An empirical investigation was then undertaken to assess whether there was a basis for these factors in the practice and experiences of the major firms in an information intensive industry area. Seventeen grounded hypotheses were developed from this evidence. These covered some of the factors indicated in the literature and
identified others which emerged in the course of the research. The findings of this study contribute to the knowledge base of information management and provide guidelines for practitioners in the achievement of business and information strategy alignment.

Chapter Two outlines the theoretical and conceptual basis for the study. Chapter Three reviews the literature of the management of information systems and services, with particular relevance to strategic issues, and develops the potential alignment factors for analysis in the empirical investigation. Chapter Four explores the research design of the empirical investigation and Chapter Five describes the data collection process.

The data from the case study organizations in the empirical study is documented in Chapters Six to Nine. Chapter Ten provides a comparative analysis of the firms and these are consolidated into set of findings, emerging indicators for alignment, grounded hypotheses and areas for further research in Chapter Eleven.
2. CONCEPTUAL FRAMEWORKS

2.1 Conceptual Bases

A study based on broad definitions of information services and the alignment of business and information strategies is interdisciplinary and draws on different types of literatures and research bases: firstly, on organizational theories, information theories, and strategy development, which provide the overriding conceptual frameworks within which to explore the research question; and, secondly a cluster of information provision and management practice-oriented literatures which together constitute the broad area of information management. The latter literatures, in particular, show evidence of increasing convergence and recognition of the importance of the uses of information and information technology in business strategy.

Organizational theory is the sociology of the organisation (Perrow, 1970; Daft, 1983) and is concerned with 'people aggregated into departments and organizations and with the differences in structure and behaviour of those aggregates' (Daft, 1983:24). A modified form of contingency (or situational) theory and the information processing view of organisations provide particularly pertinent frameworks for the present study.

Information science is concerned with the principles and practices of the provision of information (Institute of Information Scientists, 1982). Information science provides the general frame of reference towards which information services are directed (Wersig and Windel, 1985).

This chapter will first chart developments in some areas of organizational theory, with emphasis on the development of the 'information processing' model of organisations, in which this study of business and information strategies is embedded. This will be followed by an analysis of the current state of evolution of the field of information science, as it relates to information services, and meanings of information which are derived from theories of information and are used in this study.

The works referred to in this chapter are those which have informed and provided frameworks for this study and contributed to discourse in the areas of organizational theory and the study of information in organizational contexts.
2.2 Organizational Theory and Design Frameworks

In reviewing the current challenges in the study of organisations Bedeian (1986) acknowledged that the study of organisations is an emerging discipline in which the 1960s and 1970s saw a transition from the study of individual participants as the focal unit of analysis, to the study of organizations as independent entities, their structural characteristics and the connections among organisations and their environments.

Lawrence and Lorsch (1967, 1969) laid the foundations for contingency theory in their systematic study of ten organisations in three different industrial environments. In examining the differences in internal states and processes in these organisations on the basis of the differences in their external environments, they proposed a contingency theory of organisations in which organizational variables are in a complex interrelationship with one another and with conditions in the environment.

Lawrence and Lorsch reviewed six earlier studies which were concerned with environmental and task variables: those of Burns and Stalker (1961) which gave rise to the terms 'mechanistic' and 'organic' management methods and procedures; Woodward's work on task variability (1965); Fouraker's experiments as quoted by Lawrence and Lorsch, which simulated organizational types and environments; Chandler's comparative analysis of the history of firms (1962); Udy's analysis (1959) of the link between technology and organization structure; and Leavitt's work (1962) which emphasised the four components of organizational analysis (task, technology, people and organizational structure). While Lawrence and Lorsch acknowledge differences in terminology amongst these studies, they make a strong case for claiming that the findings of these earlier works support the essence of a 'contingency theory' whereby 'different organizational forms are required to cope effectively with different task and environmental conditions' (Lawrence and Lorsch, 1969:203).

The social science bases of administrative theory were explored by Thompson (1967) who attempted to integrate the behaviourist approaches of Simon (1957), March and Simon (1958) and Cyert and March (1963), with earlier rational models. Thompson reintroduced the concept of the complex organization as an open system subject to criteria of rationality, and combined this with the problems of uncertainty. 'Long-linked', 'mediating' and 'intensive' technologies were identified as dimensions of variations in technologies in organisations. These technologies
together with organizational domains and task environments were seen to have a
critical impact on the design of organizations.

In his sociological analysis of organisations, Perrow (1970) questioned whether
there could be one 'theory of organization', or whether this should be more
accurately expressed as 'theories of organizations'. Underlying this distinction was
his observation that 'organizations differ in their tasks, and thus in the way they are
run' (Perrow, 1970:49). In focussing on the nature of task activities, their
analyzability and variety, Perrow's framework for examining the basis of structure
in organizations was supportive of Woodward's work, which Lawrence and Lorsch
(1967; 1969) included in the six studies they reviewed. Woodward (1965) studied
the link between technology and organisational structure in 100 British firms.
Woodward's sample of 100 firms was 91% of all the firms in the geographic area of
South Essex employing more than 100 people. She concluded that the key factor
shaping organizational structure was not 'hardware' but 'task variability'.

Organizations in a 'turbulent' environment may need to adapt to situations which are
simultaneously complex, experiencing rapid change and increasing
interconnectedness (Emery and Trist, 1969). In such environments, Emery and
Trist claim that organizations need to make extensive changes throughout the
structure of their organizations. The environment of the large financial institutions
in Australia from 1985 to 1989 could aptly be described as one of turbulence.

Galbraith (1973) sought to clarify concepts of information and uncertainty as part of
his work on designing complex organizations. Uncertainty was a relative concept
related to the amount of information required and already possessed by the
organization. It was not uncertainty per se that was of interest, but information
processing that was the key concept, specifically information processing during
actual task execution.

In his seminal work, Galbraith (1977) defined organizations and linked the notions
of decision making and information processing and this provided a basis for the
development of the 'information processing' view of organisations. In Galbraith's
view, organisations were composed of 'people and groups of people in order to
achieve some shared purpose through a division of labor integrated by information-
based decision processes continuously over time' (Galbraith, 1977:3).
The need for and ability of organisations to process information for decision making is seen to account for variations in organizing modes. Galbraith's observations that specific structural characteristics and behaviours were associated with organizational information requirements is still valid, and is consistent with contemporary research on information and information technology in organizations which is reviewed in Section 3.5.

Galbraith saw the organisational design challenge as one of achieving coherence among strategy, organizing mode, and integration of individuals. His basic proposition was that the greater the task uncertainty, the greater the amount of information that had to be processed among decision makers during task execution in order to achieve a given level of performance. Organisations had limited capacities to process information and adopt different organizing modes to deal with that uncertainty. Thus, Galbraith linked the information environment to the structure of organisations and the process of organisational design. Organisational design was dependant on the nature and type of information processing required to make decisions in an organisation. The information infrastructure of firms in this study is examined in the context of the type of strategic and organizational decision-making processes in place.

Lorsch proposed an approach to organization design based on 'situational theory', a term he now preferred to 'contingency theory' (Lorsch, 1977). After discussing the need for differentiation within organisations, Lorsch examined the subsequent difficulties in achieving integration within organisations. One of the problems of integration was the complexity and uncertainty of the information involved in an organisation: the more uncertain or complex the information, the more time and effort must be expended to sort out, understand, and resolve conflicting points of view.

In a thoughtful essay published in 1977, Connolly sought to integrate research on information processing with decision-making phenomena in organisations. Connolly reviewed the separate developments of these two areas of research and used the notion of the 'diffuse decision' process to describe the interdependence of the two bodies of work. Decisions emerged from the 'interlocked activities of multiple decision participants embedded in a complex net of information flows'. (Connolly, 1977: 228-229).
Writing in the year that the work of Galbraith and Connolly was published, Tushman and Nadler (1978) drew on concepts of uncertainty and information processing to integrate the literatures of organization design and organizational structures. Tushman and Nadler built on the view of organizations as information processing systems facing uncertainty and extended this to develop a conceptual model for organizational design and structure. Like Galbraith, Tushman and Nadler clearly linked information, uncertainty, decision making processes and organisational structure. 'Information processing' was 'the gathering, interpreting and synthesis of information in the context of organizational decision making' (Tushman and Nadler, 1978:614).

Tushman and Nadler's three working assumptions were well grounded in theory and research and are shared in the present study: organizations are open social systems which must deal with work-related uncertainty; organizations can be viewed as information processing systems, and organizations are composed of sets of groups or departments (subunits).

The features of the Tushman and Nadler model were presented as a series of propositions with relevant research well documented: the tasks of organizational subunits vary in their degree of uncertainty; as work related uncertainty increases so does the need for increased amounts of information, and thus the need for increased information processing capacity; different organizational structures have different capacities for effective information processing; organizations will be more effective when there is a match between information processing requirements facing the organization and information processing capacity of the organization's structure; and, if organizations (or subunits) face different conditions over time, more effective units will adapt their structures to meet the changed information processing requirements. The adaptation of organizational structures in large financial firms was examined in the empirical part of this study.

The work of Tushman and Nadler makes it clear that by the late 1970s there was a considerable body of research which gave credence to information processing as an integrating concept in organizational design, even though the model's central hypothesis, related to fit and match between information processing requirements and capacity of an organization's structure, remained to be tested. The results of Tushman's empirical study (1978) of technical communication in R and D laboratories provided further support for the 'core information processing idea' that 'effectiveness is contingent on the match between communication patterns (or
structure) and the nature of the subunit's work' (1978:643). At this stage though, there had been little reference to the implications of the information processing model for information service functions within organisations.

Knight and McDaniel (1979) appear to have attempted that process by linking a systems perspective with the 'information processing' approach to the study of organizations as 'information systems'. They claimed that there was no simple internal logic dictating proper organizational structure. The 'information systems perspective' of Knight and McDaniel used 'information, information flows, and information processing' as the key variables to describe organizations. An understanding of the structure and management of different kinds of organizations required an understanding of the nature of information flows, particularly the notion of 'critical information flows'. These were the information flows that 'have a significant effect on the structure and management of organisations' (Knight and McDaniel, 1979:12).

The essence of the 'information systems perspective' of organizational theory focuses on the nature and handling of 'critical information flows'. If the critical information flows were relatively certain and stable over time, the organization was more likely to be characterized by a high level of routine in structure and behaviour than if these flows were uncertain and unstable over time. The latter situation would create variability in both structure and behaviour (Knight and McDaniel, 1979: ix-x).

In examining the implications of, and information systems perspectives on, organizational design, Knight and McDaniel provided the useful analogy that organizational design is more like painting a picture or writing a song than putting together a jigsaw puzzle: 'there is no one solution nor is there one arrangement of parts that is essential' (Knight and McDaniel, 1979:170). While they do not go into depth on the matter of specific differences between industries, they group characteristics of specific organizations into two categories: 'general industry bodies of knowledge' and 'specific organization bodies of knowledge' which are not applicable to any other entity and are unique to a particular organization.

Categories of industry knowledge required for organizational knowledge may be seen as the situational and environmental variables referred to by earlier writers. Though Knight and McDaniel's contribution did not overtly draw on or document its research base, their work is a lucid elaboration of the 'information processing'
view of organisations using a systems analysis framework which identified the importance of industry and other differences in organizational design. The empirical component of the present study examined one industry area only and, thus, takes into account at least some of these contingent variables.

Daft and Macintosh (1981) provided a neat summary of the developing theoretical and empirical literature on organizations as information processing systems in introducing their study of information and task variables in 24 work units. As an outcome of an exploratory field study of the relationships between work-unit task activities and information processing, they reworked Perrow's classification of work-unit technologies (Perrow, 1970) as a revised model of information processing along two dimensions of analyzability and variety of tasks. High and low levels of equivocality require different types of information: information of a more qualitative nature is required in situations of high equivocality, whereas situations of low equivocality require primarily quantitative information.

While concluding that effective information support systems in organizations should reflect work-unit information requirements, Daft and Macintosh commented that 'additional research is needed to understand better the practical implication of "fit" between information sources and information needs' (Daft and Macintosh, 1981:222). In the late 1980s, the finance industry was in a situation of high equivocality, where extensive economic and political information, together with competitor intelligence was required as part of the corporate and business planning processes.

Lengel's research (1983) linked communication media, or channels of communication, used in organizations with the potential information-carrying capacity of particular media and introduced the notion of 'information richness'. Lengel proposed that communication media varied in the richness of information processed. Daft and Lengel (1984, 1986) later built on this work, claiming that 'organizational success is based on the organization's ability to process information of appropriate richness to reduce uncertainty and clarify ambiguity' (Daft and Lengel, 1984:195). A model of managerial information processing was suggested which helped explain Mintzberg's (1973) findings of managerial avoidance of formal information sources in organizations.

Daft and Lengel then pursued models of organizational information processing which focussed on both the vertical and horizontal information processing needs of
organizations. Weick's theory of equivocality (Weick, 1969, 1979) is seen as pertaining to the 'interpretation' needs of organisations (the vertical dimension) while Galbraith's work on information amount (Galbraith, 1977) pertains to information for internal 'coordination' (the horizontal dimension). Organizations must both interpret the environment and coordinate tasks internally. These 'two information needs are resolved in organizations through the use of rich information' (Daft and Lengel, 1984:207). Organizations 'reduce equivocality through the use of sequentially less rich media down through the hierarchy' (Daft and Lengel, 1984:212).

Daft and Weick (1984) combined to work towards a model of organisations as 'interpretation systems'. Interpretation is 'the process through which information is given meaning and actions are chosen' (Daft and Weick, 1984:294). Daft and Weick saw an interactive relationship between organizational scanning (data collection), interpretation (data given meaning) and learning (action taken).

Organization theory and design (Daft, 1983), provided a synthesis of much of this research, and integrated it into a more complete sociological approach to organization theory. Daft emphasised the overwhelming impact of the external environment on management uncertainty and organizational functioning. He went further than previous organization theorists in outlining the importance of information and decision-making processes in organisations and the implications for organizational design and the delivery of information services.

The concept of organizational learning was linked to processing information about the environment by Daft and Huber (1987). Though rarely made explicit, Daft and Huber point out that organizational learning has been a key assumption in organizational theory. Implicit in the idea that organizations adapt to their environment are the ideas that organizations learn what their environment is and 'which organizational design features work best for their particular environment' (Daft and Huber, 1987: 3). In order to learn, organizations must solve two problems: acquiring and distributing information about their external and internal environments, and reducing equivocality by developing a shared interpretation of this information. This requires both a 'logistical system' to handle the processing of data, and, also, an 'interpretive system' to enable the appropriate perceptions and understanding of data (Daft and Huber, 1987: 31). They contend that organizations can be designed with characteristics to increase the capacity of either system, and that this design requires the selection of appropriately rich communication channels.
In the present study, it is posited that a firm's strategic planning processes might provide an 'information rich' channel for the development of a shared interpretation of the environment.

The work of Daft and his colleagues in the 1980s considerably enhanced the research base and conceptual framework of organisations as information processing systems. Its contribution to the present study is in providing a conceptual base for the acknowledgement of the need for different types and levels of information systems and services in organizations. This study makes the connection between the notion of 'information richness' and the role of strategic planning processes in organizations, particularly in industry areas which are information intensive and undergoing structural change.

Parallel with Daft's work were Lawrence and Dyer's (1983) efforts to synthesise two major internal controversies in organizational theory: firstly, the question of whether organizations are driven by environmental forces or by organizational choice; and, secondly, whether organizational forms depend primarily on resource availability or on information uncertainty. Organizations must secure resources from their environments in order to survive and must utilize information from their environments to make some sense of events going on around them. Resource scarcity and information complexity, then, were seen as two different forms of uncertainty.

Lawrence and Dyer's theory of organizational adaptation and readaptation over time links these different approaches, as adaptation is a process by which an organization and its environment reach and maintain an equilibrium, ensuring the survival of a system as a whole. Adaptation is a process of accommodation between an organization and its relevant environment. An organization is 'a purposeful system of coordinated action' and organizational strategy is an organization's 'definition of its goals, the relevant environment in which it will pursue them and its internal arrangements towards this end' (Lawrence and Dyer, 1983:295). From this study's perspective, in information intensive firms, the extent to which business and information strategy are consistent is an indication of the organization's adaptation to its environment and its maturity as a post-industrial organization.

Drawing on literatures of contingency theory, strategic management theory and systems theory, Huber (1984) asserted that organizations have survival as a goal and that those which survived were more likely to have structures, processes and
technologies more suited to their environment than whose which failed. Successful post-industrial organizations will be radically different from their predecessors and will be designed for more effective decision-making, innovation, and information acquisition and distribution. In the information area, organizations are faced with dual and apparently conflicting information needs: while organizations need to seek out information to adequately sense their environment, they also need to guard against information overload.

In reviewing the naivety of contingency theory, Weill and Olson (1989) questioned the assumption of rationality and the lack of attention given to the operation of political factors in organizations. They suggested a 'modified contingency theory' which incorporated such factors. This is a pertinent perspective in relation to the development of information services and provides the underlying theoretical framework for this study.

2.3 Emerging Organizational Forms

During the 1980s, researchers have referred to new organizational forms which are emerging due largely to developments in information and communications technologies and the increased nature of competition, particularly global competition. New forms of organizations, or new ways of looking at organizations, are required in order to make sense of current realities and the attempts of organizations, particularly firms, to adapt to rapidly changing environments.

The 'evolutionary theory' of Nelson and Winter (1982) and the 'resource-based theory' of Wernerfelt (1985) provide other perspectives for viewing the firm as, respectively, a collection of routines or a collection of resources. In Nelson and Winter's 'evolutionary theory' reaction to a change in the environment might depend heavily on the nature of a firm's learned routines, that is, its history and they seek to address structural change in this context.

The 'resource-based' view can be traced back to Penrose's description of firms as 'collections of resources', where growth is due to the desire to utilize slack resources (Penrose 1959). Clemons and Row (1989) have developed the resource-based theories in the context of changes brought about by information technology. In the resource-based approach, the concern is with the allocation of resources to
activities, and firms are viewed as 'resource bundles under common managerial control' (Clemons and Row, 1989:343). Two sets of interactions are important: vertical interactions refer to the flow of goods and services along a single value chain, while horizontal interactions are the coordination of similar or complementary resources among multiple markets or industries. Both types of interactions can be either intra-organizational or inter-organizational. Changes in one firm's structure were usually accompanied by related changes in other firms. Clemons and Row indicate that in future it will become increasingly difficult to ignore inter-relationships between markets and between business units within firms and this requires a much more holistic approach to a firm's planning and strategy.

Miller and Mintzberg (1983) have described organizations in terms of 'configurations'. These 'configurations' are 'commonly occurring clusters of attributes' that are 'internally consistent' such as states and processes of the organizations as well as the characteristics of its situation (Miller and Mintzberg, 1983: 57). An organization may delay adaptation to environmental change in order to retain its internal configuration as long as possible, but at the price of gradually worsening environmental fit. They quote Miller and Friesen's study of firms (Miller and Friesen, 1982) where successful firms were those which were able to move quickly from one configuration to another. Unsuccessful firms favoured piecemeal and incremental approaches, perhaps remaining 'between' configurations for too long. This work has particular relevance for information intensive firms, particularly financial firms, which have experienced considerable deregulation at a time of rapid technological change.

Drucker (1988) has posited that the 'new organization' will be an information-based organization with its design more closely resembling a symphony orchestra, hospital or university than the corporate forms currently in existence. Task-oriented teams will be the focus of work activity in the future knowledge-based organizations, where groups of specialists will direct and discipline their own performance through organizational feedback from colleagues, customers and headquarters.

Such information-based organizations, in Drucker's view, require clear, simple and common objectives that translate into particular actions and they should concentrate on only a few objectives at one time. Information-based organizations must be structured around goals that clearly state management's performance expectations for the enterprise and for each part. Organized feedback compares the results with
these performance expectations so that every member can exercise self-control. Everyone in the organization needs to take individual information responsibility, identifying what he or she needs to do the job and what others need from them.

Drucker's 'new organization' is consistent with the 'dynamic network' of Miles and Snow (1986), which they see as providing the 'building blocks' of new theory. The 'dynamic network', together with 'industry synergy', represents 'a new organizational form' which is emerging to cope with new environmental conditions. Its major components can be assembled and reassembled in order to meet complex and changing competitive conditions. Business functions are performed by independent organizations within a network and 'broad-access computerized information systems' are an integral and necessary part of this form. These systems are used as substitutes for 'lengthy trust building processes based on experience' (Miles and Snow, 1986: 65).

The 'dynamic network' form of Miles and Snow is an evolving and iterative process which is both a cause and a result of the changing nature of competition. As organizations formulate new strategies to meet new competitive conditions, Miles and Snow claim that they find that their structures and management systems also require modification. Simultaneously, as new organizational forms become better understood and more widely used, new competitive strategies are easier to implement. Evidence of new organizational forms is sought amongst the participant firms in the empirical part of this study.

2.4 Implications of Organizational Design Frameworks

Several consistent threads in theories of organizational design are useful and pertinent in informing and providing a framework for this study. Lawrence and Lorsch (1969) laid the foundations for 'contingency theory' in their examination of the differences in internal states and processes and the external environments of ten organizations. They proposed that organizational variables are in a complex interrelationship with one another and with conditions in the environment. The design and use of the organization's information infrastructure have more recently been clearly identified as important members of this set of variables (See Section 3.4, in particular the discussion of McFarlan [1984c] and Porter and Millar [1985]).
Organizational design is dependent on the nature and type of information processing required to make decisions in an organization (Galbraith, 1977). However, decisions emerge from the interlocked activities of multiple participants embedded in a complex network of information flows (Connolly, 1977). On a practical level, these ideas are consistent with the commonly observed interactions and conflicts between the providers and principal users of information and the owners of organizational information systems.

The progressive sophistication of information handling technologies has proceeded in parallel with developments in the 'contingency' or 'situational' school of organizational theorists using 'information processing' models of organizations. Earlier work of Lawrence and Lorsch (1967, 1969) and Galbraith (1973, 1977) has been enriched by the work of Tushman and Nadler (1978), Knight and McDaniel (1979), Daft and Macintosh (1981), Daft (1983), Daft and Weick (1984), and Huber and McDaniel (1986), focusing on information processing as an integrating concept for organizational design and the requirements of information processing in uncertain and equivocal situations.

The need for, and ability of, organizations to process information for decision making is seen to account for variations in organizing modes (Galbraith, 1977). Galbraith's observations that specific structural characteristics and behaviours were associated with organizational information requirements is still valid, and is consistent with contemporary research on information and information technology in organizations reviewed in the cluster of literatures in Chapter Three.

In this study, organizations are viewed as 'purposeful systems of coordinated action' (Lawrence and Dyer, 1983:295) which must deal both with resource and also information uncertainty and equivocality, in an environment which is not necessarily rational (Weill and Olson, 1989). Organizations are open social systems which must develop ways of dealing with uncertainty and equivocality in order to meet their goals (Tushman and Nadler, 1978). Critical information flows within organizations have a significant effect on the structure and management of organizations (Knight and McDaniel, 1979). They must develop information services strategies which involve simultaneously seeking out information and avoiding information overload.

The most appropriate structure to do this should be set in the context of the strategy the organization has decided to follow and the extent to which the strategy is
dependent on information services for its achievement. The interaction of strategy and structure at the organizational level, particularly in the information services area, needs to be recognised (Frederickson, 1986; Leifer and White, 1987; Henderson and Sifonis, 1987).

Critical information flows would be expected to involve those whose contribution and area of responsibility was seen as critical to the organization's activities and survival. If information strategy is critical to an organization, then those involved in the development of information services would be expected to be part of strategic planning and development processes. Decision making processes in the organization would operate in such a way as to include senior information personnel in those processes.

In an information intensive industry, the information strategies of organizations would be expected to mesh with business strategies in order to achieve goals. However, there may be political factors which interact with that process as part of the internal arrangements directed towards goal achievements. The extent to which business and information strategies are consistent may be an indication of the organization's state of adaptation or readaptation and its maturity as a post-industrial organization.

This study of business and information strategy alignment draws on organization design frameworks in a way which Cowherd and Luchs (1988) have claimed is rare. Strategy and organizational studies have emerged as two separate streams of thought, and the area of tailoring an organization to support business strategy is lacking sound theory and often degenerates to 'exchanges of anecdotes and the invocation of the latest management best-seller' (Cowherd and Luchs, 1988: 47). The analysis of business and information strategy in this study attempted to identify organizational features which might support alignment of those strategies.

2.5 Organizational Theories and Information Concepts

Throughout the organizational theory literature reviewed, the term 'information' has a particular connotation. The notion of information as 'that which reduces uncertainty' is integral to much of the work of organizational theorists. Daft and Lengel (1984) make this same point in the introduction to their discussion of the connections between organizational information requirements, media richness and
structural design, and build on Weick's proposition (1979) that organizational information processing is also aimed at reducing equivocality.

Knight and McDaniel (1979) and Daft (1983) go into more depth in defining 'information' in their texts on the study of organizations. Information consists of 'meaningful bits of data being transmitted . . . symbols, objects, or physical phenomena that have the potential for influencing a future state of affairs and that are flowing from one point to another in an orderly fashion' (Knight and McDaniel, 1979:13).

The environmental context for an information flow is important 'because what may be information in one situation may not be in another' (Knight and McDaniel, 1979:13). They distinguished between 'routine' and 'nonroutine' information: what may be routine to one system may be nonroutine to another. The structure and management of organizations vary as the nature of the information flow varies.

Daft's distinction between 'information' and 'data' is consistent with Knight and McDaniel's definition of information as 'meaningful bits of data' and Drucker's view of information as 'data endowed with relevance and purpose' (Drucker, 1988:46). Daft (1983) drew on the work of Daft and Macintosh (1981) and defined 'information' as 'that which alters understanding'. Information is 'not usually tangible or measurable'; 'data' on the other hand is 'the output of the communication channel', is 'tangible and can be counted', and does not become information unless people use it to improve their understanding (Daft, 1983:299). Daft emphasised that this distinction between 'information' and 'data' was important as organizations were attempting to provide information rather than data to employees and that 'managers want information, not data'.

Daft identified 'task accomplishment and control' as the two major purposes of information, with two important variables in information design being the requirements for 'information amount' and 'information richness'. Organizational structures and information support should be designed to provide managers and employees with the appropriate amount and richness of information. For routine activities, the amount of information could be small and directed toward a limited set of analyzable applications. For nonroutine activities, large amounts of rich information have to be accessible or gathered. Work activities and, thus, information requirements differ both horizontally and vertically in organizations.
Daft's work is important for its synthesis of the output of research from the information processing perspective of organisations, and for providing the groundwork for identifying the implications of research findings for the design and evaluation of information services in organisations. His work can be seen as providing a conceptual link between organizational design theorists and information theorists.

2.6 Information Science Theory Frameworks

This section will analyse the development of the broad field of information science in order to elaborate the information-related conceptual framework for the study. The literature of information science, and its many subsets, provides different perspectives, contexts and definitions for the term information and for information science itself. Reference to selected works will assist in establishing a basis for the conceptual and methodological approach taken throughout this study.

Over twenty years ago, Borko (1968) made a well crafted, if ambitious, attempt to answer the question 'information science: what is it?'. He defined information science as that discipline which 'investigates the properties and behaviour of information, the forces governing the flow of information, and the means of processing information for optimum accessibility and usability'. It is concerned with 'that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation and utilization of information' (Borko, 1968:3).

Borko acknowledged that information science was an interdisciplinary area which derived from and related to a range of fields including mathematics, logic, linguistics, psychology, computer technology, operations research, the graphic arts, communications, library science and management. He apologised for the complicated nature of the definition and explained that it was intended to be 'all-encompassing'.

In 1975, information science was a newly emerging field whose 'first consciousness of being a discipline' dates back to the late fifties (Wersig and Neveling, 1975). Wersig and Neveling further claimed that that statement was one of the very few which could be made concerning information science which 'would not be discussed at length by a set of randomly collected people calling themselves
"information scientists". They attributed this diversity of perspectives on information science to the fact that contributions to the 'birth' of information science came from many different disciplines and interests: computer science, library science, philosophy and taxonomy, linguistics, cybernetics and mathematics. Later entrants to the field included social science, the science of science, and communication theory.

Wersig and Neveling examined the historical emergence of explicit and implicit definitions of information and information science. They claimed that the discipline of information science arose from activities aimed at the problem of transmitting knowledge to those who needed it. In this area, Wersig and Neveling make a useful distinction between information science, the information sciences and the general theory of information. Together these comprised the 'system of information sciences'.

A somewhat similar approach can be seen in the efforts of Otten and Debons (1970) in their opinion paper on a 'metascience' of information. They saw a need to provide a common basis upon which all information-oriented specialised sciences and technologies could be understood and studied. They expressed a concern that 'information theory' in the mathematical sense was the outgrowth of an attempt to measure whatever can be transmitted over a communication channel of given measurable physical probabilities. In their view, this did not take into account the theory that 'information' is used and valued by human beings in their daily actions.

The multidisciplinary nature of information science can be seen in Kochen's (1974) listing of four different vantage points for viewing the field: information theory, computer sciences, behavioural sciences, and information science in a narrow (information storage and retrieval) sense. Information science could be seen as a broad field comprised of the first three areas mentioned, or as a new discipline which stands by itself apart from its antecedents. In this study, information science is seen as the broad field, similar to Wersig and Neveling's 'system of information sciences'.

In a major review of the literature of the history and foundations of information science, Shera and Cleveland (1977) traced the origins and definitions of the field of documentation, the transformation of documentation into information science, definitional problems, and the search for theoretical foundations for information science. They concluded, somewhat regretfully, that 'we may be overly concerned
with definitions' and 'it may be fruitless to begin with definitions, when we should simply get on with the business at hand'. As knowledge was amassed about the phenomena of information and more was understood about the field and activities of information science, a definition would evolve by natural processes (Shera and Cleveland, 1977:266).

The titles of other significant contributions in the literature of information science serve to illustrate numerous and persistent efforts to identify, redefine and interpret the field of information science. These include Information science: search for identity (Debons, 1974), Belkin and Robertson's 'Information science and the phenomena of information' (1976), Brooke's 'A new paradigm for information science?' (1976), Garfield's 'Information science education: an ivory tower of Babel' (1981) and Rowley's 'Has information science an identity?' (1983).

Writing in 1979, Machlup acknowledged that information science was not yet a 'fully integrated assemblage of systematic studies of the processes regarded as information'. The publication The study of information: interdisciplinary messages, edited by Machlup and Mansfield (1983), represents a major resource which documents the cultural diversity in studies of information and the many different perspectives on information and information science. Machlup and Mansfield sought to 'analyze the logical (or methodological) and pragmatic relations among the disciplines and subject areas that are centred on information'. In his concluding essay Machlup attempted to chart 'semantic quirks' in the studies of information and perhaps provided further evidence of the pervasiveness, yet lack of syntheses, in notions of information (Machlup, 1983).

In a review article on principles and theories in information science, Boyce and Kraft (1985) set quite narrow boundaries for their literature analysis, and reviewed 'what is being done by those we call information scientists and what is being published in what we consider the information science literature' (Boyce and Kraft, 1985:153). They concluded that while they found several generally accepted principles, they found 'nothing like a theory of information science in the sense meant by Popper and Carnap' (Boyce and Kraft, 1985:165). This view is supported by Houser's analysis of 'information science' based on the first 15 volumes of the Journal of the American Society for Information Science Science (Houser, 1988). However, Boyce and Kraft did not see this state of affairs as arguing against the existence of such a theory, but rather a reflection of a discipline which has its roots in practical problems.
A broad and activity oriented view of information science is implicit in a policy statement of the UK-based Institute of Information Scientists (1982). The Institute's current statement of criteria for courses in information science and for corporate membership of the Institute defines information science as being concerned with:

\[
\ldots \text{the principles and practice of the provision of information. To this end, it includes the study of information from its generation to its exploitation, and of its transmission in a variety of forms through a variety of channels. (Institute of Information Scientists, 1982:232)}
\]

Such an 'umbrella' definition of the province of information science is consistent with Kochen's notion (Kochen, 1974) of information science as a broad field which incorporates the 'vantage points' of what he terms as 'information theory, computer sciences and behavioural sciences'. The overt focus is on information provision rather than the structure, design and models of organisations and their information requirements.

Some dimensions of the relationships between different vantage points which share some sort of focus on information provision were depicted in a diagram by this researcher (Broadbent, 1984:224). The diagram depicted in Figure 2.1, which ideally should be at least three-dimensional, attempted to portray the interconnections amongst a number of areas which are encompassed by the 'system of information sciences' as broadly defined: computer science, information theory, librarianship, information counselling and information management.

The application of information science principles and practices for the provision of formal information services in organisations is represented in Figure 2.1 by the area of 'information management', different thrusts of which are reviewed in Chapter Three.

Recent theorists such as Wersig and Windel (1985) and Taylor (R. Taylor, 1986) have focused their attentions on 'information activities' as the basis for developing theories and models. Each has provided very useful approaches to conceptualising the field of information or information science which will be drawn on in the design of this study.
Wersig and Windel suggested that theories of information should be built around a theory of 'information actions'. While admitting that information science as an academic discipline had not yet built a coherent corpus of ideas, models, theories or analytic-methodological tools, Wersig and Windel claimed that information science was forming itself in a kind of social science at the interface between such technical disciplines as cybernetics, computer science, telecommunications, technologically based subjects like mass communications, social sciences like sociology, and humanities like psychology.

Some of the new pressures on the development of information science included developments in information technology and failures and shortcomings in information practice. Wersig and Windel's proposed theory of 'information actions' was based on the notion that information process and information behaviour could be described, analysed and understood as segments of an underlying factor or problem. They argued that the 'problems of people' are the basis of information science and provide the general frame of reference towards which information services have to be directed. This is a useful, if pragmatic, description of the field from authors who have contributed much to the discourse on what information science is about.
In the present study the 'problems of people' may be re-interpreted as the 'problems of organisations' or particular aggregates of people. The problems of organizations provide the frame of reference to which formal information provision has to be directed.

Taylor identified the 'praxis of information organization, processing and provision' as fundamental to his development of the 'user-driven' approach to the design of information systems (R. Taylor, 1986). Taylor stated quite bluntly, and correctly, that the field of information is 'basically at a prescientific stage' of 'naming, taxonomic, descriptive, and defining'. There are 'information systems that work' and efforts should be directed towards describing in rigorous terms 'what it is those systems do and how they do it'. After that it will be appropriate to begin to apply experimental and quantitative techniques (R. Taylor, 1986:2-3).

Taylor's definition of 'information systems' is broad and generic and does not necessarily imply automated systems. Taylor defined 'information systems' as 'a series of formal processes by which the potential usefulness of specific input messages being processed is enhanced' (R. Taylor, 1986:6). Information systems were a series of value-adding processes, the results of which helped users to make choices or which assisted them in clarifying problems.

Central to Taylor's work is the notion that the design of information systems must come from an analysis of the information use environment. While this might seem to be stating the obvious, Taylor makes a strong case for distinguishing his 'user-driven approach' from other approaches which he refers to as the 'content-driven' approach (information science) and the 'technology-driven' approach (automated information systems, in the terminology used in Chapter 3).

The empirical component of this study focuses on 'information actions' in the context of use environments of a relatively small number of organizations. Recent information theorists have strongly advocated the need for research to examine 'information actions' (Wersig and Windel, 1985) or the 'praxis of information provision' (R. Taylor, 1986) as a way of developing a theoretical base.
2.7 Information Theories and Information Concepts

The purpose of this section is to explore particular interpretations and contexts of the term 'information' in the information-based literature, and the implications of these for research into information strategies and the uses of information and information technology in organisations. Definitions of information generally reflect the context of their derivation (Broadbent, 1984) and the gradations and varieties of epistemological standpoints (McGarry, 1983). However, it should be possible to provide a synthesised and pertinent definition of the term 'information' which is derived from an analysis of information-related literature and is consistent with key concepts from organizational theory literature.

In most branches of both literatures there is a consistent and similar distinction made between 'information' and 'data'. In the literature of information science, and its various subsets, the term is less likely to be linked to automated processes than in the literature of the design of automated information systems reviewed in Section 3.3. For the purposes of this study, the broader approaches are more appropriate.

In one of the earliest works on information economics, McDonough (1963) described the differences between the terms 'data', 'information' and 'knowledge' and conceptually separated 'data processing' from 'information formation'. According to McDonough, data is 'unevaluated messages'; information equals 'data plus evaluation in a specific situation'; and knowledge is 'data plus evaluation of future use in general'. Information, then, is a 'compound idea': information is formed as a particular problem is matched by the specific data needed for the problem solution. In the framework of business problem solving and decision making, information is 'the measure of the net value obtained from the process of matching the elements of a present problem with appropriate elements of data' (McDonough, 1963:76).

In his seminal study on the information economy, Porat (1977) offered a definition of an 'information activity' which he saw as 'reasonable, makes economic sense and is measurable'. His operational definition of 'information activity' was based on the definition of 'information' as 'data that have been organised and communicated' (1977:2). Porat recognised that to organise data into information, systems of logic, thought, measurement and communication were needed.
In the major occupational survey of information professionals in the United States, Debons and his colleagues (1981) developed two complementary definitions of information, one 'source-based' and the other 'receiver based'. In the source-based definition information is viewed as a commodity:

...Information is as a symbol or string of symbols which have potential for meaning (the commodity of information). (Debons and others, 1981:30)

The receiver-based definition focuses on information as a process:

...Information is that which adds to or changes (my) picture of the universe (the process of information). (Debons and others, 1981:30)

These definitions, drawn from the meaning of information in the context of an information system, in fact, closely resemble the definitions of and distinctions made between 'information' and 'data' by organizational theorists such as Knight and McDaniel (1979) and Daft (1983). The source-based definition of information resembles 'data', while the receiver-based definition is close to definitions of 'information' based in organizational theory, given in Section 2.5. They are also consistent with Machlup's broad perspectives on the term information (Machlup, 1983) and can be integrated into Marchand's (1982) conceptual view of information management. Marchand's 'data resources' is similar to the commodity-oriented definition of information; while the management of the information process is similar in concept to the process-oriented definition of information.

Levitan's notion of information 'sources' and 'resources' provides a further elaboration of the concept of 'information'. Information resources are sources of information or data which have been, in some way, recorded for further use, that is 're-sourced' (Levitan, 1982).

The Occupational Survey definitions provide a complementary and fairly complete view of information which is quite consistent with many other attempts to define the meaning of this term. It is intended to use these definitions of information in developing operational terms for use in this study. Thus, information can be defined as a symbol or string of symbols which have potential for meaning and have been recorded for further use. Information is aimed at informing by way of changing an individual's picture of the universe.
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