THE STRATEGIC DIMENSIONS OF INFORMATION SYSTEMS CAPABILITY: CASE STUDIES IN A DEVELOPING COUNTRY CONTEXT

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This thesis is dedicated to my wife Joan, my children, Julian and Jeremy,
my father, Arthur and my mother, Carmen (now deceased).

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Abstract

This research addresses the issue of how organisations can build capabilities to acquire, deploy, exploit and sustain computer-based information systems. With the application of information technology dramatically altering the strategies, structure, and processes of organisations, capabilities in acquiring and deploying computer-based information systems are considered critical to organisational success. It is often presumed that firms have similar capabilities to derive maximum value from deploying computer-based information systems. However, they have been shown to exhibit disparate capacities to successfully implement and exploit such systems.

The concept *information systems capability* is introduced and refers to an organisation's capacity to effectively orchestrate the processes of acquiring, deploying, exploiting and sustaining computer-based information systems to support its strategic and functional objectives. Emphasising evolutionary and resource-based perspectives of the firm the research stresses the firm-specific, cumulative, and path-dependent nature of organisational IS capability. Three strategic dimensions of IS capability are identified. These are routines, resources, and contexts. Routines refer to the IS-related processes and practices of the organisation. Resources are its endowments. Contexts reflect the environmental factors influencing IS investment opportunities and decisions. Capabilities develop through a prescient understanding of the contexts, the strategic acquisition and deployment of IS resources and the establishment and enaction of effective organisational routines.

Researchers are concerned about the persistence of ineffective information technology transfer and diffusion in developing countries. This research seeks to explicate the concept of information systems capability by drawing on examples from a developing country context. Through case studies and surveys done in Zimbabwe it explores organisational efforts to develop IS capability. The findings of the case studies confirm the significant impact of macro-contextual and organisational factors on capability building. A framework for IS capability building is proposed.

Table of Contents

List of Tables

List of Figures

CHAPTER 1

Information Systems Capability: A Conceptual Framework

1.1 Introduction

The application of advanced information technology (IT) has dramatically changed the way organisations function. Information technology now constitutes a major part of organisational information systems and as a consequence has fundamentally altered the content, process and product of organisational endeavour. The implementation of computer-based information systems in organisations represents a major technological innovation. Unlike other types of innovations, IT, due to its pervasive nature, has a wide ranging impact on organisations. It not only affects the production processes, but fundamentally challenges the current orthodoxy as to how organisations structure, manage and co-ordinate their activities, serve their customers, and interact with external partners, suppliers and competitors. It also alters social structures and relations within organisations.

The implementation of computer-based information systems in developing countries has received significant focus (Odedra, 1990; Lind, 1991; Bhatnagar and Odedra, 1992; Woherem, 1992; Kluzer, 1993). The recent moves in most countries to reduce barriers to international trade by liberalising entry to local markets have put increased pressure on local companies in developing countries to offer services at 'world class' standards. Many organisations in traditionally less industrialised countries view the exploitation of IT assets as instrumental in overcoming the conventional barriers of location, time and access to information and expertise. They also see it as a means of improving or even surpassing their international competitors in local, regional and world markets. To these firms, implementing IT systems is an urgent requirement if they are to survive in a marketplace that is increasingly global in nature.

The changes in global political and economic structures, coupled with those brought about by the information technology revolution, have ignited a massive movement of information technology from industrialised to less developed countries. The impetus for this global information technology transfer is many fold, emanating from both foreign and local

sources. In the first instance many organisations (including business firms, financial service providers and international agencies) are operating on a global basis. They use massive amounts of information technology as a natural consequence of a desire to manage and co-ordinate their activities world-wide. This inevitably leads to a massive translocation of technology. This type of technology transfer occurs in a way similar to what happened in the early industrial era. During that time, the transfer of technology, for example railways and telegraph, was driven by the desire to service the needs of colonial powers and their surrogates (Headrick 1988).

Another external impetus for the transfer of computer-based systems is the fact that these systems are increasingly embedded in international programmes, projects and products (Kluzer, 1993). Many international agencies, including the IMF, World Bank, UNDP, promote the inclusion of information technology components in programmes and projects that they fund. They base this on the belief that the use of information technology will enhance the co-ordination and administration of projects and facilitate reporting and feedback. International aid work is growing in scale, scope and complexity. The use of computer-based information systems helps to make these activities manageable. Pernicious management practices and inefficiencies in many developing countries encourage agencies such as the World Bank to press governments to implement computer-based systems to increase rationality and overcome knowledge and skill deficiencies. In many instances, these systems are implemented without carefully considering the social and economic impacts in the local context.

In recent times, the major driving force behind the transfer of information technology to developing countries has been local firms and organisations anxious to reap the potential benefits that computer-based systems offer. These companies seek to participate and survive in the global marketplace. With their local competitive advantage eroding through the liberalisation of markets they see no other option. Local managers believe that computer-based systems would bring performance advantages not currently enjoyed. They are fully prepared to take the risk that implementing such systems entail.

The transfer of computer-based systems to developing countries begs the question: do local organisations possess the capabilities necessary to select, adopt, deploy, exploit and sustain computer-based information systems in order to reap the promised competitive

benefits? It would appear from the persistence of 'failures' of computer-based information systems (Odedra, 1990) that organisations in developing countries are facing significant difficulties appropriating the advantages that such systems offer.

A number of researchers (Nelson and Winter, 1982; Wernerfelt, 1984; Dosi and Orsenigo, 1988; Lall, 1987, 1992; Lall, et al., 1994; Prahalad and Hamel, 1990; Bell and Pavitt, 1993; Collis, 1994; Hamel and Prahalad, 1994; Teece and Pisano, 1994; Zander and Kogut, 1995) have begun to highlight the significance of organisational capabilities in allowing firms to engage in innovative activities which lead to superior performance and the creation of sustainable competitive advantage. Organisational capabilities represent resources accumulated over time through non-market activities. These capabilities are embedded in the organising principles and routines of the organisation. They tend to be idiosyncratic and firm-specific, and as a consequence cannot be easily replicated by other competing organisations. Capabilities reflect the ability of organisational participants to convert organisational assets through processes of strategic planning, integration, learning, and re-configuration and transformation, to generate superior performance to exploit business opportunities.

Capabilities in implementing, integrating and re-configuring computer-based information systems are seen as critical to organisational success. Researchers have shown that investment in IT, while necessary, is not sufficient to bring about improved organisational performance (Robey, 1987; McKersie and Walton, 1991; Weill, 1992; Soh and Markus, 1995). Many firms, having invested heavily in computer-based information systems, have not reaped the benefits promised by such systems. Investment in IT leads to the creation of IT assets which includes applications portfolio, IT infrastructure and user skill (Soh and Markus, 1995). However, the conversion of IT assets into effective performance outcomes is perceived to be dependent on intervening variables associated with organisational roles, processes and contexts. Weill, (1992, p. 310) emphasises the importance of the organisational context "in converting IT investments into productive outputs". Boynton, Jacobs and Zmud (1992) and Marcus and Soh (1993) highlight the importance of IT management processes and roles in facilitating the IT conversion process. Walton and McKersie (1991) emphasise the importance of management processes, individual roles and structure, supported by an enabling culture and an adaptive

organisation, in creating conditions for successful IT implementation. Improved organisational performance is made possible when firms develop the requisite capabilities to effectively convert IT assets into performance enhancing IT outcomes.

Indications from research in developing countries of Africa suggest that most organisations there have difficulties developing and converting IT assets into real business value because of the limitations in physical and human capital (Odedra, 1990). Implementations of computer-based information systems are prone to failure because organisations lack the necessary technical skills and IT management expertise that are crucial to systems implementation and utilisation success. Although IS failure is not an uncommon phenomenon in most countries, developing countries tend to lack the capacity to readily implement alternative solutions when failure occurs.

Given the environments in which they operate, how can firms in developing countries build capabilities to effectively acquire, deploy, exploit and sustain computer-based information systems and create sustainable business value? The answer to this question lies in an understanding of how organisations assemble and accumulate the capabilities to carry out technological innovations effectively. This understanding hinges on two related developments. The first is a holistic understanding of what constitutes technology and how technology contributes to the process of institutional development. The second is a clear conception of the nature of organisational capabilities and how these capabilities develop and are sustained. Current research and writings associated with institutional and evolutionary economics (Nelson and Winter, 1982; Dosi and Orsenigo, 1988; Lall, 1987, 1992; Lall, et al., 1994; Bell and Pavitt, 1993; Zander and Kogut, 1995) and those associated with the resource-based view of the firm in strategic management (Penrose, 1959; Wernerfelt, 1984; Barney, 1986; Dierickx and Cool, 1989; Prahalad and Hamel, 1990; Grant, 1991; Barney and Zajac, 1994; Collis, 1994; Hamel and Prahalad, 1994; Teece and Pisano, 1994) provide the epistemological basis for investigations into this question.

1.2. Technology and technological capabilities

Historically, societies and their constituent institutions have sought to deploy technology to enhance and sustain their economic and social well-being. The consequences of the application of technology have, however, been asymmetrical within and across societies and organisations. There has been great variability in outcomes in the implementation of technology (Rosenberg, 1982). The reasons for the variability are not well understood. Traditional explanations emphasising differences in factor endowments have proved inadequate (Freeman, 1988).

One explanation that has received particular attention recently is that successful organisations tend to be those that develop significant capabilities to acquire, deploy, diffuse and retain technological and organisational knowledge (Chandler, 1992; Dosi, et al., 1994; Dahlman, Ross-Larsen and Westphal, 1987; Lall, et al., 1994; Bell and Pavitt, 1993). These organisations have developed capabilities in identifying and mastering their core technologies, effectively integrating them into the business processes, and engaging in process and product innovation in the face of changing business and technological environments and opportunities. Lazonick (1991) attributes the passage of industrial leadership from Britain to the United States and Germany to the superior organisational capabilities developed in these countries.

Much of the recent discussion surrounding the transfer of technology and the accumulation of technological capability in developing countries is increasingly being influenced by the recently propounded evolutionary theory of the firm (Nelson and Winter, 1982). Although their work did not specifically address developing countries, the concepts explicated provided the theoretical support for investigations into technology transfer associated with that context. In contrast to 'neo-classical' economists, Nelson and Winter place the emphasis on production rather than exchange (Chandler 1992). In their view, firms relate to their various stakeholders through a series of 'routines' which have "arisen in the firm through a series of past actions" (Nelson 1987). Routines result from purposeful activities of the firm's actors to find "better ways of doing things". The routines are themselves derived from decision processes characterised by "bounded rationality". Nelson (1987 p. 21) proposes that firms that have better routines will tend to prosper and grow relative to those firms whose capabilities and behaviour are less well suited to the current situation.

Most classical treatments of technological choice and adoption tend to obscure the very complex nature of the processes involved in acquiring and deploying a particular technology in an organisation (Bell and Pavitt, 1993). The notion that firms have unimpeded access to the international technological "superstore" from which they can acquire needed technology is misleading (Rosenberg, 1994). It assumes, on the one hand, that information about technology is readily available and that it can be acquired without significant investment (Carlsson and Eliasson 1994; Lall, et al., 1994; Rosenberg, 1994). On the other hand, the assumption is also made that once firms acquire a given technology, that technology can be readily and seamlessly incorporated into the current productive and business processes of the organisation. Lall (1992 p. 166) asserts that "technological knowledge is not shared equally among firms, nor is it easily imitated by or transferred across firms". Acquiring technological capability requires significant effort (Hillebrand, et al. 1994) and investment in technological learning (Dodgson, 1991; Bell, 1984; Bell and Pavitt, 1993; Nelson, 1994).

Deploying computer-based information systems requires a high degree of technological capability. To build a base for later discussion there is need to establish our understanding of the concepts 'technology' and 'capability'. These two terms have been used in various instances to mean different things. Technology is often conceptualised as simply a piece of hardware. At other times it refers, not just to the hardware, but the whole gamut of techniques and processes surrounding production. There is much confusion and contradiction surrounding the use of the term 'capability'. It is at various times used to mean 'competence', 'skill', 'knowledge' 'ability' or any combination of these. This makes it difficult to determine if researchers in this area are indeed 'talking the same language'. The next two sections will outline our conception of both terms.

1.3 Conceptualising technology and technological knowledge

Most people adopt a narrow view of technology that centres on what is embodied in a product or technological artefact. However, any product is the result of the employment of knowledge and a whole series of techniques and procedures organised in a productive way. No product is possible without this combination. Technologies are constructs of the general and specific environments in which they are developed. They do not arise in a vacuum. They

embody social and organisational characteristics (Hillebrand, et al. 1994). Technology should therefore be seen to encompass more than the mere product. Dahlman, et al. (1987) propose that

> ...technology is not simply a product to be bought and sold. It is a method for doing something, and using that method requires three things: information about the method, the means of carrying out the method, and some understanding of the method. Moreover, the term, technology, refers to more than just the physical processes that transform inputs into outputs and the specifications for those inputs and outputs. The term also refers to the procedural and organizational arrangements for carrying out the transformations. (pp. 762)

Stewart (1984, p. 1) concurs, propounding that

> ...technology is often identified with the hardware of production--knowledge about machines and processes. Here a much broader definition is adopted, extending to all the `skills, knowledge, and procedures for making, using and doing useful things'. Technology thus includes methods used in non-marketed activities as well as marketed ones. It includes the nature and specification of what is produced - the product design - as well as how it is produced. It encompasses managerial and marketing techniques as well as techniques directly involved in production.

For Zander and Kogut (1995, p. 77) technology "consists of the principles by which individual skills and competence are gained and used and by which work among people is organised and co-ordinated".

Technology is a cultural artefact developed to satisfy the needs of a particular cultural group. It cannot be isolated from factors in the social and organisational contexts in which it is employed. It is both legitimised and constrained by these factors. Transferring technology from one cultural setting to another raises numerous questions about appropriateness, efficacy, cultural domination, and indigenous development. Information technology epitomises the ultimate cultural artefact. It not only encapsulates productive techniques, it can embed culturally determined procedures and routines. This is especially the case with computer

software. The dominant theme in the implementation of IT is that it will assist in the production of a rational answer to the most complex questions. The problem this presents is that these IT 'solutions' embed logic based on a particular rationalisation that may be at variance with the prevailing logic in the local context. The logic of efficiency and effectiveness, competitive advantage through automating, informating and transforming business routines and processes, may be the dominant theme in IT implementation efforts in industrialised countries. This same logic may be seen as anathema in other contexts where the dominant logic is personal advantage through chaos, control of information, and centralisation of decision-making.

Technology, in this research, means more than just the output of a production process. It incorporates all the knowledge, skills, techniques and procedures, including managerial and organisational ones, employed in the development of economic units. Being socially contrived, technology incorporates much of the distinctive features of the social or organisational context in which it is developed. It therefore tends to have firm-specific properties and comprises a very large tacit element, acquired through a process of accumulation, that cannot be easily appropriated (Bell and Pavitt, 1993; Dosi and Orsenigo, 1988; Zander and Kogut, 1995). According to Dosi and Orsenigo (1988 p.16)

> technology is not a free good, but involves specific, often idiosyncratic, partly appropriable knowledge which is accumulated over time through equally specific learning processes, whose direction partly depends on firm-specific knowledge and on technologies already in use.

1.4 Information systems as technology

Organisational information systems have increasingly incorporated substantial amounts of information technology. Information technology, unlike manufacturing or other production technology, has the potential to transform radically, not only the process of organisational functioning, but the very nature of organisations themselves (Scott Morton, 1991; Venkatraman, 1994; Fulk and DeSanctis, 1995). IT fundamentally alters the production, communication and co-ordination processes in organisations. Traditional organising principles (such as hierarchies, departmentation and spans of control) are being

substituted for by new modes of executing work. The application of IT has the effect of escalating social, economic and technical transformation.

IT changes the knowledge structure in organisations. Proprietary knowledge, previously held by individuals, can now be codified and made easily available to a vast number of people at the same time. Specialised knowledge (accounting, engineering and manufacturing principles) can be encoded in computer software. Computer technology has revolutionised manufacturing through the use of computer-aided manufacturing (CAM) techniques. The architecture profession has been transformed by innovations in computer-aided design (CAD) (Yetton, et al. 1994). The banking and distribution industries make extensive use of electronic data interchange (EDI). EDI also provides the backbone support for just-in-time (JIT) manufacturing systems. Shared access to corporate databases has been greatly facilitated by the use of information technology. This is most evident in the travel and insurance industries (Tapscott and Caston, 1993).

In the industrial era, the transfer of manufacturing technology was seen as the most effective way encouraging economic development. Most studies on technology transfer have therefore focused on the transfer of manufacturing technology and know-how. Throughout the 1980's and into the 1990's the move to a knowledge-based economy has gathered momentum. This has been facilitated by the far-reaching and overwhelming developments in the information technology field. Many view information and communications technology (ICT) as the new driving force behind technological and economic development. This trend is observed in efforts by countries to develop national information technology policies and infrastructures in many countries (National Computer Board, Singapore, 1992)

1.5 Conceptualising organisational capability

Recent interest in evolutionary and resource-based views of the firm (Nelson and Winter 1982; Wernerfelt 1984; Barney, 1986; Dosi and Orsenigo, 1988) has focused attention on organisational capabilities and how they distinguish between those organisations that are successful in maintaining and enhancing business performance and competitiveness and those that are not. The evolutionary and resource-based views of the firm represent two complementary streams of current research that inform contemporary investigation into

organisational capabilities. They support the notion of organisational heterogeneity and give primary consideration to how organisations develop and accumulate firm-specific knowledge which provides the basis for their distinctiveness. Tables 1.1 and 1.2 highlight the main elements of these research approaches.

Table 1.1 Research on organisational capabilities: evolutionary economics focus

Research focus	Technical change and the development of technological capabilities
Epistemological foundations	Industrial and evolutionary economics (key proponent Nelson and Winter, 1982)
Unit of analysis	Industrial firms
Key concept	Organisational 'routines' as source of growth and prosperity
Mechanism for developing capability	Technological accumulation and technological learning through technology transfer and localised technological innovation
Presumed outcomes	Industrial development and growth

♦ Organisational capabilities: an evolutionary perspective

A number of institutional and evolutionary economists, concerned with technical change, technological learning and technology transfer, have begun to highlight the asymmetries that exist between firms in various settings in the employment and diffusion of technology (Lall, 1982, 1987; Rosenberg 1982, 1994; Bell, 1984; Fransman, 1984; Bell and Pavitt, 1993; Dosi and Orsenigo, 1988; Freeman, 1988). Traditionally, only major technological innovations and breakthroughs were considered by economists as significant to the growth of indigenous technological capability. This focus on the capacity to undertake major technological innovations tended to ignore the much broader effort in technological learning and knowledge accumulation that organisations engaged in during the process of acquiring, implementing and assimilating new technology. By focusing attention on equilibrium theory, they have aggregated factors relating to the processes involved in technical and institutional change as `residual factors' or `exogenous shocks'. (Freeman 1988). Several authors (Rosenberg, 1982; Lall, 1982, 1987; Bell 1984; Fransman 1984; Westphal, Kim and Dahlman, 1985; Dosi and Orsenigo, 1988; Freeman, 1988) however, have begun to focus more on the inevitable consequences of `learning' that result from the interaction with

imported technology and the subsequent generation of technical innovations by indigenous enterprises. As Westphal, et al. (1985 p. 168) commented:

> Why is it that economists typically do not associate technological development with the industrialisation of developing countries? Perhaps because invention, the central aspect of global technological development, plays only a minor part in the process. Most technology introduced in developing countries is transferred in one way or another from industrially more advanced countries. But because industrialisation adds to the variety of products produced and processes used in a country, it surely does involve technological development in the sense of gaining mastery over products and processes that are new to the local economy. The minor role of invention simply means that much technological development consists of assimilating foreign technology.

Lall (1982,1987) reiterates this point by suggesting that the breakthrough syndrome has detracted from a proper appreciation of the contribution of technological changes made in the process of diffusion, imitation and adaptation.

Implementing technology into a new setting requires a certain amount of adaptation. This adaptation might be major or minor depending on the circumstances. In the case of application software, for example, modifications might have to be made to particular aspects of the application such as account numbers, reports, field attributes. Those implementing the new technology have an opportunity to learn about the technology and the organisational processes required to successfully implement it. This type of learning is characterised as 'learning by doing' or 'learning by operating' (Bell, 1984). Firms develop capabilities in operating and using the technology by investing in the creation of a stock of knowledge about the technology in use. This may lead it to expand its experience to allow it to "move through phases based successively on replicative copying, the specification of 'minor' improvements and modifications, formalised overall re-design, and R&D based innovation." (Bell, 1984 p. 201)

Institutional and development economists offer a number of suggestions as to what is meant by technological capability. Boye, et al. (1988) define technological capability as "the cognitive, behavioural and evaluative dimensions necessary for understanding, replicating,

adapting and improving the borrowed technology." Lall's (1987) definition suggests that technological capability is the general ability to undertake the broad range of tasks involved in the selection, acquisition, assimilation and innovation of technology at an organisational or national level. Westphal, et al., (1985) propose that technological capability is the ability to make effective use of technological knowledge.

To assimilate, reproduce and diffuse new technologies effectively, Bell and Pavitt (1993 p. 162) suggest that firms in developing countries

> must accumulate the deeper forms of knowledge, skills and experience required to generate continuing paths of incremental change, which both improve on the original performance standards of the technology in use, and modify its inputs, outputs and processes in response to changing input and product markets.

They define technological capabilities as consisting "of the resources needed to generate and manage technical change, including skills, knowledge and experience, and institutional structures and linkages". (p. 163)

Enos (1991), approaching technological capability from a national perspective, argues that indigenous technological capability comprises three fundamental components. The first attribute is the `complex mix of human skill whose common characteristic is technical knowledge'. The second attribute is an institution or institutions which permit the assembling and application of technical knowledge. The last attribute is a common purpose, which provides the focus for the achievement of organisational and individual objectives.

> The first of these attributes probably gives rise to the least disagreement; technological capability resides in individuals with the inclination, training and experience which enable them to cope with certain portions of the overall body of useful knowledge we call technology. The second fundamental component of technological capability is the institution within which individuals with different talents and know-how are assembled. Operating singly in a technologically complex environment, individuals can produce little, regardless of their ambition and enterprise. In order to absorb or advance a technique, they need to be brought together within an institution...

> The third component of technological capability is arguably the most vital and yet arguably the most ambiguous: it is a common purpose. Without purpose, an assembled number of individuals, whatever their skills, are unproductive. It is only when they are co-operating, with some objective in sight, that their talents are fully exploited. (pp. 3-4)

Enos further suggests that technological capability is not an absolute, but a relative phenomenon. It varies across developing countries and across sectors of economic activity. To develop technological competence, Enos proposes three broad policy prescriptions. These are, the nurturing of skills, the creation of organisations and the instilling of purpose.

Lall (1992) and Dahlman, Ross-Larson and Westphal (1987) propose functional classifications of technological capabilities. According to Lall's classification, technological capabilities can be divided into investment, production and linkage capabilities.[1] Investment capabilities refer to the skills and information required to identify potential and feasible investment projects. It also includes the ability to locate and purchase suitable technologies, to design and engineer, construct and commission the production facilities. Production capabilities are the skills needed for the operation and improvement of production facilities. These include the performing of routine functions, making adaptations and improvements to production technology, implementing and improving control, maintenance and scheduling procedures through process and product engineering. Linkage capabilities refer to the skills needed to establish and maintain production and technological links with other firms and institutions. These links involve the development of co-operative relations that facilitate the sharing of technical knowledge, information and skills. It may lead to the licensing of the firm's own technology to others and eventually involve major technology transfer to other firms.

The development of the a firm's capabilities involves significant investment of time and resources. Accumulation of technological capabilities does not take place overnight. It also means that firms must be prepared to invest in people in order to enhance their capacities to absorb new technologies and processes (Cohen and Levinthal, 1990).

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[1] Dahlman, et al. refer to production, investment and innovation capabilities.

- **Technology transfer and the development of technological capabilities**

The development of technological capabilities in developing countries is intimately linked to the process of technology transfer. This process tends to follow the sequence of identification, adoption, utilisation, adaptation, re-design and innovation of technology (Bell, 1984; James, 1988; Sviedrys, 1989; Lall, 1987, 1992, 1994; Hillebrand, et al., 1994). Identification and selection of the appropriate technological solution is the first major hurdle faced by those engaging in the process of technology transfer. This is because factor markets are inherently inefficient and are characterised by uncertainty, unpredictability and imperfect information (Dosi, 1988; Lall, 1992). Firms do not necessarily optimise or make decisions on the best available information. Many other considerations go into the selection process. Once the 'appropriate' technology is identified it is acquired and implemented.

The full transfer of technology is made possible when recipient organisations develop the capabilities to productively implement and enhance the transferred technology. Lall (1982, 1987) uses the terms *`know-how'* and *`know-why'* to characterise two distinct stages in the development of technological capability. According to Lall (1987, pp. 14)

> we categorize the capability of implementing and slightly modifying brought in designs as *'know-how'*. Know-how involves the mastery of production technology utilising a given set of technological parameters - it does not involve the understanding of how the parameters themselves (the basic scientific, metallurgical, engineering principles) are derived...The further development of this capability, leading to substantial changes to product design and to new product introduction, requires *know-why* - the knowledge of the basic principles of the technology. This can be based only on the conscious effort directed at collecting the necessary empirical and theoretical data, conducting trials and formally synthesising the results. This is what is commonly known as `applied' R&D...There is still a further stage: the enhancement of know-why itself. This represents learning at the frontiers of technology, and is generally known as basic research.

The accumulation of know-how which accompanies the acquisition and operationalisation of technology is a very important factor in technological development. It provides the base for the later development of know-why. Various studies (Lall 1987, India; Katz 1985, South America; Westphal, et al. 1985, Korea) have shown that the build-up of technological capability began with a focus on the accumulation of know-how and only later was there a shift in focus to the development of know-why. Again, it should be pointed out that while know-how is certainly a part of know-why, there are discontinuities in the relationship between the two phenomena. The character of the relationship is determined by factors such as the nature of the firm, the technology in use, the scale of production. Katz (1985) shows important distinctions that can be made between small, family owned firms, local subsidiaries of multinational corporations, public enterprises and locally owned, large incorporated firms.

Much of the literature on technological capability, innovation, and the strategic management of technology implicitly assume that learning is a central feature in the development of technological capabilities. Learning, in many instances, is assumed to be a costless and automatic result of the process of "doing". Thus "learning-by-doing" is a prominent theme in the economic literature. This premise of costless learning has been criticised by some researchers. Bell (1984) and Dodgson (1991) argue that learning is neither costless or automatic. Bell and Pavitt (1993) suggest that while `doing-based learning' might explain some of the growth in technological capacity in firms and industries, there is not enough evidence to show that it is sufficient to maintain technological progress and overcome significant discontinuous change in technology. Experience is of no significant benefit unless efforts are made to harness the knowledge that flows from that experience. Sometimes firms must adopt entirely new forms of technology to maintain their competitive position.

Navigating the technology innovation path involves significant investment in technological learning and the accumulation of technical and organisational knowledge. Information technology-based information systems are characterised by rapid change, discontinuity and obsolescence in the character, content and application of technology. What was considered "leading edge" a year ago is now surpassed by entirely new technology. In order for computer-based information systems to remain relevant to the needs of business, mechanisms to re-configure, re-engineer and transform these systems must be put in place.

♦ Organisational capabilities: a resource-based perspective

In the strategic management field the interest in organisational capabilities have been fuelled by the search to explain the asymmetries between firms engaged in competitive markets: what it is that creates sustainable competitive advantage? Explanations provided by neo-classical economists and researchers on market structure and competitive positioning such as Porter (1980, 1985) failed to explain fully why some organisations continued to dominate the markets in which they competed and why others did not. The search for answers led to a renewal of interest in the resource-based view of the firm influenced to a large extent by Penrose (1959) and articulated by Wernerfelt (1984) and Barney (1986). The resource-based view of the firm holds that competitive advantage resides in the firm-specific capabilities that are generated in organisations. These capabilities are in many ways idiosyncratic and are not easily replicated or imitated. Much of this firm-specific knowledge is localised and tacit in nature. The capabilities make it possible for firms to engage in continuous innovation, which cannot be easily replicated in the market, through the unique integration, deployment, co-ordination of internal and external skills and resources.

Table 1.2 Research on organisational capabilities: resource-based perspective

Research focus	Strategic management of organisational capabilities
Epistemological foundations	Resource-based view of the firm (Penrose, 1959; Wernerfelt, 1984; Barney , 1986)
Unit of analysis	Diversified business firms
Key concepts	'Resources', core capabilities (or competencies)
Mechanism for developing capability	Deploying and exploiting organisational assets through strategic planning, integration, co-ordination, and organisational learning.
Presumed outcomes	Superior performance and competitive advantage

Wernerfelt (1995) attributes the growth in interest in the resource-based view of the firm among practising managers to an article (Prahalad and Hamel 1990) published in the Harvard Business Review. The article focused attention on the role of core competencies in

creating sustainable competitive advantage in large multinational firms. A number of articles have since appeared attempting to define and understand how competence is developed (McGrath, MacMillan and Venkataraman, 1995); measured (Henderson and Cockburn, 1994); and which describe how distinctive capabilities emerge (Levinthal and Myatt, 1994; Teece and Pisano, 1994). Some have pointed out possible unintended negative consequences of focusing on core competencies (Leonard-Barton, 1992). Collis (1994, p. 151) suggests that capabilities, while an important source of competitive advantage, have limits since current capabilities could easily be superseded by higher-order capabilities.

The use of the terms 'competence' and 'capability' in the strategic management literature is confusing (Collis, 1994). Both terms are sometimes used simultaneously to refer to the same concept (Henderson and Cockburn, 1994). Henderson and Cockburn (1994) suggest that there are two categories of competencies: 'component' and 'architectural' competencies. Component competencies consist of the "local abilities and knowledge that are fundamental to day-to-day problem solving". Architectural competencies involves "the ability to use these component competencies--to integrate them effectively and to develop fresh component competencies as they are required" (Henderson and Cockburn, 1994 p. 65). In this research, we distinguish between competencies and capabilities. Competence represents the capacity to effectively and efficiently accomplish specific organisational tasks. It involves the application of specialised and firm-specific knowledge and skills. This is similar to Henderson and Cockburn's 'component' competence.

Capability consists of the ability to consistently deploy an integrated set of resources (including specialised competencies) towards the attainment of specific functional and strategic objectives. Capability here can be understood as being similar to 'architectural' competence (Henderson and Cockburn, 1994). Hamel and Prahalad (1994, p. 202) conceives of organisational competence (capability) as "a bundle of skills and technologies rather than a single discrete skill or technology". In their view organisational capability covers a broad range of skills. Collis (1994 p. 145) defines organisational capabilities as "socially complex routines that determine the efficiency with which firms physically transform inputs into outputs." He emphasises the notion that routines are products of the entire organisation system and that they are reflected in the observable processes and structures of the organisation as well as in the invisible elements such as the corporate culture and in employee relations.

Collis (1994) identifies three levels of organisational capabilities. These are functional, innovation, and entrepreneurial capabilities. Functional capability consists of the ability to perform basic functional activities of the firm. Innovation capability is the ability to make dynamic improvements to the activities of the firm in response to environmental and market trends. It also encompasses the ability to learn, adapt, change and renew over time. Entrepreneurial capability involves the ability to develop novel ways of carrying out the firm's activities. This is manifested in strategic foresight, i.e. the ability to conceive of entirely new ways of developing and deploying the firm's resources.

The concept of dynamic capabilities is introduced and elaborated on by Teece and Pisano (1994). They suggest that "the term 'capabilities' emphasises the key role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organization skills, resources and functional competencies toward [a] changing environment"(Teece and Pisano, 1994 p. 538). Dynamic capabilities are determined by three strategic dimensions of the firm, its processes, its position and the paths available to it (Teece and Pisano, 1994 p. 541). Table 1.3 outlines the strategic dimensions of dynamic capabilities described by Teece and Pisano. Grant (1991 p. 119) distinguishes 'resources' from 'capabilities'. Resources can be categorised as financial, physical, human, technological, reputation, and organisational. The capabilities of a firm are what it can do as a result of the synergistic application of resources. Resources are the source of capabilities and capabilities give rise to competitive advantage.

Table 1.3 Strategic dimensions of organisational capabilities (Teece and Pisano, 1994)

Dimensions	Descriptions
1. Processes	**The way things are done in the firm. Its 'routines' or patterns of current practice and learning.**
♦ Integration ♦ Learning ♦ Re-configuration/ Transformation	• Co-ordination of internal and external activities and alliances • Process of generating new 'solutions' and embedding them in organisational routines. • Undertaking organisational change in response to changing environments and opportunities
2. Positions	**Endowments of technology and intellectual property as well as customer base and upstream alliances with suppliers**
♦ Technological assets ♦ Complementary assets ♦ Financial assets ♦ Locational assets	• Firm-specific know-how that differentiates a firm from its competitors • Other assets that support the exploitation of innovations e.g. distribution network • Cash position and degree of financial leverage • Geographical location of particular advantage
3. Paths	**Strategic alternatives available to the firm and the attractiveness of opportunities which lie ahead.**
♦ Path dependencies ♦ Technological opportunities	• Future position depends on current position and past investments • Investment choices faced by firms

1.6 Key characteristics of organisational capabilities

Organisational capabilities as discussed from the evolutionary and resource-based perspectives of the firm share a number of common or complementary characteristics. These provide important points of departure in understanding the nature of organisational capabilities and the contingencies surrounding their accumulation and exploitation. Table 1.4 highlights some of the key characteristics of organisational capabilities. Ten attributes are posited, each associated with a number of characteristics derived from selected references in the extant technological and organisational capability literature. Although these may not be all the possible attributes, they represent those most consistently referred to in the capability literature.

Table 1.4 Key characteristics of organisational capabilities

Attributes	Characteristics	Descriptions	References
Nature	• Firm-specific • Localised • Idiosyncratic • Causally ambiguous	Capabilities arise in non-market conditions within firms. They tend to be idiosyncratic, reflecting the firm's particular history and experience.	Dosi and Orsenigo, 1988 Dierickx and Cool, 1989 Lall, 1992, 1994 Teece and Pisano, 1994 McGrath, et al., 1995 Zander and Kogut, 1995
Development mode	• Evolutionary • Cumulative • Path Dependent • Incremental • Constrained by the past.	Capabilities develop in an evolutionary manner building on past investment and knowledge bases. Capabilities are 'built not bought' (Teece and Pisano, 1994). Past investment strongly influence the capabilities that are pursued.	Nelson and Winter , 1982 Nelson, 1987 Bell and Pavitt, 1993 Rosenberg, 1994 Teece and Pisano, 1994 Zander and Kogut, 1995
Knowledge Characteristics	• Explicit • Tacit	Firm capabilities tend to have a large tacit dimension that is difficult to articulate and codify.	Nelson and Winter, 1982 Nelson, 1987; Dosi, et al., 1988 Bell and Pavitt, 1993 Lall, 1994; Nonaka, 1994 Carlsson and Eliasson, 1994 Senker, 1995
Decision criteria	• Imperfect information • Uncertainty • 'Bounded rationality'	Search for and selection of appropriate firm strategies, technologies and organising principles are characterised by imperfect information.	Nelson and Winter, 1982 Nelson, 1987; Dosi and Orsenigo, 1988; Lall, 1992; Simon, 1993 Fransman, 1994; Rosenberg, 1994
Replicability	• Inimitable or difficult to replicate	"Organizational capabilities, and the routines upon which they rest, are normally rather difficult to replicate". (Teece and Pisano, 1994 p. 549	Dierickx and Cool, 1989 Teece and Pisano, 1994 Grant, 1991 Collis, 1994
Knowledge Accumulation	• Require significant investment in continuous learning	The development and accumulation of technological knowledge requires significant investment in continuous organisational learning.	Bell and Pavitt, 1993 Lall, 1992; Dodgson, 1991 Hillebrand,et al., 1994 Teece and Pisano, 1994
Locus	• Organisational not individual	Organisational capabilities represents the synergistic combination of a large number of competencies resident in individuals and groups. No single individual embodies the entirety of an organisations capabilities.	Dosi and Orsenigo, 1988 Hamel and Prahalad, 1994 Collis, 1994
Typology	• Hierarchical	Organisational capabilities can be considered as hierarchical. They can be separated into functional, tactical, or strategic categories.	Nelson, 1987 Lall, 1992, 1994; Collis, 1994 Hamel and Prahalad, 1994 Teece and Pisano, 1994 Carlsson and Eliasson, 1994
Predicted outcomes	• Effective Performance • Competitive advantage • Dynamic growth	Better capabilities (routines and organising principles) convey competitive advantage and lead to more effective and productive firms.	Nelson and Winter, 1982 Barney, 1986 Nelson, 1987 Chandler, 1990 Hamel and Prahalad, 1994
Contra-indications	• Asset erosion • "Rigidities" • "Infinite regress" • Obsolescence	Investment in core capabilities can make adaptation to new circumstances difficult. Current capabilities can be super-ceded by higher order capabilities	Dierickx and Cool, 1989 Leonard-Barton, 1992 Collis, 1994 Chandler, 1990

1.7 Organisational capability and information systems

Whether they convey competitive advantage (Cash and Konsynski, 1985; Johnson and Vitale, 1988; Wysocki and Young, 1990), enable cost reduction, provide management support (Boynton, Zmud and Jacobs, 1994) or they are competitive necessities (Clemons and Row,

1991), computer-based information systems have become a central feature in business enterprises. The returns from investment in IT have, however, been asymmetrical at best. Some firms have experienced positive gains in terms of productivity and profitability from investment in computer-based systems. Others, having made even larger investments, have not experienced similar returns (Boynton, et al., 1994; Weill, 1992). The resulting 'productivity paradox' has become a significant concern for researchers (Mooney, Gurbaxani and Kraemer, 1995). Indeed, several researchers (Kelley, 1994; Soh and Markus, 1995; Mooney, et al., 1995) suggest that understanding IT's contribution to business value requires a redefinition of the outcome measure. Most current measures of IT outcomes tend to focus on overall productivity or profitability gains that can be directly attributed to IT investment. The tendency of this type of global input/output rationalisation, however, is to obscure the significant IT impacts that occur at the process level of IT application rather than at the overall firm level (Kelley, 1994; Soh and Markus, 1995; Mooney, et. al, 1995). Mooney, et al. (1995, p.21) assert that "to assess the technology's impact on firm revenues is an unreasonable abstraction of its role and potential since the ultimate revenues depend on the competitive viability of the [firm's] strategy."

Because of the natural heterogeneity of business firms and other organisations, it should not be surprising that the results of IT investment are asymmetrical across firms. Firms operate in a variety of contexts (Weill, 1992) and have differential capacities to absorb and assimilate information technology (Boynton, et al., 1994). Weill (1992) introduces the concept of 'conversion effectiveness' which, he claims, moderates the impact of IT investment on firm performance. Conversion effectiveness "is defined as the quality of the firm-wide management and commitment to IT"(p. 312). Conversion effectiveness is comprised of four factors. These are: top management commitment to IT, previous firm experience with IT, user satisfaction with systems, the turbulence of the political environment within the firm. Other researchers have highlighted the intervening roles of the organisational context (Walsham, 1993), management processes (Soh and Markus, 1995), managerial IT skills (Mata, Fuerst and Barney, 1995), management climate (Boynton, et al., 1994), IT assets (Soh and Markus, 1995), complementary resources (Clemons and Row, 1991) in explaining differential performance of IT in creating business value.

The underlying presumption of many when evaluating the returns on a firm's IT investment is to assume that all firms have similar capabilities to conceptualise, design, develop, deploy and exploit computer-based information system. Studies within and outside the IS field clearly show, however, that organisations have differential capacities to absorb and deploy IT resources (Boynton, et al., 1994). We introduce the term 'information systems capability' to describe an organisation's capacity to invest in, deploy and exploit computer-based information systems to support business objectives. Information systems capability is conceptually related to organisational capabilities (Mata, et al., 1995). While organisational capabilities refer to the broad categorisation of an organisation's capacity to attain its business objectives, information systems capability represents that subset of capabilities related to the deployment and effective use of computer-based systems in support of an organisation's strategic goals.

In this research, information systems capability is defined as the organisational capacity to orchestrate investment in acquiring, deploying, exploiting and sustaining computer-based information systems in support of the strategic and functional objectives of the organisation. This capability will be reflected in an organisation's initial capacity to conceptualise, acquire, deploy, exploit and sustain organisation-wide computer-based information systems. It will further be manifested in the sustained and subsequent ability to re-engineer, re-configure and re-deploy existing and future information systems to meet changing organisational needs and to take advantage of new technologies and opportunities. At its very essence, information systems capability encompasses the ability to determine the scope and content of the information system that is demanded by the context and content of a business strategy, the ability to put such a system in place and the capacity to enhance and sustain it over time. An organisation demonstrating a high level of information systems capability is one which in which IT/IS knowledge and skills are widely diffused across all levels (strategic, tactical, and operational) of the organisation. Such an organisation would have created and deployed high quality IT assets (technological infrastructure, human resources, and the relationships between IS and internal and external clients and suppliers) and have demonstrated significant IT impacts at functional and process levels (Soh and Markus; 1995; Mooney, et al., 1995). It would also demonstrate high levels of managerial, technical and operational (user) IT competence. Generally, an organisation with a high level of IS

capability would exhibit substantial improvement in overall organisational effectiveness and competitiveness.

1.8 Key characteristics of organisational information systems capability

Information systems capability may be understood in the light of the attributes and characteristics of organisational capabilities discussed earlier. Table 1.5 presents a taxonomy of organisational capability attributes and characteristics and relates them to extant and current information systems research. This provides a useful way of conceptualising the various characteristics of organisational information systems and the issues to be tackled if they are to be developed and deployed effectively. The references provided present a non-exhaustive sample of relevant citations. In many cases the characteristics highlighted are implied in much of the research although they may not be specifically articulated.

Table 1.5 Key characteristics of organisational information systems capability

Attributes	Characteristics	Descriptions	Selected References
Nature	• Firm-specific • Localised • Idiosyncratic • Causally ambiguous	IS capabilities are largely dependent on the context (external and internal) in which they arise and on the content of the particular information systems and the processes supporting their deployment. 'Conversion effectiveness' and 'absorptive capacity' moderate IT investment outcomes	Han and Walsham, 1993 pp. 16-17 Walsham, 1993 Mata, et al., 1995 Weill, 1992 Boynton, et al., 1994
Development mode	• Evolutionary • Cumulative • Path Dependent • Incremental • Constrained by the past.	IS capabilities take time to acquire and develop in an evolutionary manner building on past investment IT assets and knowledge bases. IS capabilities are 'built not bought'. Previous investment in IT assets affect future capability development.	McFarlan and McKenney, 1982; Lyytinen, 1991; Cooper and Zmud, 1990. Venkatraman, 1994 Markus and Soh, 1993
Knowledge Characteristics	• Managerial knowledge largely tacit • Technical knowledge codifiable	Managerial IS/IT knowledge tacitly embodied in people and processes. Hiring experience IT personnel can transfer tacit knowledge. High IS/IT staff turnover leads to loss of IT knowledge Technical IS/IT knowledge and skills can be codified	Clemons, 1992 Mata, et al., 1995.
Decision criteria	• Imperfect information • Uncertainty • 'Bounded rationality'	Decision about IS/IT strategies, architectures, technologies, personnel and processes are characterised by uncertainty, imperfect information and 'bounded rationality'.	Implied in a majority of the extant IS research.
Replicability	• Some aspects imitable • others difficult to replicate	Technical knowledge can be replicated and imitated Managerial IT skills source of advantage IS/IT capabilities will convey competitive advantage when they are difficult to imitate	Mata, et al., 1995. Clemons and Row, 1991
Knowledge Accumulation	• Require significant investment	Building IS/IT capability involves more that simply investing in IT components Requires significant investment in staff development Requires investment in learning (search, accumulation and diffusion).	Raho, et al., 1987 Osterman, 1991 Johnston and Carrico, 1988
Locus	• Organisational • Not limited to a single individual or group	IS capability development depends on a multiplicity of groups and individuals within the organisation - Top management, middle management, business users - IT staff - IT champion - cross-functional project teams	Boynton, et al., 1994 McKersie and Walton, 1991; Davenport et al., 1989 Osterman, 1991; Beath, 1991; Benjamin and Levinson, 1993 Henderson, 1990.
Typology	• Hierarchical	IS/IT capabilities: operational, tactical, strategic Business process effects: automational, informational, transformational IT use: cost reduction, management support, strategic planning,, competitive thrust IT-enabled business transformation: localized exploitation, internal integration, business process redesign, business network redesign, business scope redefinition	Gorry and Scott Morton, 1971; Kirs, et al., 1989; Clark, 1992; Weill, 1992. Scott Morton, 1991; Mooney, et al., 1995 Boynton, et al., 1994 Venkatraman, 1994
Predicted outcomes	• Effective Performance • Competitive advantage • Dynamic growth • Organisational transformation	IS/IT capabilities will provide Improved organisational performance Business transformation Competitive advantage	Ives & Learmonth, 1984 McFarlan, 1984; Cash & Konsynski, 1985; Porter & Millar, 1985; Johnson & Vitale, 1988 Scott Morton, 1991; Hammer & Champy, 1993 Venkatraman, 1994 Fulk & DeSanctis, 1995
Contra-indications	• Erosion • "Rigidities" • "Infinite regress" • Obsolescence • Unuse or under-use	Investing in IS/IT capabilities can lock firms into paths of competitive disadvantage Current IS/IT capabilities can easily be superseded by new ones Even well develop systems can remain unused or under-used Investment in IT 'strategic necessities' no advantage	Ciborra, 1994; Economist, Jan. 13, 1996 Markus and Keil, 1994 Clemons and Row, 1991

1.9 Building information systems capability

The discussion in the previous section highlights the fact that information systems capability is a multifaceted phenomenon and that building such capability will be a difficult undertaking. It counteracts the naive belief that organisations can acquire capabilities to develop and deploy complex, organisation-transforming information systems by simply acquiring certain IT assets. Building information systems capability will require continuous

and intentional managerial action to guide the design, acquisition, deployment and integration processes. The exercise of effective managerial, technical and operational (user) IT skills is an imperative part of the capability building process. The notion of information systems capability emphasises management's purposeful role in creating and converting organisational IT resources into productive output. It also reflects the ability of users at all levels of the organisation to adroitly deploy and exploit the resources at their disposal. Such capability develops when IT and complementary organisational resources are created and mobilised by processes enacted through organisational routines along paths defined by the contexts and opportunities faced by the business.

Organisations attempting to successfully implement computer-based information systems must seek to build the requisite technical and managerial capabilities to conceptualise, design, acquire, deploy, exploit and sustain such systems. Building information systems capability involves self-conscious, intentional efforts to increase organisational knowledge and foster organisational learning. This will allow organisations to effectively leverage the benefits of computer-based information systems to attain business goals. It also entails effectively managing the change processes necessitated by the introduction of computer-based systems into the organisation's operating environment. An organisation's ability to manage change is directly related to its capacity to engage in continuous organisational learning. Organisational learning is constrained by the environmental context in which the entity operates (both external and internal) and by functional, technological and individual factors. All of these are moderated by the shared values that define the organisational culture and climate and which conditions the way the organisation functions.

The purposeful action of management in setting the direction for the strategic use of IT in organisations has been widely discussed in the IS and strategic management literature. Management plays an important role in creating IT assets, managing IT-enabled organisational change, creating an enabling organisational climate and harnessing the organisation's learning potential. The extent to which management undertakes these tasks effectively characterises the level of capability that the firm possesses in converting its IT resources into productive outcomes.

1.10 The strategic dimensions of information systems capability

In analysing and evaluating how organisations build information systems capability it may be useful to identify the various dimensions of capability that should be taken into consideration. Adapting Teece and Pisano's (1994) characterisation and incorporating concepts from evolutionary and resource-based views of the firm, three strategic dimensions of IS capability are identified. These are routines, resources, and contexts. Routines refer to how things are done in the organisation and reflect the activities of management and non-management personnel in conceptualising, designing and executing organisational activities related to the implementation of computer-based information systems. Five crucial routines are highlighted. These are strategic IS planning, IS organisation building, functional and strategic integration of computer-based information systems with internal and external activities and alliances, IT-enabled organisational change management, and IS/IT related organisational learning.

Resources refer to organisational endowments that are at the basis of IS capability development. These include IS/IT infrastructure, IS/IT human resources, organisational IS/IT competencies (managerial, technical and operational), financial capacity to invest in and sustain IS/IT infrastructure and services, supportive organisational culture and climate, and internal and external organisational linkages. Contexts reflect the environmental factors that influence organisational IT-related investments and the path-dependent nature of such investments. Investment alternatives are constrained, on the one hand, by internal and external contextual factors, including past IS/IT investments. On the other hand they are augmented by technological advances and the strategic challenges and opportunities faced by the organisation. Table 1.6 outlines the strategic dimensions discussed above and the factors that constitute those dimensions.

Identifying the strategic dimensions of information systems capabilities provides a basis for understanding and analysing how these capabilities are developed in organisations. Many of the factors associated with each of the dimensions have been explored extensively in the extant IS research literature. However, several issues are worth highlighting. These include the important role of a clear strategic vision for the use of computer-based information systems in organisations, the need to invest in human resource and organisational development, the

importance of effectively designing and managing IT-enabled organisational change and the need for creating a supportive and enabling organisational climate for computer-based information systems implementation. The significance of organisations engaging in intentional organisational learning is also highlighted.

Table 1.6 Strategic dimensions of organisational information systems capability

Dimensions	Descriptions
1. Routines	**The management and non-management practices and activities that promote the successful deployment and exploitation of computer-based information systems.**
♦ Strategic IS planning	Articulating a vision of the role of IS in the organisation and developing an IS strategy that is firmly aligned with business strategy.
♦ IS organisation building	Crafting the structure, processes and staff composition of the organisation to provide the mechanism effective implementation of IS/IT.
♦ IS integration	Co-ordinating the integration of functional IS/IT skills, processes, technology, and information.
♦ Managing IT-enabled change	Managing IT-enabled organisational change in response to changing environments and opportunities.
♦ IS-related learning	Generating new IS related knowledge and embedding them into organisational routines.
2. Resources	**Organisational endowments that create the capacity to undertake the deployment and effective use of computer-based information systems.**
♦ Human resources	Skilled and experienced managerial, technical, operational personnel
♦ IT infrastructure	Investments in IT resources: hardware and software.
♦ IS/IT competencies	Specialised IS/IT management, technical and operational competencies, gained through project implementation experience and R&D, embedded in organisational memory.
♦ Financial capacity	Capacity to fund and sustain investment in IT infrastructure and services.
♦ Organisational culture/climate	Organisational culture and climate supportive of IS development and implementation.
♦ Organisational linkages	Internal and external organisational linkages that promote the exchange of knowledge, skills and services.
3. Contexts	**The role of the historical, current and future contexts in influencing organisational IT-related investments.**
♦ Macro-environmental context	Historical and current external environmental factors (political, economic, social, regulatory, technological) influencing IS investment decisions and organisational IS capability development.
♦ Technological and strategic opportunities and challenges	Forces driving investment in computer-based information systems.

♦ Establishing a clear strategic IS vision

Organisational theory literature is replete with references about the need for a well articulated vision of what a business organisation would like to achieve. Such vision provides a linchpin for galvanising the commitment of organisation members. Hamel and Prahalad (1994) introduce the concept of strategic 'foresight' to encapsulate the notion of an organisation's expanded vision of what and how to serve customers. Providing foresight or vision is the responsibility of top management. "Top management cannot abdicate its responsibility for developing, articulating, a sharing a point of view about the future" (Hamel and Prahalad, 1994 pp. 80-81). Davenport, Hammer, and Metsisto (1989) emphasise the crucial role of top management in articulating an organisation's basic philosophy about IT and its role in attaining business goals. They suggest that this philosophy can be usefully articulated as a set of principles. These principles would address issues dealing with the type of IT/IS environment, the architectures (technical, information and managerial), the relationships with users, customers and suppliers, the organisation wishes to have. These principles are sometimes backed up by models and standards.

While the top managers of an organisation may articulate a vision of how they would like to see the organisation develop, the vision must be translated into a carefully crafted business strategy. An organisation's business strategy identifies its long term goals and objectives and the courses of action to be pursued in attaining them. Effective business strategies result from a strategic planning process. This involves the `process of examining an organisation's environment, establishing a mission, setting desired goals and objectives, developing an operating plan and developing a portfolio plan' (Ivancevich, et al. 1994 p. 204). Although strategic planning is often viewed as static it needs to be seen as a dynamic, iterative and continuous process. This is because the environment in which businesses operate is constantly changing and organisations are constantly learning new ways of addressing the challenges and opportunities posed by the environment.

It is a commonly held view in the IS field that the key to successful information systems implementation is an information systems strategy that is firmly rooted in overall business strategy (Brancheau and Wetherbe, 1987; Galliers, 1993; Kovacevic and Majluf, 1993). An information systems strategy should be developed in support of business strategy. The IS strategy does not have a life of its own but is subservient to the overall business objectives. Strategic planning for IS/IT is more than a technical process handled by technical

specialists. Rather, it is a managerial procedure that involves the entire organisation (Kovacevic and Majluf, 1993 p. 78). Effective IS/IT strategic planning requires the involvement of managers and users across the organisation.

♦ Investing in human resource and organisational development

While no factor can be singularly designated as most important, it is quite fair to say that without the right kind of people no capability building effort would be possible. Capability is a characteristic of people who in turn make up organisations. Organisational capabilities are the composite of various individual capabilities. For organisations to develop capabilities the right people need to be in place. Argyris and Schön (1978) emphasise the importance of individuals in organisations by suggesting that individuals 'are the agents for organisational learning...there is no organisational learning without individual learning' (pp. 19-20). Much of what an organisation knows is tacitly embedded in the minds of individuals who play a central role in correctly interpreting the messages that lead to effective performance. According to Nelson and Winter (1982 p. 104)

> Information is actually stored in the memories of the members of the organization, in which reside all the knowledge, articulable and tacit, that constitutes their individual skills and routines, the generalized language competence and the specific command of the organizational dialect, and, above all, the associations that link the incoming messages to the specific performances that they call for.

Individuals carry with them unique and implicit ways of accomplishing organisational tasks. Although individuals bring to the job previous education and training, much of what they will accomplish for the organisation will have been developed on the job. It is extremely important, therefore, for organisations to be effective in recruiting, developing and retaining the right kind of staff.

The development of information systems capability is rooted in the competencies of the individuals within the firm. It is not only attributable to managers and technical IT people, but extends to end-users at the operational level. People operating at the 'grassroots' of the organisation daily deploy and perfect the skills necessary for exploiting strategic IS applications

(Ciborra, 1994). Productivity benefits from IS results from both efficiently supplied and effectively utilised IS outputs (Nelson and Cheney, 1987, p. 550). For firms to appropriate the benefits of deploying computer-based information systems, managers must be willing to invest in developing the skills of its employees (Osterman, 1991). Trauth and Cole (1992) emphasise the importance of providing integrated organisational support for end-users to enable effective systems exploitation.

The retention of qualified and experienced IT staff is problematic for most organisations. Even if there is a high availability of suitably educated IT people, most organisations are seeking people with substantial experience who can get their systems up and running with a minimum of investment in training and development. This makes them willing to pay top salaries to suitably qualified candidates. This has led, however, to an almost incessant 'poaching' of experienced IT people by one organisation from another. Organisations hoping to build and sustain IS capability must develop effective ways to recruit, induct and retain well qualified and experienced IS personnel.

Organisational capabilities are not vested in a single individual (Collis, 1994 p.145). They are embedded in the firm's routines, processes, structures and culture. Simply aggregating the competencies of individuals will not result in the development of organisational capability. Advancing the state of the art and increasing the capacity to generate and manage change requires the cumulative efforts of people with a variety of skills and experience. An organisation may have people who are highly competent in their own right yet the organisation cannot say that it is truly competent. This is because the competencies vested in individuals are likely to be lost to the firm should that person decide to leave. Organisational competencies, although including them, are distinctly different from individual competencies. They are characteristic of the organisation rather than the individual. This means that the effective performance of an activity is not solely dependent on one person (Boynton, et al. 1994). The relevant skills are distributed across the organisational function. Organisational competencies have to be specifically developed and nurtured. Thus organisations must take specific steps to ensure that IT skills and knowledge become widely diffused and embedded in the organisation through a variety of learning interventions

♦ Managing IT-enabled organisational change

The introduction of computer-based information systems into an organisation should be viewed as a major technological innovation. Managing IT-enabled change is becoming more complex with time. This, according to Benjamin and Blunt (1992 pp. 16-17) is because

> the technology is allowing us to build ever larger and more complex systems, and supporting interdependent business processes will require those larger and more complex systems. Thus IT will continue to be involved in a change process that, at the same time, it makes more complex. IT complicates the change process in a number of ways: it moves the locus of knowledge and hence power in the organisation, it changes the time dimension of processes and decisions, and it enables new organisational constructs to be implemented.

Benjamin and Levinson argue that "organisations must recognize that managing the change enabled by IT is at least as important as bringing IT into the organization" (Benjamin and Levinson, 1993, p.33). The success of any change management exercise is highly dependent on organisational participants executing their roles effectively. The leadership provided by top management, the implementing skills of middle management and the involvement of user personnel in the design and development of the proposed systems are key components in the successful institution of IT-enabled change.

Effective implementation of IT depends on the alignment of the technology and the organisation that operates it (Mckersie and Walton, 1991). The alignment of IT with the organisation involves a process of organisational change and technology implementation (i.e. adoption, introduction and diffusion). This alignment can occur in several ways. The first involves pre-emptive organisational change followed by IT implementation. This envisages a situation where organisational changes have already been effected in preparation for the implementation of IT. IT is pulled into place by the users rather than pushed by sponsors or superiors (Mckersie and Walton, 1991, p. 251) This proactive approach to organisational and IT alignment is deemed to be desirable because it generally predicates significant user involvement. As a consequence IT and organisational change implementation tend to have a greater chance of success.

The second way of ensuring IT and organisational alignment is by simultaneous implementation of organisational change and IT. Increasingly this approach is viewed as beneficial in that it allows mutual adaptation of the technical and social subsystem of an IT installation (Mckersie and Walton, 1991, p.253). This symbiotic approach leads to more mutually acceptable systems and processes being implemented. The third approach suggested by Mckersie and Walton, involves the introduction of IT systems without adjusting the prevailing organisational arrangements. This assumes a deliberate choice to use technology to push the organisation to change and adopt new ways of operating. IT is seen as a catalyst that will generate the need for change. It opens the door that would otherwise be firmly shut. This approach might be very useful in organisations that tend to emphasise traditional ways of doing things and that tend to be highly resistant to change.

All three of the above processes assume deliberate and self-conscious actions on the part of management and users. However, this is not necessarily the case in practice. In organisations where the culture of deliberate and systematic planning is absent, IT systems are implemented haphazardly and without reference to a carefully developed and organised plan. In many organisations decisions are not made on the basis of what is best but on what is politically expedient. This is particularly the case with many public sector concerns and in some developing country settings. Information technology is sometimes brought into an organisation because a crisis has developed in the operational systems or simply because it seems the right thing to do. Many organisations, especially those without well developed management systems, don't follow consciously developed alignment strategies. The approach taken by many is an amalgam featuring aspects of all three. Following a technology-push strategy, as described in the third approach, can lead to an entrenchment of the status quo and a consolidation of the current power structures if the implementation process is not carefully co-ordinated and managed. This tendency is very prevalent in highly bureaucratic organisations. A technology-push strategy, although necessary in some situations, is not sustainable over the long term. It must be superseded by more participative approaches.

♦ Creating a supportive and enabling organisational climate

The building of information systems capability is advanced most effectively in an organisational environment that is supportive and responsive to change. The internal organisational environment must be one that enables change to be implemented and learning to take place. Top management in organisations are instrumental in creating the type of internal environment in which capabilities will be developed. By the policies that are implemented, the resources that are allocated, the rewards and sanctions provided, managers can foster or inhibit the development of capabilities. For example, an organisation that encourages collaboration with others might find that it gains more from this collaboration than it might potentially lose in sharing proprietary knowledge. The level of inter-organisational collaboration in the IT industry is a clear example of this. Apart from the role played by top management, staff in organisations must themselves be responsive and supportive of the process of developing new capabilities. They must be willing to learn new technologies and processes, experiment, and share their expertise with others. One of the biggest barriers to the implementation of any innovation in organisations is resistance by organisational personnel. The resistance can be either active or passive.

Weill's (1992) concept of 'conversion effectiveness' is useful in describing aspects of a firm's climate that influences IT implementation. Establishing an enabling environment depends on managers' commitment and willingness to create structures that empower organisational participants to pursue business goals. Managers must be willing to allocate the effort and financial resources necessary to provide the facilities and technologies needed to carry out the desired work.

♦ Engaging in intentional organisational learning

The concept of the 'learning organisation' is gaining widespread attention. A number of researchers have begun to outline their understanding of what constitutes a learning organisation and how these organisations actually learn (Argyris and Schön, 1978; Senge, 1990; Garvin, 1993; Kim, 1993; Schein, 1993). Garvin (1993 p. 80) defines a learning organisation as "an organization skilled at creating, acquiring, and transferring knowledge, and at modifying its behavior to reflect new knowledge and insights". He further suggests that

learning organisations are skilled at five main activities: systematic problem solving, experimentation with new approaches, learning from their own experiences and past history, learning from the best practices of others, and transferring knowledge quickly and efficiently throughout the organisation.

Individuals are the linchpin in organisational learning (Argyris and Schön, 1978). However, organisational learning is more than the sum total of individual learning (Argyris and Schön, 1978; Kim, 1993). Senge (1990) proposes that there are five disciplines of the learning organisation. They are: personal mastery, shared 'mental models', shared vision, team learning, and systems thinking. A learning organisation must effectively combine these disciplines in order to reap the benefits promised. In their book "The power of learning: a guide to gaining competitive advantage" Mayo and Lank (1994) provide a practical approach to developing learning organisations. They conclude that creating learning organisations may involve significant change in organisational culture. This will require top management commitment, extensive education and communication and adjustment in systems and processes.

Bell (1984) proposed a number of mechanisms through which learning can be achieved in organisations. These mechanisms are indicative of explicit and prospective ways in which organisations can proactively engage in learning. Table 1.7 presents a description of various learning mechanisms and suggest examples of how these can be exemplified in IS-related learning in the organisation. The learning mechanisms presented represent a slight modification of Bell's (1984) categorisation.

There is a presumption that all learning is good and that what has been learnt should be perpetually retained. Levinthal and March (1993) articulate certain caveats to organisational learning that managers should take note of. They warn managers about a number of learning 'myopias' and learning 'traps' which can compromise effective organisational learning. Several other writers (Hedberg, 1981; Senge, 1990; Hamel and Prahalad, 1994) have highlighted the need for organisations to 'unlearn' outmoded and dysfunctional practices that might inhibit the accumulation of new knowledge and serve as a hindrance to the implementation of new modes of operation. Senge (1990) warns about the potential for undetected and untreated learning 'disabilities' to create the potential for the eventual collapse of an organisation.

Table 1.7 Learning Mechanisms

Learning Mechanism	Description	Examples of IS-related Learning Opportunities
Learning by operating and adapting	Learning that results from implementing, operating and adapting technical systems.	Implementing and using computer-based systems. Modifying applications software to cater for changing requirements.
Learning through performance feedback	Regular recording and monitoring of performance feedback to identify and interpret performance .	Post implementation review of IT deployment. User satisfaction review.
Learning by training	Learning that occurs through formalised training.	User training, Specialist training in using new systems development tools .
Learning by hiring	Hiring people with the required competencies.	Hiring of experienced IS personnel such as IS managers.
Learning by searching	Engaging in specific search efforts to develop organisational knowledge.	Investigating the availability of appropriate packaged software. IT equipment tendering process.
Learning through basic research	Undertaking research activities including experimentation, field trials and case studies to discover .	Experimenting with different IT implementation approaches to see which is most effective. Testing the performance of new software and hardware technology.

Many who propose the creation of learning organisations assume that all organisations have the desire and the capacity to create a learning climate. Such a requirement is a challenge in many developing countries where organisations embed many dysfunctional characteristics (Kiggundu, 1990). The context in which the organisation exists influences its capacity to learn effectively.

Developing information systems capability does not automatically result from the tactical implementation of information technologies and systems. It involves conscious and focused efforts to understand the technology that is being implemented, the environmental context in which it is being implemented and the expected (or unexpected) consequences of the interaction of the two. Learning how to set up and run one or more information systems is no guarantee that one would be able to automatically do the same for another type of information system. This is because the factors obtaining in one context will be different from those in another context. In the same way, implementing a particular information system in a developed country does not automatically mean that one can necessarily accomplish a similar task in a developing country context. The change in context introduces different variables into the equation. Although some knowledge and experience will be transferred in the process, accumulating context specific knowledge is imperative. To build organisational information

systems capability, deliberate steps need to be taken to embed what is learnt into the organisational `consciousness'.

1.11 Summary

The chapter has introduced the concept of information systems capability as a way of understanding how organisations can derive business value from strategic investment in computer-based information systems. The concept is epistemologically rooted in evolutionary and resource-based approaches to understanding the asymmetries that exists between organisational investments and business performance outcomes. Strategic advantage or outstanding organisational performance occurs when organisations are able to exploit firm-specific routines and resources that are difficult for other organisations to replicate, imitate or surpass. Key characteristics of organisational and information systems capabilities were outlined. These attributes highlight the complex nature of information systems capability.

Three strategic dimensions of organisational information systems capability were identified. These are routines, resources, and contexts. Routines refer to the IS-related processes and practices of the organisation. Resources refer to its IS-related endowments and contexts reflect the environmental factors influencing IS investment opportunities and decisions. A number of key issues important to the development of information systems capability were discussed. They underscored the proactive and purposeful role that managers and other organisational members must play in harnessing the benefits of computer-based information systems. The relevance of these issues will be explicated in the case studies that follow later in the thesis.

The development of information systems capability in a developing country context is a key concern of this research. The next chapter explores external contextual issues relating to the building of information systems capability in a developing country setting. It will address the broad issues of development, under-development and developing countries, their meanings and implications. It will also deal with the question of the transfer and diffusion of information technology to developing countries and explore the opportunities and challenges faced by organisations attempting to deploy computer-based information systems in such settings.

CHAPTER 2

Information Systems Capability in the Developing Country Context

2.1 Introduction

Conditions in developing countries pose significant challenges to organisations attempting to build capabilities to effectively develop and deploy computer-based information systems. The challenges emanate from a complex of economic, political, socio-cultural, regulatory and technological factors. A recognition of the impact of prevailing environmental conditions significantly undermines the simplistic argument that organisations in developing countries interested in deploying computer-based information systems can simply identify and purchase information technology products and services from the relevant factor market. In contrast, the ability to participate in local and international information technology factor markets is highly circumscribed in many developing countries by the acute lack of knowledge, resources and infrastructure.

The external environmental context and its impact on organisations and individuals is central to any discussion on capability building. Factors prevalent externally can be either enabling or constraining to capability development. A firm's attempt to develop and deploy organisational capabilities cannot be understood independent of the specific context in which it operates (Barney and Zajac, 1994). Such a company faces a number of opportunities and challenges generated from external sources and so develop capabilities to exploit the opportunities faced and counter the threats posed by these sources.

The concept of information systems capability in this research is being explored through the experiences of organisations operating in a developing country context. This chapter examines external contextual issues relating to the building of information systems capability in a developing country setting. It will, first of all, address the broad issues of development and under-development. It then goes on to examine the concept of

developing countries, identifying the defining characteristics of such countries. The general economic and social conditions in sub-Saharan Africa are then discussed. The opportunities and challenges of transferring information technology will be discussed with particular focus on sub-Saharan Africa. The chapter concludes by outlining the challenges posed by the external environmental conditions, thus explored, on the accumulation of information systems capabilities in developing countries.

2.2 Development and under-development

Any discussion of development or developing countries requires some treatment of one or both of these questions; what is meant by development? what does it mean to be developed? Ingham (1993) suggest that the answer depends on the perspective from which development is interpreted. Development can be viewed from a historical perspective. This may range from the historical `stages of development' model purported by Rostow (1959) to models proposed by institutional economists including Chenery, et al. (1974) and John Enos (1991). Institutional economists emphasise the central role of institutions and institutional arrangements in economic growth. Development can also be seen from the perspective of structural change. The process of industrialisation involves a move away from primary sector activities to secondary and tertiary sector activities. This means that more and more people will move out of agricultural production into manufacturing and services. This move is attributed to the increased demand and supply of non-agricultural goods because of rising disposable income.

According to Ingham (1993) modernisation implies industrialisation and urbanisation and the technological transformation of agriculture. It elevates individual rights above communal ones and asserts the primacy of scientific investigation as the highest form of knowledge acquisition. Modernisation as preached is often criticised as meaning `westernisation'. Most development approaches proffer western models as being the standard by which other societies are judged. This view is increasingly being challenged.

> Historians talk about the `modernization' of societies, by which they mean the process of organizing society around rational and secular concepts rather than spiritual ideas and values (McCarthy 1994, p. 23).

Some associate development with democratisation or `popular sovereignty' (McCarthy, 1994). The implication is that political democracy and economic development go hand in hand. Historical analysis fails to confirm this belief, however. Many countries have achieved significant economic growth despite being led by authoritarian regimes. Many of the newly industrialising countries share this characteristic. Some people even advocate that for countries to develop there should be less democracy. Alternatively, popular sovereignty is viewed as an important platform for development. The concept of decentralisation is closely associated with democratisation. Many see decentralisation as a way of fostering popular participation in economic and political decision-making. Participation envisages people being in control of charting their own economic and political destiny.

The implementation of modern information and communications technology is viewed by many as both an instrument and a catalyst for modernisation and popular democracy. Modern information technology has been implemented in some countries in a bid to enhance social and economic development (Madon, 1994). Some, particularly people from western countries, argue that the use of such technologies will enable access to information and services that will help to alleviate chronic poverty and ignorance. However, others have argued against the rationalisation that modern information technology will make any significant contribution to either democracy or social and economic development if the target groups are practically incapable of articulating their own vision of the implementation and use of the systems. In fact, it is felt that without significant efforts to ensure participation, information technology may serve to entrench endemic inefficiencies and power relationships (Madon, 1994). Some development specialists advocate a focus on basic needs that would address the substantive and urgent issues of survival that most people in developing countries face.

Most traditional approaches to development focus on improvement of material well-being. Recent approaches, however, are shifting the focus from goods-centred (based on per capita GNP) to people-centred, environmentally-friendly methods that seek to improve human welfare. Todaro (1994) discusses the variety of attempts that have been made to assess the level of development from a people-centred point of view. The Human Development Index (HDI) by UNDP (1992) is one approach that seeks to view development in terms of growth in human well-being.

Using 1990 data from 160 countries, the HDI ranked all the countries. Those countries with scores between 0.00 and 0.50 were considered as having low human development, those with scores ranging from 0.51 to 0.79 medium development, and those with scores between 0.80 and 1.00 high human development. The country with the lowest human development was Guinea with a score of 0.050 and that with the highest was Canada with a score of 0.982. (Todaro, 1994, pp. 63-64)

The HDI is not infallible, however. The focus on the national HDI tends to hide the disparities that exist between various sectors of society. Urban areas tend to have a higher index than rural areas. Men gain more than women and the well-off more than the poor. Ingham (1993) suggests that development economists must take several issues into account if a people-oriented definition of development is to be adopted. Economic development should mean expanding the capabilities of people to appropriate the benefits of development. People should benefit from development policy rather than be the objects of policy impact. The needs of women should be given prominence considering their disproportionate share of poverty. Development policy should be sensitive to the dominant culture in order to mitigate against resistance to change. The ethical and social issues associated with any development policy should be addressed.

The concept of sustainable development is increasingly being cited by a variety of people concerned about social and economic development. The term `sustainable development' means different things to different people, depending on their professional and philosophical orientation. What is considered sustainable development by one group

may be seen as a hindrance to development by others. For example, many of those advocating sustainable development are environmental activists from western countries. In most instances they are asking people who have benefited little from modernisation and so called development to maintain a state of under-development for the benefit of the environment. However, some in developing countries feel that people from the western industrialised countries have no right talking to them about conservation since the industrialised countries have engaged in mass exploitation of resources both at home and abroad for the benefit of a few. Industrialised countries, being the main consumers of the earth's resources, should put their own house in order first. Sustainable development does not only focus on physical resources but on human capital as well.

Many development policy prescriptions involve the making of ethical or moral choices among development alternatives. Introducing mechanisation in rural agriculture may mean increased productivity but it may also have the effect of putting rural people (women in particular) out of work. Building a hydroelectric dam in a remote forest region may provide much needed electricity to power industries and homes but may also cause severe ecological damage and displacement of indigenous tribes people.[2] Introducing computers in the work place could improve organisational functioning in the long term but could include permanent job losses and long term transformation of working practices. Under ethical development philosophy the dilemma presented by the above scenarios must be resolved.

Ethical development approaches would suggest finding alternatives that resolve or reduce the moral tension presented by policy alternatives. For example, instead of proposing the uncontrolled introduction of computers into an organisation with the consequent job losses, managers would seek to more carefully identify areas where computerisation would be most beneficial and provide skill upgrading or alternative employment for those most likely to be affected. This would preserve jobs and resolve the moral dilemma of taking away the livelihood of people.

[2] For example, Kariba Dam in Zimbabwe.

The above discussion on development perspectives highlight the assertion that development is a complex issue. The philosophical glasses through which development is viewed significantly affects the policy orientations of those proposing development alternatives and the stance of those interpreting and analysing the effect of such prescriptions. Many times seemingly unresolvable conflicts arise because proponents of policy and those who oppose them come to their positions from distinctly different philosophical positions. While every issue will not be resolved to the satisfaction of everyone, policy makers need to consider how best to address the moral dilemmas presented by their proposals.

2.3 Developing countries

Many attempts have been made to classify countries. More advanced countries have been termed, 'developed', 'first world', 'western', 'the North', 'industrialised', and so on. Less advanced countries are usually termed 'developing', 'less-developed', 'Third World', 'less-industrialised', 'the South', among other terms. Distinguishing between countries in relation to their level of development is fraught with much difficulty and controversy. Each of the terms cited above carries its own political and social baggage. Each designation underscores assumptions held, both consciously and unconsciously, about the relative value of countries and the relationship between them.

In classifying less advanced countries, the United Nations has designated the poorest countries as 'least developed' and the next poorest as 'developing nations'. Oil producing countries are designated as members of OPEC. The classification scheme used by the Organisation of Economic Co-operation and Development (OECD) identifies 'low income countries' (including least developed countries (LLDCs), `middle income countries (MIC), 'newly industrializing countries', and the 13 members of OPEC (Todaro, 1994 p.28). While the term 'developing countries' is despised by some we will

use it throughout this monograph to refer to low and middle income countries as designated by the OECD.

Making assumptions about the character and nature of developing countries present many difficulties. Developing countries are by nature and character very diverse. They tend to have distinct physical, cultural, political and economic characteristics. Todaro (1994 p.31) suggests seven critical factors that must be looked at when portraying the structural diversity of developing nations. These are, the size of the country, its historical and colonial background, its endowments of physical and human resources, the relative importance of its public and private sectors, the nature of its industrial structure, the degree of dependence on external economic and political forces and the distribution of power and the institutional and political structure within the nation.

Developing countries differ in size from each other in terms of their geographic area, population and income level. In Africa, for example, there are large countries such as Zaire (2.4 million sq. kilometres) and small ones such as Comoros (1,800 sq. kilometres). Nigeria has a population of approximately 90 million people while Sao Tome and Principe has only 126,000. The population density varies also: Botswana (582,000 sq. kilometres) has only 1.3 million people, compared to Rwanda (26,000 sq. kilometres) which has over 7 million people. Per capita income in Gabon was US$4,450 in 1992 while in Tanzania it was US$110. Table 2.1 compares the size, population, and per capita income of selected countries in Africa.

The diversity among developing countries is further underlined when their historical and colonial background is considered. Most countries that make up the developing nations in Africa, Asia and the Caribbean were at one time the colonies of some Western European power. Some countries were colonised by the British. Others by the French and still others by the Portuguese, Spanish, Dutch, Germans and Belgians. Each colonial power introduced systems of administration and commerce that fostered very strong ties with the 'mother' country. Many former colonies have stronger relationships with a distant former colonial power than with neighbouring countries. This

situation is very pronounced in Africa. It is common to find, for example, that telephone calls made from Senegal to Ghana go through Paris and London before reaching Accra. Systems of education, administration and commerce are patterned after systems in the former colonial power. Probably the biggest legacy of the colonial past are the languages and cultures left by the past masters. Sub-Saharan Africa is divided into three major European language groups, English, French and Portuguese. Spanish plays a much more minor role. The language divide has had a deleterious effect on the co-operation and integration of African member states. Even within language groups there is a tendency for each country to associate more closely with a former colonial power than with a neighbouring country.

Table 2.1 Comparison of selected African countries: size, population and per capita income*

Country	Size (sq. km)	Population 1992 (millions)	Per Capita Income 1992 (US$)
Botswana	582,000	1.4	2,790
Comoros	2,000	.51	510
Gabon	268,000	1.2	4,450
Kenya	582,000	25.7	310
Nigeria	923,000	101.9	320
Rwanda	26,000	7.3	250
Tanzania	945,000	25.9	110
Zimbabwe	391,000	10.4	570

*Data taken from World Bank, World Development Report 1994, New York: Oxford University Press, pp. 162-163, 228

♦ Characteristics of developing countries

While classifying countries is intensely political[3], there are certain general characteristics that define developing countries. Todaro (1994 p.38) outlines six characteristics that are common to developing nations. Firstly, developing nations are generally characterised by low levels of living.

[3] Pre-independence, white-ruled South Africa classified as developed when the majority of the population lived in abject poverty.

These low levels of living are manifested quantitatively and qualitatively in the form of low incomes, poverty, inadequate housing, poor health, limited or no education, high infant mortality, low life and work expectancy, and in many cases a general sense of malaise and hopelessness.

The second characteristic identified is low levels of productivity. Classical economics tend to view productivity in terms of the production function where varying levels of factor inputs for a given technology are associated with a commensurate level of output. In reality, however, classical models are not sufficient to explain the persistent low productivity even when advanced applications of technology are made. While high level productivity results from significant investment in physical and human capital, people's (worker and management) attitudes, capabilities and health have significant bearing on the level of productivity achieved. High rates of population growth and dependency burdens is the third characteristic suggested by Todaro. Two-thirds of the world's population live in developing countries. These countries tend to have much higher birth rates than developed countries. The high birth rate coupled with a high death rate and low life expectancy produce a population mix where most of the people living in these countries tend to be children under the age of fifteen. This means that a significant proportion of the population are dependants.

The fourth factor characterising developing countries is high and rising levels of unemployment and underemployment. In many developing countries most people are engaged in non-formal employment. In some countries the majority of the population reside in the rural areas and make their living through subsistence farming or other non-wage occupations. Fifth, much of the industrial activity in developing countries is in the primary sector (i.e. agriculture, forestry, mining, fishing). Manufacturing and services tend to comprise a much smaller percentage of industrial activities in developing countries than in developed countries. Rather than exporting manufactured finished goods the bulk of exports tend to be agricultural products or raw material.

> For the less developed countries, a significant factor contributing to the persistence of low levels of living, rising unemployment, and growing income inequality is the highly unequal distribution of economic and political power between rich and poor nations. (Todaro, 1994 p.53).

Lastly, developing countries have very little leverage in determining the balance in economic and political relationships in international fora. Economic and political policy is dictated by the rich and powerful nations of the world. The preponderant role of the major economic powers in the Uruguay Round of GATT trade talks and the veto power that some nations have over the decisions of the United Nations testify to this.

Kanungo and Jaeger (1990) identify a number of characteristics that differentiate between developed and developing countries. Two of the characteristics described that typify the economic and political environment are the predictability of events and the difficulty of obtaining resources from the environment. They argue that developing countries, although having high aspirations for development and modernisation, are nonetheless stymied by the dysfunctional characteristics of their economic and political environments.

> Developing countries no longer represent the traditional agrarian society but are on the way to industrialization and modernization. Very often, the developing country environment becomes complex because of the non-availability of resources to meet the high aspirations for development. Thus, complexity is the result not just of what is, but what 'is not'. Organizational means and goals tend to be incongruous and create difficulties for effective management (p. 9).

Events, on the average, tend to be relatively unpredictable and the political environment less stable. This type of environment presents difficulties for the acquisition of required economic, technological and human resources. Managing in this type of environment poses challenges to developing country managers that are qualitatively different from those faced by managers in developed countries (Kanungo and Jaeger, 1990 p. 9).

♦ International aid and development funding

A significant factor in the economic development process of developing countries is the role played by international agencies. A variety of agencies are involved in providing development assistance. These include foreign governments, international agencies such as the World Bank and the IMF, private banks and non-governmental organisations (e.g. Oxfam, Save the Children Fund). Development aid was originally meant to provide assistance in raising the standard of living for people in developing countries. Over the years the rationale for giving and receiving aid has become quite murky. During the Cold War period, for example, aid served to buy the loyalty of governments. The withholding of aid was also used as a weapon in bringing about political change in some countries. Malawi and Kenya, for example, were subjected to intense international pressure to implement political changes. Aid was withheld as a key part of the strategy to bring about the changes.

International aid forms a significant part of the revenues of many developing countries. In 1993/94 fiscal year Zimbabwe received international aid support of over Z$923 million. This constituted approximately 6.7 percent of the total revenues taken in during that period. Almost Z$1 billion in international aid was budgeted for 1994/95 fiscal year. The impact of international agencies is significant because developing countries such as Zimbabwe cannot fund major infrastructural projects from its own resources. They have to look to international bodies to provide the necessary capital. For example, the World Bank is currently funding the Zimbabwe - Power III Project which has an estimated cost of US$200.2 million. The aim of the project is to improve the electricity generating and distribution capacity of the country . A significant portion of these funds will be used to finance the upgrading and enlargement of the information technology insfrastructure of the Zimbabwe Electricity Supply Authority.

Foreign loans and aid tend to come with conditions attached. They might embody procurement and performance conditions that preclude the use of local or alternative foreign sources of products and expertise. They can tie the recipient to

sourcing products and expertise from only the donor country. Some may require the use of foreign expertise with the effect of denying local expertise the international exposure that involvement in such projects bring. For example, loan agreements might stipulate the requirement to use only the large international consulting firms on the projects.

Aid contracts might also require local governments and organisations to undergo major organisational and operational restructuring that may create severe social problems. Most structural adjustment programmes have been criticised along these lines. The contracts may also dictate or imply the use of modern technology which has the deleterious effect of creating structural unemployment. The increasing IT content of most loans and aid packages lends support to this assertion (Schware and Choudhury, 1988). Kluzer (1993) highlighted the influential role played by international aid agencies both in creating the pressures for the use of computer-based information systems and being the substantive source of funding for such systems.

2.4 Conditions in sub-Saharan Africa

In almost any measure of development, sub-Saharan African countries (excluding South Africa) rank the lowest among countries of the world. Of the 61 countries of the world classified as low income countries (LICs) by the OECD, 34 are to be found in sub-Saharan Africa. Only 5 countries (Botswana, Congo, Cote d'Ivoire, Swaziland and Zimbabwe) are classified as middle income countries (MICs). Gabon and Nigeria are listed among the OPEC countries (Todaro, 1994 p.29-30). In terms of human development, most sub-Saharan African countries rank among those countries with lowest human development. Of the 62 countries classified by the UNDP, in its 1993 Human Development Report, as having low human development, 39 (63%) were sub-Saharan African countries (UNDP, 1993). In 1989 an estimated 62% of the population of sub-Saharan Africa were living in absolute poverty (Todaro, 1994 p. 43).

Sub-Saharan Africa's technological, industrial and communication infrastructures are relatively underdeveloped. In the area of telecommunications, for example, Minges and Kelly (1994) assert that

> by most measurements, telecommunications in Africa lags behind every region in the world. It has only two percent of the world's main telephone lines despite having 12 percent of its population. It had the lowest annual growth in teledensity (main telephone lines per 100 inhabitants) of any developing country region over the last ten years, partly due to rapid population growth. Some 35 of the world's 49 least telecommunications-developed countries are African (Minges and Kelly, 1994 p. 11).

Sub-Saharan African countries have suffered significantly from political and economic instability. The last three decades have witnessed a preponderance of coup d'etats, civil wars, liberation struggles, political dictatorships and repression in many countries. This has created massive political upheaval and has contributed to dislocation of millions of people from their homes. The political problems have in turn contributed to the poor economic performance of the countries. Productivity in many countries has been negative over the past several years. The general downturn in the world's economy has not helped the situation. Many countries in the region are saddled with foreign debt. Some are paying more than 30% of their gross domestic product in interest to foreign creditors.

The situation is not totally bleak, however. Over the past decades there have been movements toward the democratisation of the political process in many countries in the sub-Saharan African region. South Africa now has a popularly elected government as does Malawi. Most countries are attempting to restructure their economies. The opening up of the economies is bringing increased foreign investment into the region, albeit with countervailing consequences for indigenous business organisations.

2.5 Implementing socio-technical systems in developing country organisations

Kiggundu (1990) argues that the implementation of socio-technical systems, conceived in Western industrialised settings, into a developing country situation, will be fraught with much difficulty and could possibly lead to the failure of such implementations. Socio-technical systems, conceived and implemented in Western industrialised nations, presuppose the existence of rational systems of management and organisation. They anticipate open, democratic values, beliefs and practices in the society and workplace, and presume a catalogue of strategic choice options. The reality is quite different in most cases. Organisations and organisational members in developing countries tend to exhibit a number of dysfunctional characteristics that mitigate against the successful implementation of socio-technical systems. Kiggundu (1990, p 148) highlights some reasons for the difficulties faced in implementing socio-technical systems. These are outlined in table 2.2.

Table 2.2 Difficulties faced in implementing socio-technical systems in developing countries (Kiggundu, 1990)

Dimension	Description
Managerial approach	Organisations are managed as closed systems and are relatively unresponsive to environmental changes and demands.
Role of government	Government tends to have a dominant and pervasive role in the functioning of organisations.
Organisational structure	Organisations tend to lack a coherent structure and have low tolerance for ambiguity and change.
Work motivation	Motivation to work stems from different sources, including the need for individual rather than group recognition by one's superior.
Managing interpersonal relationships	Organisations in developing countries exhibit dysfunctional modes of conflict management, closer social and emotional interactions, inter-group rivalry, little capacity for openness, trust, the rational expression of feelings, and well established hierarchical and social status barriers.
Support mechanisms	Inadequate physical, managerial, and institutional frameworks exist for the effective use of technological innovations.
Effectiveness of foreign theories	American theories of management do not apply abroad.
Performance Measurement	Organisations employ ambiguous, ill-defined, abstract, and symbolic measurement of performance and organizational goals.

Socio-technical systems, including computer-based information systems, require a high level of organisational rationality and coherence. Computer-based information systems presume that data can be captured, processed and analysed in a rational way and that the product of such a systems would be used in a rational decision-making process. Such rationality might not be present in many developing country situations. This state of affairs might prevail despite the desire for rationality on the part of managers. As Kiggundu points out,

> Organizations in developing countries also operate under different business, economic, and technical realities, and often operate under conditions of organizational and managerial scarcity with insufficient resources, weak or insufficient physical and institutional support systems, and inadequate management and technical personnel. (Kiggundu, 1990 p. 149).

2.6 The transfer of information technology to developing countries

Organisations in developing countries of Africa are now very actively involved in the acquisition of computer and communications technology. That the diffusion of IT products (i.e. computer and communication hardware and software) is taking place is not in doubt. What is not clear, however, is whether or not they are being exploited effectively to serve the strategic and functional objectives of business firms and other organisations. This raises two important questions. What contributions are computer-based systems making to organisational effectiveness and profitability? Can computer-based information systems, once implemented, be effectively sustained and improved in the long term?

IT is being applied in most sectors of economic activity in many African countries. The banking industry in most countries is an intensive user of IT. Bank services in Kenya, Botswana, and Zimbabwe, for example, are extensively computerised. Computerisation is not only affecting back office functions but many front office

procedures as well. In Zimbabwe, customers at branches of the Central Africa Building Society (CABS) can have their accounts updated on-line and in real time. There is a growing proliferation of automated teller machines (ATMs) in both Zimbabwe and Botswana. A consortium of banks in Zimbabwe inaugurated Zimswitch in December 1995. Zimswitch is an interbank electronic fund transfer system connecting all the partner banks. This includes the connection of over 120 ATMS to the system (Dickinson, 1996 p. 20). Computerisation is also very much in evidence in the hospitality and travel industry. Most major hotel chains operating in Botswana, Kenya, Uganda, Zambia, and Zimbabwe, have computerised back and front office functions. Travel agencies in Zimbabwe have recently gone on-line with their reservation system.

Computerisation is growing extensively in many private sector companies. This is especially the case for companies that have overseas links. The public sector has not been left out. Backed by extensive funding from organisations such as the World Bank and other international agencies many public sector enterprises have undertaken major computerisation projects. The Government of Uganda has embarked on an extensive computerisation project through the Uganda Computer Services, a department of the Directorate of Data Processing. The aim is to apply IT to most of the functions of government. The Uganda Revenue Authority's revenue collection and financial management information system is an example of one of the projects currently being implemented (Zake, 1995). The Post and Telecommunications Corporation of Zimbabwe is engaged in one of the largest computerisation projects in Sub-Saharan Africa, outside of South Africa. Similarly, organisations such as the Zambia Consolidated Copper Mines and the National Railways of Zimbabwe are extensive users of computer-based systems.

2.7 Trends and forces driving IT diffusion in developing countries

There are many reasons why organisations have embarked on actively deploying computer-based information systems. In the private sector, IT systems deployment tends to emanate from a business rationale. Many hold the view that the application of information technology will help to acquire or maintain competitive advantage (Delone,

1988; Porter and Millar, 1985; McFarlan, 1984). In the banking industry computerisation has become a competitive necessity (Clemons and Row, 1991; Tobaiwa, 1993). Banks that do not computerise and offer services such as ATMs will soon find themselves losing customers to other banks which do. Computerisation in the public sector has come about largely as a result of both internal and external pressure. Internally, many public sector organisations find that they are unable to cope with the sheer volume of data that needs to be processed in order to meet the rising requirement for more efficient and effective service. Externally, agencies such as the World Bank, IMF, various United Nations agencies and major donor organisations, through their funding mechanisms, are forcing public sector agencies to rationalise the acquisition, storage and dissemination of information in line with major economic and organisational restructuring. The application of computer-based information systems, in many instances, is mandated as a part of an overall strategy of improving efficiency and effectiveness in performance and reporting. Public pressure for better accountability and information is also driving the application of IT in government.

Another reason for acquiring information technology-based systems is the general belief that IT will provide "solutions" to previously intractable problems, and will in due course improve profitability and organisational effectiveness. This has become significantly more important given the fact that many developing countries in Africa and elsewhere are undergoing one form or another of economic structural adjustment. These programs put great emphasis on competitive market forces as a means of bringing about the economic revival of previously moribund or declining economies. Markets that formerly were highly protected are now being liberalised. This increases the pressure on local producers to be competitive at 'world class' levels. Computer-based systems can assist companies in this process. The increased globalisation of business activities and the need for organisations to maintain effective links with suppliers, clients and customers world-wide in order to sustain their business activities are also forces behind the application of computer technology. Lastly, many deploy computer-based information systems in order to maintain competitive parity.

2.8 Problems and difficulties facing the deployment of IT

The application of IT in organisations in African and other developing countries has, in many instances, not lived up to expectations (Harindranath, 1993). Many implementations of computer-based information systems end up as outright failures or fail to produce expected results (Odedra, 1990: Woherem, 1992). Failure or under-performance of computer-based information systems is not a new phenomenon restricted to developing countries. There are countless examples, in developed countries, of massive and outright failure of computer-based information systems. Sauer (1993) and Benyon-Davies (1995) detail some of the classic failures in the UK and Australia. The London Ambulance Service and the Taurus project of the London Stock Exchange are two recent examples of catastrophic information systems failure (Benyon-Davies, 1995). Although information systems failure in developing countries is comparable in many respects to similar failures in developed countries, the consequences for resource-poor countries tend to be greater and more far reaching. While many establishments in developed countries can generally withstand the financial and business impact of such failures, companies in developing countries tend to lack the financial and organisational resources, the managerial and technical IT capability to cope effectively with large scale IT systems failure. In many cases the funding for large scale computer-based information systems does not come from the organisations own resources. Typically, they result from loans or grants provided through bilateral institution building agreements. If this investment is squandered the organisation generally has no recourse to additional funds. It means then that the system will fall into disuse.

In the case of technical failure, organisations in developed countries can more easily find alternative suppliers, products, or expertise. For example the technical and organisational failure of the Taurus project, although massive in scale, did not leave the London Stock Exchange bereft of alternatives. Known alternatives were readily available. In many developing countries, especially in sub-Saharan Africa, alternatives may not be readily available. Even if they are known about, the requisite finance, staff, organisation might not be in place to exploit them. Consequently, even when all the

resources have been put in place the time lag involved in getting alternatives implemented might render the whole project a failure for the second time around.

A major contributing factor to under-performance or failure of computer-based information systems in developing countries is the low level of organisational information systems capability. While implementations of computer-based systems are increasing exponentially, organisations lack the technical and managerial competencies effectively to orchestrate the deployment and profitable exploitation of such systems. The national IT infrastructure in most countries tends to be quite weak also, both in terms of the technical infrastructure and human resources (Bhatnagar, 1992; Woherem, 1992).

Many countries, particularly those in sub-Saharan Africa, do not have the good telecommunications facilities that are essential for organisations having distributed operations. The cost of communications tends to be very high and facilities are restricted to a select number of urban centres (Bhatnagar, 1992; Waema, 1996). Local IT industries tend to constitute mostly dealers and agents for foreign computer companies. The capacity to develop and deploy systems is limited mainly to operational support and transaction processing application systems. Complex implementations of computer-based systems are usually handled by foreign experts.

Developing countries suffer an acute shortage of high quality and experienced IT specialists (Bhatnagar, 1992; Waema, 1996). This is exacerbated by the shortage of training institutions capable of producing high quality IT graduates. Even as more institutions are being developed and IT programmes expanded there is still concern about the scope and level of the training provided. IT training programmes tend to focus on the use of application programmes and business applications programming, typically using COBOL. The applications being developed are, in most cases, transaction processing systems. They are geared towards automating clerical and accounting functions. Application areas such as office automation, decision support and inter-organisational systems are only marginally explored, if at all.

The quality of training provided is significantly lowered by the fact that most training institutions lack the technical and human resources necessary for developing highly skilled people. Most institutions providing IT training are technically under-resourced (Odedra, 1990). In many institutions the equipment being used tends to be old and obsolete. There is also not enough equipment to provide relatively uninhibited access by trainees. There is an equally acute shortage of qualified staff in institutions providing IT training. This shortage is exacerbated by the high turnover in the ranks of university and college lecturers and other trainers in the IT field. People with highly developed IT skills are in high demand in industry. Because of the attractive pay, benefits, and working conditions offered by industry, teachers are easily lured from academia (Moturi and Rodriques, 1992). As a result academic institutions are constantly battling to recruit and hold on to qualified staff. IT departments tend to always be in a state of flux. They also tend to have less staff than they have budget allocation for. For example, the National University of Science and Technology in Bulawayo, Zimbabwe, has a budget allocation, funded by the Commonwealth Secretariat for experienced computer science lecturers. Some of the positions have remained unfilled for over a year.

Academic institutions are in a competitively weak position in attracting qualified staff when compared to industry, especially the private sector. Industry is able to differentially compensate workers based on market demand (Moturi and Rodriques, 1992). However, universities and other academic institutions are bound by administrative or government policies to offer similar compensation packages to each worker in specified categories. The general demand for teachers of history or anthropology might not be great in comparison to the demand for teachers in technical subjects. However, collective bargaining and or university policies prevent institutions from offering substantially differentiated compensation packages. The offering of substantially differentiated packages while practicable might not be desirable. If one group of teachers within an academic institution is offered a better compensation package than others it could result in significant morale problems. Teachers not receiving the higher compensation may become demoralised. This could have a debilitating effect on the whole academic system.

Another contributing factor to the under-performance or failure of computer-based information systems is the fact that organisations are acquiring computer-based systems without having in place a clearly defined strategic purpose for their use (Woherem, 1992). There is no well-defined strategy to guide definition, implementation and management of the systems. The application of information technology does not serve a well-defined business purpose. Therefore obtaining IT becomes an end in itself. In some instances, decisions are made about systems without significant prior reference to the implementing organisation.

IT strategies in many organisations, rather than being proactive, tend to be reactive. They emanate, not from an internally justified need but often from the need to justify decisions already taken by others either within or outside the organisation. Just acquiring information technology does not in itself guarantee any solution to organisational information management problems. Information technology is only a means of delivering information systems and so constitutes only one component of the more all-encompassing notion of information systems. While technically viable in most settings, success of computer-based information systems depends on the effective IT co-ordination and integration efforts.

The application of information technology in organisations must satisfy a clearly defined strategic business purpose (Galliers, 1993). It should be preceded by a clear understanding of the role and function of information in organisations. There should be a thorough identification and understanding of organisational objectives, needs and processes, and an effective deployment of organisational resources (human and capital) and systems capable of exploiting the potential benefits of IT in pursuing purposeful business activities. All this must take place in an organisational environment supportive of the objectives of developing computer-based information systems.

Many IS managers and IS service providers in sub-Saharan Africa complain that there have been too few successes in information systems implementation in organisations. The blame for this is usually attributed to a myriad of factors. Those

frequently cited include government interference, suppliers' arrogance, lack of top management support, user resistance and general intransigence. These may be important contributing factors to IS failure or under-performance. However, one of the most significant reasons for failure stems from the fact that many organisations have been unable to develop sustained capability in conceptualising, designing, developing and deploying computer-based information systems. This results from asymmetries between organisational intentions and organisational capacity.

The difficulties many organisations in developing countries have in sustaining their technical and managerial capabilities over any extended length of time have been highlighted earlier (Kiggundu, 1990 p. 148). These difficulties create a dysfunctional organisational climate that has a deleterious effect on organisational capability building. Some organisations actually lose capability. Okot-Uma (1990) highlights a regressive phenomenon in some African countries where IT capability reverts from a more advanced stage to a less advanced one. Without a sustained growth in technical and managerial capabilities, organisations in Africa will continue to fall behind in terms of their ability to remain productive and competitive in both domestic and international markets.

2.9 Purpose of this research

Previous research by Odedra (1990), Kluzer (1993) and Kamel (1994) focused on the diffusion of information technology in countries of Africa. Odedra's work examined the extent to which information technology is being adopted in organisations and the factors which hindered or promoted successful adoption. She illustrated her work by conducting a number of case studies across various sectors in Kenya, Zambia and Zimbabwe. Her conclusions outline various structural and organisational problems hindering the successful implementation of technology and suggest the need for organisations to develop capabilities in implementing information systems. Kluzer's work was entirely based in Mozambique and looked at the socio-political factors driving the diffusion of information technology in that country. The work identified the motivations

of the various actors in the diffusion process and highlighted the role of the information elite and various governmental and non-governmental organisations. While diffusion is indeed taking place against a seemingly improbable socio-political and economic background the need for the development of indigenous information systems capability was again highlighted. Kamel investigated the use of decision-support systems in development planning in the governorates of Egypt. It identified the technical and management challenges faced during the implementation process and presented a number of findings that can serve as a guide to future projects.

This research addresses one of the key issues highlighted by Odedra (1990), Kluzer (1993) and Kamel (1994), that is, the need for organisations to build local informations systems capability. Specifically, this research will address the following question. How can organisations in developing countries build capability to orchestrate investment in the design, acquisition, deployment, exploitation and sustenance of computer-based information systems?

2.10 Summary

This chapter focused on conditions in developing countries and how these conditions affect the transfer of information technology and the subsequent development of information systems capability. We found that there are no easy ways to classify developing countries. The countries, although sharing similar characteristics, are very different from each other. The situation in sub-Saharan Africa was highlighted. The chapter pointed out some of the difficulties in implementing socio-technical systems in developing countries. Assumptions underpinning the implementations of such systems in industrialised settings do not obtain fully in developing countries.

We described forces driving the diffusion of information technology in developing countries and discussed some of the key challenges faced by organisations attempting to implement computer-based information systems. We concluded that the implementation of computer-based information systems should be rooted in an

organisation's business strategy. Information systems capabilities will only develop if managers take deliberate action to build such capabilities.

Chapter three addresses the research issues and methodology followed in carrying out the study. The chapter presents a process-oriented, multi-strategy approach to data collection and analysis.

CHAPTER 3

Studying Capability: Research Issues and Methodology

3.1 Introduction

This chapter addresses the research issues that underlie our study of information systems capability and the research methodology used to elicit empirical evidence to support our theoretical findings. In chapter one, information systems capability was portrayed as a multi-faceted phenomenon educed from the interaction of an integrated set of factors. It represents the capacity of an organisation to effectively orchestrate the design, acquisition, deployment and exploitation of computer-based information systems amid a complex of countervailing organisational interests, challenges and opportunities. No single attribute or combination of attributes satisfy a necessary and sufficient condition for the development of IS capability. IS capability arises out of the complex interaction of a number of elements (environmental, organisational, interpersonal and individual) in a synergistic relationship. Capability development in a specific organisation follows a particular idiosyncratic, evolutionary path. While certain conditions are necessary for the development of capability they are not sufficient to guarantee its eventual achievement.

The deployment of computer-based information systems is most widely understood to occur in the organisational context. It usually characterises an organisation's attempt to organise and co-ordinate the flow of internally generated and externally derived information to support its effective functioning and create sustained business value. In this research we focus on information systems capability at the organisational level. The investigation of information systems capability is approached, however, with a clear understanding that an organisation cannot be studied in isolation of its contexts and internal influences. Reference must be made to the environmental, interpersonal and individual factors that influence organisational processes and outcomes.

3.2. Research issues and methodology

Research in information systems has tended to focus on identifying necessary conditions that, when fulfilled, would lead to some expected outcome. These conditions, if met, are presumed to be sufficient to guarantee the postulated outcome. For example, it is posited that the strategic deployment of IT assets will lead to competitive advantage (Porter and Millar 1985, Cash and Konsynski, 1985). Research has shown, however, that investment in and deployment of IT assets, while necessary, is not a sufficient condition for acquiring competitive advantage (Weill, 1992; Clemons and Row, 1991).

Theories that assume a causal relationship between logical antecedents and outcomes are characterised as variance theories (Markus and Robey, 1988). Variance theories presume that the fulfilment of a necessary condition is sufficient to guarantee a particular outcome. In variance theories, pre-conditions and outcomes are treated as variables which can assume a range of outcomes. Logically speaking therefore, variance theories suggest that if condition X obtains then outcome Y will result. If more of X is introduced then more of Y will result. This type of input/output logic is not consistent with the experience of implementing computer-based information systems in organisational settings. The outcomes of IT investment have been found to be asymmetrical (Markus and Keil, 1994: Weill, 1992). Variance theories, although excelling at explaining variations in the magnitude of a certain outcome tend not to do well in situations where the outcome is uncertain (Soh and Markus, 1995).

Process theories, while acknowledging that the fulfilment of necessary conditions is important to achieving certain outcomes, do not hold that these conditions are sufficient to guarantee the anticipated outcomes. The fulfilment of certain conditions is but one part of the puzzle. Process theories give credence to the idiosyncratic nature of organisational experience, emphasising the impact of contexts, processes, chance and random events in determining the eventual outcome of an undertaking. Walsham (1993), advocating a contextualist approach to understanding information systems and their impact on organisations, emphasises the importance of viewing organisational change as linked to both the intra-organisational and broader contexts. "Power, chance and opportunism are as

influential in shaping outcomes as are design, negotiated agreements and masterplans"(Walsham, 1993 p. 53) Process theories provide more explanatory power than variance theories. They allow for comprehensive explanation of why certain outcomes occur. They are not constrained by the need to maintain a deterministic causal relationship between input and outcomes.

Research supporting evolutionary and resource-based views of technological and organisational capability growth in firms have tended to emphasise process approaches to understanding capability development. Although much of that research tends to have a macroeconomic or industry-level focus, they have highlighted the importance of contexts, routines, and resources in explaining capability development. Technological capability research has favoured the use of a mix of firm-level descriptive case studies combined with economic statistical data to elucidate their theoretical propositions on the subject (Lall. 1992; Dahlman, Ross-Larson, and Westphal, 1987; Wangwe 1992). Others have relied almost exclusively on comparative economic data to support theory building (Enos, 1991; Dosi et al., 1994). Much of this research is geared to developing understandings of national technological capability in industrial production. Few studies, with some exceptions (e.g. Girvan and Marcelle, 1990) have concentrated on capability building in individual firms. Research emphasising resource-based perspectives have tended to focus on the experiences of large conglomerates and how they can gain competitive advantage from deploying firm-specific assets and competencies (Hamel and Prahalad, 1994). The multiplicity of factors involved in the creation of technological and organisational capabilities and the divergent approaches taken to understand these factors makes it very difficult for anyone attempting to research in this area to find a coherent methodology on which to base research efforts. Lall (personal interview 1993), voiced concerns about the challenges of assessing the level of indigenous technological capability without the benefit of a clearly defined research method.

Research on information systems capability in developing countries is virtually non-existent. Most of the published works have tended to focus on information technology policy, transfer, and diffusion (Kaul, Patel and Shams, 1989; Kluzer, 1990, 1993; Odedra, 1990). That capabilities in the development and deployment of computer-based information systems in developing countries are needed is acknowledged by researchers (Kluzer, 1993;

Odedra, 1990). No theoretical framework specifically addresses this issue. Odedra (1990) concluded that there was little in the way of established theoretical or empirical material to provide guidelines for research on information technology in developing countries. This research is one attempt to present a comprehensive theoretical framework and research methodology for addressing the subject.

3.3 Choosing a research strategy

The multi-dimensional characteristics of organisational information systems capability, highlighted in chapter one, suggest that no single attribute constitutes a necessary and sufficient condition for the creation of IS capability. Explaining how organisations develop information systems capability requires an understanding of the impact of contextual, organisational, interpersonal and individual factors on organisational functions and processes. A single research strategy for exploring the phenomena of IS capability building would be insufficient to yield satisfactory results. Firm level case studies, for example, are excellent when trying to understand inner organisational contexts and processes. They are less valuable when trying to make generalisations about the broader environmental context. Surveys and questionnaires are useful for deriving general opinion and information. They tend to give only a static picture, however, and lack the richness of case studies. A combination of research methods provides the best chance of eliciting concrete and more complete results.

The choice of a research strategy is, unquestionably, the most important decision a researcher must make when attempting to understand phenomena. Many of the discussions about research strategies in general and IS research strategies in particular, tend to highlight the apparent dichotomy between approaches that are qualitative in nature and those that are quantitative (Galliers and Land, 1987; Jarvenpaa, 1988; Lee, 1989; Smith, 1990; Gable, 1994; Yin, 1994). Some researchers, however, rather than viewing these as competing research strategies, see them as complementary (Layder, 1993; Gable, 1994). Yin (1994) argues that attempts to place research strategies in a hierarchy are misconceived. "The more appropriate view of these strategies is a pluralistic one." (Yin, 1994 p.3)

Layder (1993) suggests that social reality is very rarely one dimensional. One research method will therefore generally not be sufficient to explain phenomena. He advocates a multi-strategy approach to research in social phenomena that seeks to bridge the gap between qualitative and quantitative forms of analysis. Gable (1994) advocates a strong case for a multi-strategy approach to studying information systems. He argues that a multi-method approach will prove advantageous in eliciting a richer picture of what is happening in organisations concerning information systems. This research adopts a multi-strategy approach to data gathering.

3.4 Level and units of analysis

Benbasat, Goldstien and Mead (1987) advise that before embarking on any research effort one needs to have some idea as to the analytical level at which the research will focus. Will the focus be on individuals and their response to social experience or on what happens when individuals interact in groups (emergent behaviours and meanings). Is the interest on the impact of the setting and social organisation or on the macro environmental context that surrounds all social settings, interactions and participants. Layder (1993) proposes a research map that is useful in identifying the potential facets of a research agenda and the possible areas of focus for a particular piece of research. Table 3.1 outlines the components of the map.

The self dimension focuses on the individual's response to the social situations surrounding them. Situated activity is concerned with the `dynamics' of interaction between individuals engaged in social activities and the emergent behaviours, meanings and understandings that define the scope and scale of the interaction. The setting defines where situated activity takes place. Setting has a very significant influence on social activity. The macro-context focuses attention on society-wide concerns and their impact on the other elements. The history element "represents the temporal dimension through which all the other elements move". The basic idea behind the history dimension is a recognition that the social processes represented by each of the four elements takes place over time and within units of time. The sections depicted in the research map should not be strictly interpreted to

represent distinct social phenomena. The map is heuristic in nature and serves to identify various elements of social situations. Layder points out that "when it comes to their application in social research it is a matter of *emphasis* [emphasis in original] as to which element is the main focus. There are no hard and fast cut-off points" (p.74). While each element has distinctive characteristics they "shade into and interweave" with each other.

Table 3.1 Research map (Layder, 1993 p.72)

	Research Element	Research Focus
HISTORY	CONTEXT	*Macro social organisation* Values, traditions, forms of social and economic organisation and power relations
	SETTING	*Intermediate social organisation* Work: Industrial, military, state bureaucracies; labour markets; hospitals; social work agencies; domestic labour; penal and mental institutions. Non-work: Social organisation of leisure activities, sports and social clubs,; religious and spiritual organisations.
	SITUATED ACTIVITY	*Social Activity* Face-to-face activity involving symbolic communication by skilled, intentional participants implicated in the above contexts and settings.
	SELF	*Self-identity and individual's social experience* As these are influenced by the above sectors and as they interact with the unique psychobiography of the individual.

Following Layder (1993), we present a research map (Table 3.2) tailored to this research on information systems capability. The research will emphasise the organisational setting as the focal unit of analysis. The organisation is comprised of its routines and resources. The focus on the organisational setting is a matter of emphasis and does not exclude some exploration of the other elements: context, situated activity and self. The organisational setting cannot be fully understood without reference to the context in which the organisation exists and the interpersonal and individual behaviours that characterise organisational life. Layder (1993) emphasises the dynamic relationship that exists between the various levels of analysis. Markus and Robey (1988) illustrate their support for mixed level analysis in IS research by showing that the introduction of computer-based technology in organisations have both macro-level and micro-level effects. They assert that "by

consciously mixing levels of analysis, researchers can explore the dynamic interplay among individuals, technology, and the larger social context" (Markus and Robey, 1988 p. 596).

Table 3.2 IS capability research map

	Research Element	Units of analysis	Research Strategy
H I S T O R Y (organisational experiences over time)	CONTEXT	*External Context* Developing Country Context Conditions in Africa Capability and technology transfer Diffusion of information technology Zimbabwe situation: a. Political, economic and social conditions b. Technical and IT infrastructure c. The IT industry d. IT/IS Education and training	Literature review Comparative statistical data analysis Surveys
	SETTING	*Organisational Setting* Resources: Human resources IT/IS infrastructure IS/IT competencies Financial capacity Organisational culture and climate Organisational linkages Routines: Strategic IS planning IS Structuring and staffing the IS organisation IS Integration within the business IT-enabled change management IS -related organisational learning	Case studies Secondary data analysis
	INTERPERSONAL ACTIVITY	*Group experience within the organisation* Group resource endowments and routines	Case studies
	SELF	*Individual social experience of IT personnel* Individual resource endowments and routines	Case studies Surveys

The choice of the organisation as the appropriate unit of analysis can be justified on a number of bases. In the first instance, computer-based information systems are generally associated with the organisation-wide functions rather than just a single entity within the organisation. Computer-based information systems are developed and deployed to support the effective functioning of organisations through the effective management of internal and external information flows. Secondly, information systems capability represents a particular type of organisational capability. Organisational capabilities are not vested in a single individual or one particular group within the organisation. They are characteristic of the

whole organisation. The development of organisational information systems capability involves the synergistic combination of the efforts of a wide cross-section of organisational personnel and groups.

Within the dimensions presented in table 3.2 are elements that will be explored in this research. They represent the major issues of concern that will be addressed in case studies, surveys, interviews. The term interpersonal activity has been used in place of situated activity to focus more clearly on the role interpersonal relationships play in defining the activities, culture and climate in organisational settings.

3.5 Research strategy and data collection methods

Understanding organisational information systems capability is not a simple case of determining cause and effect. As a multi-faceted phenomenon, information systems capability must be viewed from several angles. No one method of data gathering can provide sufficiently reliable and useful data about this phenomenon. This is especially true when contemplating research in a developing country setting. To understand the nature of information systems capability in developing countries, one has to apply a combination of research strategies and data gathering methods to yield significant results. In this research we adopted a multi-strategy approach to gathering empirical data. This entailed using both quantitative and qualitative methods of enquiry. Table 3.3 depicts the strategies and data collection methods used.

Quantitative studies involved the administration of a series of questionnaire surveys. The questionnaires were designed to yield factual data as well as opinion. The main purpose for using the surveys was to gather data that would enable the us to develop a profile of local information systems (IS) personnel, practice and institutions. Data gathered using the questionnaires was expected to provide valuable information as to the general state of IS/IT implementation and use in the local setting.

Table 3.3 Research strategies and data collection methods

Strategy	Method	Target Organisation/Group	Respondents
SURVEYS	1. Questionnaires a. ISPQ b. ISEQ	a. Individual members b. Institutional members Computer Society of Zimbabwe	a. IS practitioners b. IS managers
	2. Semi-structured interviews	Organisational managers, consultants and academics	a. Managing directors b. General managers c. Finance directors d. IS/IT managers e. Consultants f. Academics g. Publisher
CASE STUDIES	1. Semi-structured interviews 2. Document analysis 3. Participant observation 4. Direct observation	Zimbabwe Electricity Supply Authority (3 field visits, 1993, 1994, 1995)	a. Chief executive b. Divisional managers c. IT personnel d. User personnel e. IT project manager f. Management consultant
		Datlabs (Pvt) Ltd. (Zimbabwe) (3 field visits, 1993, 1994, 1995)	a. Executive directors (4) b. IS manager c. Finance managers
		Cotton Company of Zimbabwe (3 field visits, 1993, 1994, 1995 plus two telephone interviews)	a. General manager b. Corporate services director c. Finance manager d. IT personnel e. Former asst. general manager (MIS) f. Management consultant g. New MIS manager

Two survey questionnaires were developed and administered. The first, Information Systems Personnel Questionnaire (ISPQ), sought data from current IS personnel working in organisations in Zimbabwe (see Appendix A). Data collected concerned the respondent's (1) educational background (2) evaluation of his/her post-secondary education and training (3) evaluation of short-term IS/IT training courses attended (4) employment history (5) job performance outcomes (6) general opinion on various IS related issues (7) professional development activities, and (8) demographic data. The questionnaire is composed of 11 open response, 4 restricted choice, and 8 intensity scale (using a five-point Likert scale) questions.

The second questionnaire, Information Systems Personnel - Employer Questionnaire (ISEQ) (Appendix B), administered to information systems managers, sought data on the following: (1) general background of the organisation, and its IS department; (2) IS projects undertaken and those proposed for the future, along with an evaluation of the capability to carry out proposed projects; (3) an assessment of the importance and effectiveness of post-secondary education in the performance of IS functions and responsibilities; (4) an evaluation of the relative effectiveness of local versus overseas training; (5) general opinion on the state of IS locally; and (6) demographic data and general comments. It is composed of a mix of 17 open response, 6 restricted choice, and 9 `Likert scale type' questions. The administration of the questionnaires is discussed in section 3.9 below.

3.6 Sample selection

Field research was conducted in Zimbabwe. There were several compelling reasons for this choice. These include the fact that Zimbabwe has had long history implementing computer-based information systems. It exemplifies a developing country that is seeking to apply the benefits of information technology in both the public and private sectors. Information technology has diffused rapidly throughout the country, particularly to urban commercial centres. Many organisations have had long experience using computers and have developed substantial competence in developing and deploying computer-based information systems. The Computer Society of Zimbabwe has been very active in promoting the development of IT skills. The fact that most IT practitioners belong to the Society made it an ideal vehicle for data collection using the questionnaires. A final reason for choosing Zimbabwe is that the researcher is familiar with the people and organisations in the country, having spent nearly seven years there lecturing and consulting in management and information systems.

The population of interest for the purposes of this research are individual members of the Computer Society of Zimbabwe and IS managers and general business managers in Zimbabwean organisations that have installed some type of computerised information systems. Individual members of the Computer Society provided a pool of people active in the IS field from which to draw our sample. It was assumed that these individuals would be

more likely to provide useful data for the research seeing that they are already involved with the work of a professional IT/IS group. Questionnaires were distributed to a quasi-randomly selected group of members. Efforts were made to balance the distribution to members located in different centres. Targeting members of the Computer Society does limit the extent to which the findings can be generalised to the whole population of IS practitioners in the country. However, given the objectives of the questionnaires this group was considered suitably representative.

3.7 Data Collection: questionnaires

Information Systems Personnel Questionnaires (ISPQ) were distributed to members of the Computer Society of Zimbabwe falling in three membership categories, member, associate member and affiliate member. Fellows were not sent the questionnaires for two reasons: (1) there are very few in number and (2) it was felt they might not respond to questionnaires and would probably best be interviewed individually where possible. Three hundred such questionnaires were distributed by the secretariat of the Computer Society of Zimbabwe (CSZ) on the researcher's behalf using the society's membership mailing list. They were accompanied by self-addressed stamped envelopes in which the completed questionaires were to be returned to the CSZ offices in Harare. The administrative secretary of the CSZ collected the returned questionnaires and sent them to London via overnight courier. A few respondents mailed completed questionnaires directly to the researcher in London.

The Information Systems Personnel- Employer Questionnaire (ISEQ) was sent out to 90 institutional members of the Computer Society of Zimbabwe. Institutional members are corporate bodies or other organisations that subscribe to membership in the Society. These represent the majority of corporations and other organisations, in the private, public and non-governmental sectors. The questionnaires were directed to the senior information systems manager in the organisation. They were also accompanied by self-addressed stamped return envelopes.

3.8 Semi-structured interviews

While questionnaire surveys are appropriate for obtaining factual data and general opinion which can be quantitatively assessed, they are not able to provide the broader contextual data that would enrich analytical interpretation. Gable (1994) suggests that the survey approach often provides only a snap-shot of the situation at a certain time, yielding little information on the underlying meaning of the data. Questionnaires may also not capture important information. For example, if a question was omitted, certain potentially valuable insights would may be missed. Questions asked might not be relevant to a specific situation and may therefore be responded to in a manner that leads to erroneous interpretation. With questionnaire surveys, immediate follow-up of unclear or interesting issues is not possible.

To overcome some of these problems and to provide further insight into the nature and scope of IS/IT deployment in organisations, twenty nine (29) semi-structured interviews were conducted in Zimbabwe. These occurred during October, 1993 and involved senior business and IT managers as well as other leading figures in the IT industry.[4] The duration of the interviews ranged from 45 minutes to two hours. Those interviewed included: seven managing directors (most of whom were involved in the provision of IT/IS services, three finance directors, ten IS/DP managers, three other IS managers responsible for special projects or departments, three academics in the computer science/information systems field, an IT consultant with a regional development organisation, a noted local economist and business consultant and the publisher/editor of a local computer magazine. Several informal discussions were held with a variety of other people who attended two seminars put on by the Computer Society of Zimbabwe in October 1993.

The interviews followed a loosely structured format, although similar issues were discussed in each one. Interviewees were asked to comment on a range of topics concerning IS implementation in Zimbabwe. Opinions and comments were sought on the following subject areas: local IS/IT education and training, top management's attitude towards information systems, IS department structure and placement in organisations, IS applications

[4] See Appendix C for the list of people interviewed.

used locally and applications development, local IS research and institutional linkages between IS departments and other groups within and outside the organisation. All the interviewees willing gave their views on each of the topics noted above. They made generous provisions of time to talk with the researcher. Some of the specific details of the findings from the questionnaire surveys and interviews will be discussed in chapter four.

3.9 Case studies

The second phase of field research involved the carrying out of case studies. Over a three year period beginning in 1993, three case studies were conducted in three organisations of differing sizes and at different stages of IS development. Benbasat, et al. (1987) suggest that the choice of case studies should be deliberate rather than opportunistic. In selecting case study sites, letters outlining the purpose of the research were sent to number of Zimbabwe's largest parastatal organisations, several large banks and a private company, all of which were engaged in implementing large scale computer-based information systems. These had been identified by the researcher as possible case study sites following the initial field visit. Of the number, Zimbabwe Electricity Supply Authority and Datlabs (Pvt) Ltd each agreed to be a case study site. One banking organisation indicated that it may be interested, but the responsible manager was out of the country when the researcher arrived to conduct the case study. The Cotton Company of Zimbabwe which became a case study site was selected on more opportunistic basis, although it met the original criteria for the case studies. The fact that most of the targeted organisations declined to become case study sites highlights one of the difficulties in doing case study research, that of getting access to a site. Many organisations are reluctant to expose themselves to a researcher. Others are wary of the commitment they have to make in terms of time and resources to something that they feel is not immediately beneficial to them.

The Zimbabwe Electricity Supply Authority is a large government owned power utility that is quite advanced in the development of its information systems. It has well staffed IT department whose members are experienced in the design, development and deployment of computer-based information systems. Datlabs (Pvt) Limited is a small foreign-owned drug manufacturer located in Bulawayo. Although an experienced user of

computer systems for transaction processing, it has generally tended to outsource computer systems design, development and implementation. It has a very small IT staff and has only basic in-house capability to implement computer-based information systems. The Cotton Company of Zimbabwe is in the process of making the transition from being a parastatal monopoly to a private company operating in a competitive environment. It considers IT an agent of organisational transformation. The company has gone through a somewhat turbulent experience in its attempt to build internal capability to design, develop and implement the complex information systems envisaged for the next several years. All systems being implemented are new. Previously, computer services were provided through an external computer bureau.

These organisations provide examples of the intensive efforts currently under way to deploy organisation-wide, computer-based information systems in Zimbabwe. They have all been involved in conscious efforts to develop IS/IT capabilities as a means of achieving their strategic and functional objectives.

3.10 Establishing the basis for data analysis

Almost no empirical data exist that will provide adequate information on the nature and scope of information systems implementation in Zimbabwe. Data on location, type, size and activity of business organisations in which information systems are deployed, the length of time organisations have been computerised, the applications used, the personnel requirements and capabilities are not readily available. The two questionnaires were designed to provide some of this background information. The utility of the questionnaires is in their ability to yield background data. Such data provide a starting point for analysis. The data collected by the employers' questionnaires will give a general overview of the nature of existing organisational information systems and will present the perspectives of senior IS management on issues related to education, training, and local capability in information systems design, development and management.

The practitioners' questionnaire will yield data on the background, experience, and perspectives of practising IS professionals. This will allow for the development of a general

profile of the type and quality of people comprising the professional IS community. It will provide descriptive information about the type and level of education and training these practitioners have undergone and enable the researcher to make tentative assertions about the level of capability made possible. Each type of questionnaire contained a set of general questions about the state of IS in Zimbabwe. Responses relating to local ability to carry out large-scale IS design and development, professional development efforts and public support for information systems were designed to elicit data reflecting the perceptions of IT practitioners and managers on the general issues affecting IS capability in Zimbabwe.

The results of the interviews are expected to corroborate findings obtained from the questionnaires. The interviews present the general perspective of senior IS and business managers on the challenges faced and accomplishments made in information systems design, development and deployment in Zimbabwe. Case studies provide a means for conducting a rich analysis of organisational efforts to achieve maximum benefit from the deployment and exploitation of computer-based information systems. They allow for an in-depth look at the context, routines and resources influencing the effective implementation and use of organisational information systems and the linkages that exists between these.

3.11 Framework for presenting and analysing the data

In chapter one, the strategic dimensions of organisational information systems capability were presented, namely: routines, resources and contexts. These dimensions will serve as a basis for presenting and analysing the case studies. The importance of contextual factors in shaping the development of organisational information systems capability will be given significant focus in the presentations and analyses. This is especially crucial when considering capability building in a developing country setting. The analysis of the data is expected to highlight the path dependent nature of IS capability building and the extent to which capability development is constrained or supported by factors defining the historical, current and future context.

Routines and resources are the substance of organisational capabilities. Walsham (1993) highlights the important relationship between context and process in understanding

IS implementation in organisations. The resources of the organisation define its inner context and reflect its absorptive capacity. Routines are the organisational and management processes that determine the mode and extent of employment of organisational resources. The case studies will describe the IS-related routines and resources in the organisations studied. These will be analysed to determine the extent to which they have enhanced or hindered the process of IS capability building in each organisation.

Analysis of IS-related routines will cover such issues as whether or not there exists a definitive IS/IT strategy and how that IS strategy is related to the overall business strategy. It will also look at how the IS organisation is structured and staffed and how it is aligned with the rest of the business (Clark, 1992; Leifer, 1988). How do the organisations attract and retain skilled and experienced IT personnel? What are their policies and practices with regards to recruitment, selection, retention, individual careers, professional development, achievements, motivation and rewards? How are implementation efforts undertaken and co-ordinated? What role is played by senior managers in championing IS development and management effort. The management of IT-enabled organisational change will also be investigated. The analysis will also address how organisations go about increasing their stock of knowledge about information systems issues, products and processes. It will also attempt to gage how IS-related knowledge is acquired, retained and disseminated within the organisations.

In investigating the resources of the organisation, the number and quality of IT personnel will give some indication of the organisation's ability to independently carry out major implementations of computer-based information systems. The IT infrastructure provides the platform for the deployment of information systems architecture (Boynton, Jacobs and Zmud, 1992). How adequate is it to meet the demands of the business and IS strategy? Does the organisation possess any specialised IS/IT competencies that will increase its capacity to effectively deploy information systems? What is its capacity to continuously fund the development and deployment of IT infrastructure and related services? Can this be sustained over time? Sustainability of funding is a crucial factor. This is particularly so when funding for the development of computerised information systems come in the form of development aid or cheap loans provided by an international agency.

The culture and climate in which information systems development takes place is significant in ensuring implementation success and long term sustainability. To what extent are top management supportive and involved in the process of IS strategy development and enactment? How do various groups and individuals respond to the introduction of computer-based systems? What is the level of resistance, support, or sabotage? Does the culture of the organisation encourage experimentation and learning? These are a few of the questions about culture and climate that will be addressed.

One key factor that will receive significant attention is the type, extent and quality of internal and external organisational linkages. These linkages could be either internal or external to the organisation. Linkages within and outside the organisation are invaluable to the process of capability building. These linkages provide significant access to both formal and informal information which can make a substantial difference to the process of capability development. For example, an organisation that has a good relationship with a supplier may find that it is given privileged access to information or new products. Linkages can be person to person, department to department, or organisation to organisation. They can be formal, contractual links or informal, loose links.

Analysing the resources and routines will allow for the presentation of certain conclusions about the level and scope of IS capability in the organisations studied. Insights into how organisations have operationalised their intentions will be gained. The findings resulting from the surveys, interviews and case studies will allow the researcher to propose a general framework for IS capability building. This will be discussed in chapter nine.

The next chapter presents a comprehensive discussion on Zimbabwe, focusing on its historical, political and socio-economic characteristics. It also presents an overview of the nature of the IT industry and tackles the broad issues of national technological infrastructure and human resource development. The data from the questionnaires and interviews will be incorporated to substantiate the findings presented.

Chapter 4

The Zimbabwean Context: Synthesis of Background Data

4.1 Introduction

Organisational capabilities are, for the most part, created through purposeful decisions and actions of managers and staff within organisations. However, an organisation's decisions and activities are shaped by the opportunities and constraints encountered in the prevailing external environment. Historical, economic, political, social, technological, and regulatory considerations play an important part in determining the capacity of organisations to address the challenges and opportunities they face.

In studying organisational information systems capability, this research investigates the efforts of a selection of Zimbabwean organisations to build such capabilities. Empirical data for the research are drawn from case studies and surveys done in Zimbabwe. To set the stage for the ensuing discussion, this chapter specifically examines the macro-environmental conditions, in that country, that affect the acquisition and use of computer-based information systems. The main discussion begins in section two with an overview of the country's history and political economy. This is very important in setting the context. Zimbabwe's current IT capacity has been forged, in a number of ways, by past and current political and economic decisions and actions. Section three specifically deals with the national IT industry. Here, the key features of the IT industry are outlined. Data drawn from the survey questionnaires and interviews are presented in sections four and five to supplement other data from secondary sources. The implications of the external environmental conditions on development of information systems capability are highlighted throughout the chapter.

4.2 Zimbabwe: history and political economy [5]

♦ Background and history

The history of Zimbabwe dates back to approximately 1000 AD, with the emergence of a confederation of Shona peoples centred at Great Zimbabwe. This loose confederation survived through trade, mining and cultivation until the 1830's when they were overrun by raiding Ndebeles. The Ndebele established control of most of the southern and central part of Zimbabwe and extracted tribute from the Shona people. Ndebele rule was replaced by that of the British South Africa Company (BSAC) which was led by Cecil John Rhodes. The consolidation of European rule was made possible by the defeat and subjugation of the Ndebele. The BSAC ruled the colony by Royal Charter up until the 1920's. Self government came to Zimbabwe (then called Rhodesia) in 1923. This period, extending to 1964, witnessed the consolidation of white minority rule and an increase in effort to disenfranchise the black African population. The Land Apportionment Act of 1930 established areas of exclusive occupation by European and Africans with white Zimbabweans being assigned a grossly disproportionate share of the best arable lands.

Two dates that are definitive in Zimbabwe's recent history are November 11, 1965 and April 18, 1980. In 1965, the rebel government of Southern Rhodesia, led by Ian Smith, unilaterally declared independence from Britain. This came about as a result of the ruling Rhodesia Front party's refusal to succumb to black majority rule. Following the unilateral declaration of independence (UDI) the international community imposed a series of political and economic sanctions on Rhodesia with the hope of driving the rebel government back to the negotiating table. Sanctions largely failed because the Rhodesian government devised numerous ways of overcoming them. They also had overt support from countries such as Portugal and South Africa. Rhodesia's response to sanctions, apart from ingenious sanctions 'busting', was to embark on a programme of internal self-sufficiency. During this period the country developed a substantial manufacturing base which still forms the bedrock of industrial activity in current-day Zimbabwe. The UDI

[5] Information in this section derived primarily from the book Nelson, Harold D., 1982 (ed.). Zimbabwe: a country study, Washington: United States Government

period ushered in the imposition of a severe foreign exchange and goods importation regime.

Table 4.1 Synopsis of the history of Zimbabwe from 1000 AD to 1996

Period	Political System	Major economic activities
1000-1830	Loose confederation of Shona peoples in Mashonaland.	Subsistence farming, metal working and international trade with Arabs and Portuguese.
1830-1889	Emergence of Ndebele rule in Matabeleland and the extension of that rule to Mashonaland during the reign of Mzilikazi.	Tribute extracted from Shona people. Mining concessions granted to white Zimbabweans.
1890-1920	Consolidation of European rule through the British South Africa Company. Emergence of a European settler population.	Mining and commerce.
1921-1964	Colonial self government, entrenching of white minority rule.	Segregated property rights entrenched in law.
1965-1979	Unilateral declaration of independence (UDI) period. Apartheid policies enshrined in law. Protracted guerrilla activity.	International economic sanctions. Sanctions 'busting' and move to develop internal self-sufficiency. Severe restrictions on foreign exchange and importation of foreign goods.
1980-1992	Legal independence and black African majority rule. Threat of one-party state.	Socialist economic policies. Severe restrictions on foreign exchange and importation of foreign goods.
1992-Present	Post Cold-War political re-alignment.	Economic structural adjustment. Move to more liberalised market driven economy.

While international sanctions were ineffective at bringing down the Smith government, the protracted guerrilla war that ensued undermined the morale of the minority European population. In the early 1970s, through a combination of circumstances, Rhodesia lost the support of its Portuguese ally. A revolutionary change of government in Portugal led to the independence of both Mozambique and Angola. This precipitated the isolation of Rhodesia further. During this time pressure was brought from a number of external and internal sources to find a negotiated settlement. An attempt at internal settlement failed to win the support of the international community and the Patriotic Front parties. The hybrid regime of Zimbabwe-Rhodesia gave way to a formula negotiated by all parties at the Lancaster House Conference in London. Following internationally supervised elections, won by the ZANU-PF party led by Robert Mugabe, Zimbabwe became a legally independent nation on April 18, 1980.

April 18, 1980 marked a major milestone and turning point for Zimbabwe. Black majority rule and the abolition of apartheid-based restrictions opened new opportunities for the African majority. The new government adopted an economic stance based on Marxist socialist principles and sought to entrench these values into all aspects of society. Zimbabwe experienced a period of resurgent economic growth in the immediate post independence period. However, the combined effect of hostile economic policies and shortage of capital brought a severe downturn in investment. At the same time the rolls of the unemployed increased dramatically. An internal civil war between pre-independence partners was threatening to bring protracted instability to the country. The disputes between ZANU-PF and PF-ZAPU was finally settled in 1987 with the historic agreement to merge the two parties and to share power.

♦ The Zimbabwean economy

Table 4.2 presents some of the key economic and social indicators for Zimbabwe. The country's population in 1992 was 10.4 million and is expected, according to World Bank estimates, to grow at an average annual rate of 2.1 percent. GNP per capita was 570 US dollars. Life expectancy at birth was an average of 60 years and approximate 33% of the adult population was considered literate.

Table 4.2 Zimbabwe: Key indicators (1992)[6]

Population (millions)	10.4
Size (thousands of square Km)	391
GNP per capita (US$)	570
Average annual growth in GNP (1980-92)	-0.9
Exports (millions US$)	1,235
Imports (millions US$)	2,306
Life expectancy at birth (years)	60
Adult literacy (percentage)	33
Labour force (millions)	4
Percentage of population living in urban areas	30

The socialist policies of the Zimbabwean government, while providing some successes on the social front, have largely been a failure on the economic front. Notable achievements were made in the areas of education, health, population and small holder

[6] World Bank. (1994) World development report. New York: Oxford University Press.

agriculture.[7] Between 1980 and 1989 primary school enrolment rose from 1.2 million to 2.2 million children. Secondary school enrolment jumped from 74,000 to 671,000. With the combined impact of adverse world economic conditions and perceived investment discouraging economic policies the industrial performance of Zimbabwe stalled in the mid-1980s and began a sustained decline since that time. GNP per capita grew at rate of -0.9 between 1980 and 1990. The average annual growth rate in merchandise exports was -0.8% during the same period. There was a substantial increase in external debt. In 1992, Zimbabwe had an external debt burden of US $4 billion up from US $786 million in 1980 (World Bank, 1994). At the same time major political changes were taking place around the world. The collapse of communism and the fall of the Soviet Union removed an important plank in the Zimbabwean political and economic posture.

♦ Structural adjustment and the new economic order

The influence of the economic policies of the Government of Zimbabwe on the development of organisational information systems capability cannot be fully appreciated without paying close attention to the impact of the economic structural adjustment programme on the structure and function of local businesses and organisations. The continuing decline in economic performance and the ensuing rise in unemployment and lowering of living standards prompted the government to seek a new direction in its economic policies. In 1990 it introduced the Economic Structural Adjustment Programme (ESAP). The aims of the programme are succinctly outlined in the preface of the document **Zimbabwe: a framework for economic reform (1991-95)** which states;

> The Government of Zimbabwe is committed to a programme of economic policy reform aimed at sustaining higher medium and long-term growth and reducing poverty. This requires a recovery of investment and improved efficiency. To achieve such recovery, a trade liberalisation programme aimed a moving away from the present system of foreign exchange allocation and a relaxation of domestic controls will be implemented over a period of five years. Imports will be placed progressively under Open General Import License

[7] See Republic of Zimbabwe (1991). **Zimbabwe: a framework for economic reform (1991-95)**, January 18, p.1

(OGIL) and import taxes will be made more uniform. Labour regulations and price controls will be relaxed to improve the business environment and stimulate employment. This liberalisation programme will be supported by appropriate monetary, exchange rate and fiscal policies.

Chakaodza (1993) disputes the government's claim that the programme was `home-grown'. He asserts that it was resulted from pressure exerted by the International Monetary Fund and the World Bank[8]

- **Market-driven economics**

The dominant feature of the structural adjustment programme is the promotion of market-driven economics and the heavy focus on export growth. This turn to the market represents a major shift in stated economic polices. While Zimbabwe never completely moved away from the market during the 1980s it was the government's stated policy to introduce a command style economy reflecting the conventional practice in most socialist societies at the time. Zimbabwe, however, operated in a state of economic flux, where what was preached differed from and many times conflicted with what was practised. The introduction of the structural adjustment programme was a clear admission of the failure to make significant economic headway using socialist principles. It was also a clear indication of the government's decision to accept the bitter medicine of the IMF and World Bank conditions for providing additional funds to support the economy.

- **Structural adjustment and public sector enterprises**

One of the stated aims of the economic structural adjustment programme is the "elimination of the large budgetary burden of the public enterprise (PE) sector and making the PEs more efficient[9]." This means that public corporations (parastatals) have to become self-sufficient and self-governing. Most public sector enterprises were, up to this point

[8] Chakaodza, Austin M. (1993) Structural Adjustment in Zambia and Zimbabwe, London: Third World Publishing House

[9] Republic of Zimbabwe (1991). Zimbabwe: A framework for economic reform (1991-95), p.6

returning significant operating losses due in part to poor and ineffective management. They had become a severe burden on the taxpayer. At the same time most enterprises were used as intruments of public policy by the government to implement policy directives, sometimes in spite of a negative economic impact on the organisation. This made it difficult for managers to make decisions based on sound economic judgements. Commodity prices and tariff rates were administered by the government and local management had very little control over the compensation, hiring and firing of staff and the setting of pay scales and procurement policies.

Table 4.3 Classification of public enterprises[10]

Classification	Proposed Action
Public service monopolies.	To remain in government hands, but to be rehabilitated as commercially viable enterprises.
Viable commercial entities operating in a competitive environment.	To be operated on a commercial basis.
Non-viable commercial or industrial entities.	To be liquidated.
Entities with a social role which duplicates that of another entity.	To be closed or merged.
Entities with a valid social role.	To be maintained in government hands and rehabilitated, with any remaining subsidy to be small and transparent.

The structural adjustment programme calls for a reduction of the role of the state through the restructuring and rationalisation of public enterprises and their activities. The proposed classification of public enterprises is shown in Table 4.3. Since the introduction of the structural adjustment programme a number of public sector enterprises have being transformed into independent commercial entities. Among these are the Cotton Marketing Board, which became the Cotton Company of Zimbabwe, and the Dairy Marketing Board. Other public sector enterprises such as the Zimbabwe Electricity Supply Authority, though not privatised, are beginning to operate on a commercial basis. The move to privatisation and commercialisation has generated significant structural and managerial changes in the affected industries. The public sector enterprises must now bear full responsibility for their own losses. They must rationalise their operations in order to generate the income required to carry on their business profitably.

[10]Ibid., p.7

- **Structural adjustment and private sector enterprises**

One of the key pillars of the structural adjustment programme is the general liberalisation of trade with other countries. Prior to this a very restrictive trade regime was in place. The importation and exportation of goods was severely limited by the need to get Reserve Bank, Customs and Excise, and Ministry of Trade and Commerce authorisations. At the same time there was an acute shortage of foreign exchange which restricted the extent to which organisations and individuals could purchase goods and services from abroad. Companies found it increasingly difficult to meet the demands of their markets because of the shortage of basic raw materials. There were many instances when products were not made because some important raw material was not available. During this period the government instituted a restrictive set of labour relations regulations that made it almost impossible for companies to hire and fire at will. This Labour Relations Act of 1985 sought to give workers more rights in the workplace but it resulted in limiting the freedoms of employers to manage their staff in a way that made economic sense.

The economic structural adjustment programme brought a loosening of most of the restrictive practices of the past. There has been, since 1993, a considerable relaxation of foreign exchange regulations. The need to obtain a whole series of approvals before being able to import required items has been removed. Companies are now free to obtain inputs and equipment as it suits their business purposes. New, less onerous labour relations regulations have been promulgated.

With trade liberalisation, Zimbabwean companies now face almost unrelenting competition from foreign producers. Prior to this, the companies operated in a highly protected, oligarchic environment. They faced insignificant competition from the outside because of the high tariff barriers and other restrictive trade practices enacted by the government. As a consequence, many companies became complacent and inefficient. Local production was generally below international standards. Companies were, for the most part, using old or obsolete production equipment and methods. This was most evident in both the packaging and quality of the products sold locally. Much of what was consumed in the local market could not be exported to the international market.

The new competitive environment produced two significant impacts. Firstly, Zimbabwean companies now must offer products and services at quality and price levels that meet international standards. This is essential if they are to retain their position in the local market. If not, they will lose market share to cheaper, better quality imports. The loss of market is a significant threat especially considering the proximity of South Africa, a world-class producer of goods and services. Secondly, Zimbabwean companies must become increasingly competitive in the export market in order to guarantee survival. This is extremely important since the Zimbabwean market is itself very small and will not be able to sustain many players.

Both the opportunities and challenges posed by the new competitive environment in Zimbabwe impel firms to become more efficient and effective in the delivery of products and services to the market. Companies have had to make major adjustments to their production and marketing strategies. They have had to engage in major redefinition of their strategies, restructuring of organisations, re-configuring and re-engineering of products and business processes. Some companies have engaged in significant change and quality management exercises in a bid to instil new corporate cultures that value high quality products and premium customer service.

In congruence with most organisational transformation efforts in industrialised countries, information technology is expected to play a significant role in facilitating the achievement of the twin goals of greater efficiency and effectiveness. Managers realise that they cannot expect to make consequential improvements in product and service delivery without significant investment in the effective deployment of computer-based information systems.

4.3 The IT industry in Zimbabwe

♦ The diffusion of IT in Zimbabwe

The diffusion of information technology in Zimbabwe must be understood within the context of the country's political and economic history. The first computer installation

in Zimbabwe occurred in 1960 when an ICT HEC 1202 computer was installed at the Southern Rhodesia Treasury. This early installation testifies to Zimbabwe's long history of computerisation. Several of the leading figures in the Zimbabwe IT industry got their start working on this initial installation.

Table 4.4 proposes a relationship between trends in the diffusion and organisation of IT in Zimbabwe and the changing political and economic conditions in the country. The table shows general trends only. The diffusion trends mirror the technological developments in information technology to a large extent. The character of the IT implementations in Zimbabwe was specifically influenced by the political and economic policies. Governments during both the UDI and immediate post independence period enacted severe restrictions on the use of foreign exchange for the importation of goods from abroad. Computers were not given priority status during this period. During UDI, international sanctions made it difficult for local companies to get access to the most modern computer technology. Expertise in maintaining and running old hardware developed significantly among people in the local IT industry. This expertise enabled the local industry to immediately adapt to the new environment when sanctions were lifted and the economy opened up.

Table 4.4 The changing external environment and its impact on IT diffusion in Zimbabwe

Period	Major Political and Economic Circumstances	International IT Development Trends	Local IT Diffusion Trends	Prevalent IT Architecture	Information Processing Environment	Prevailing IT Management approach
Unilateral Declaration of Independence (UDI) 1965-1979	Unilateral declaration of independence. Socio-political arrangements based on the principles of apartheid. International sanctions. Focus on sanctions "busting" and economic self sufficiency. Severe foreign exchange restrictions.	Semiconductor based mainframe computers. Proprietary software.	High acquisition and implementation costs make computerisation possible only for specialist IT firms and large institutions (govt., banks, etc.)	Independent computer bureau providing mainframe-based data processing services.	Batch processing of historical ransactions.	Outsourcing of data processing.
Immediate Post Independence 1980-1991	Political Independence Political and social restructuring Regime based on socialist principles introduced. Severe foreign exchange restrictions. Economic downturn.	Microprocessor based PC revolution. Machine independent operating systems and software.	PCs make hardware and software acquisition more affordable and possible. Forex restrictions limits supply and cause extreme price inflation.	Large institutions operating mainframes. Ad-hoc implementation of PCs. Small firms using standalone PCs.	Automation of transaction processing.	Centralised IT management. Data processing typically seen as a technical function.
Economic Restructuring 1992-	Economic structural adjustment programme (ESAP). Market-driven economics given prominence. Removal of most foreign exchange controls. Increased competition from foreign sources.	Development of powerful workstations and PCs. Expansion of open architecture network systems and inter-organisational networking.	Forex restrictions relaxed. IT products can be acquired easily from the world market. Lower prices lead to proliferation of PCs across functional areas.	Move towards PC-based distributed computing environment. Rise in PC networking.	End-user computing.	Decentralised IT management. Information management the responsibility of business unit managers.

The diffusion of IT to most sectors of the Zimbabwean economy has escalated since the late 1980's. This has resulted both from developments in information technology and from changes in the economic and regulatory climate. The advent of the PC and cheaper computers made it possible for most companies and other organisations to acquire their own computer hardware and software. Companies which previously had no computing facilities of their own no longer had to depend on computer bureaux to handle their computing needs. Larger companies were able to replace old mainframe equipment with newer and more powerful, microcomputer-based systems. Most PC-based systems implemented during the early stages were stand-alone systems. Typically, companies would buy PCs and use them to generate management reports to produce documents.

The developments in PC networking technology, coupled with the fall in the prices of PCs engendered greater investment in networked computing. Companies began to see

the benefit of establishing local area networks to allow shared access to data and computing facilities. Small and medium sized companies, which previously subsisted without any computing facilities whatsoever, began to regard investment in computing as commercially essential and financially possible. The relaxation of foreign currency restrictions now makes the acquisition of computers a fairly routine commercial transaction. Companies are free to acquire their equipment and software applications wherever it is commercially advantageous.

Many companies, particularly those in banking and commerce, have operations distributed around the country. As a consequence there is a clear impetus to provide a distributed, end-user computing environment. This is not always as easy as it appears on the surface given the deficient data communications and IT infrastructure in the country. The data communication services provided by the Post and Telecommunications Corporation (PTC) are not comprehensive and reliable enough to satisfy the mission critical wide-area networking requirements of large businesses.

Outsourcing has always been a major feature of the computing industry in Zimbabwe. In the early years outsourcing came in the form of computer bureaux handling the data and transaction processing requirements of organisations. This was done mostly in batch form and focused almost exclusively on financial data such as creditors, debtors, nominal ledger, and payroll. With companies now acquiring their own internal information-processing capacity the character of outsourcing relationships have changed dramatically. Such relationships now revolve around the provision of specialist services. These include: IT consultancy, project management, bespoke systems development, network development and implementation, training, among other services. As a result there has been a huge growth in specialist IT consultancies over the last several years. The growth of these 'niche' players is being encouraged.[11]

The diffusion of IT among Zimbabweans has been quite uneven. During UDI and much of the immediate post-independence period IT diffusion was concentrated among the urban and predominantly European class. Significant IT diffusion among black

[11] Gudza, L (1994) "Projections for 1995", IT News, Vol. 2, No. 21, December/January, 1994/95, p. 3.

Zimbabweans began in the late 1980s and has continued to grow rapidly. Diffusion is, however, still concentrated in urban areas although some rural outposts such as mines, hospitals and some schools have significant IT implementations.

♦ National IT Infrastructure

• Composition of the IT industry

Following a call for tenders for IT services the Reserve Bank of Zimbabwe identified over 250 IT service providers in the country[12]. The IT industry, however, is dominated by a few foreign-owned companies and several medium-sized local ones. The IT industry also comprises many small niche players. Table 4.5 lists the major IT service suppliers in the country .

Table 4.5 The main IT service suppliers in Zimbabwe

Company	Main Brands	Ownership
ICL Zimbabwe	ICL/Fujitsu	Foreign
NCR Zimbabwe	NCR/ AT&T	Foreign
Unitech (became IBM Zimbabwe in January, 1996)	IBM	Local (until taken over by IBM)
C F Tulley and Associates	Data General / HP/Olivetti	Local
Realtime Computers	Digital	Local

The industry is dominated by suppliers that have links with the world's major hardware producers. ICL has had a long relation with Zimbabwe especially in the public sector. NCR is dominant in the banking and retail business and IBM has a growing share of the corporate market. C F Tulley and Associates combines local knowledge with an entrepreneurial flair. It is probably the leading provider of bureau and training services in the country. Realtime is also a locally owned company which markets the Digital brand.

International consulting firms such as Coopers and Lybrand, Price Waterhouse, Deloitte-Touche play a significant role in the industry. They are most likely to be involved

[12] Information provided by the Computer Society of Zimbabwe, email from Ron Bergh, April 1, 1996.

in IS/IT strategy development and project management. All these organisations can draw on information and expertise from their world-wide partners. They are often the ones which are given large strategy development and project management contracts. Some, like Deloitte-Touche have developed substantial training arms.

There are very few significant players in the IT industry that are owned by black Zimbabweans. Black Zimbabweans are beginning to set up their own companies, targeting lucrative niches. Although they possess much IT expertise, they have commensurably less business experience than their white counterparts and are stymied by restricted access to capital. Indigenous business ownership is being encouraged through a series of initiatives launched by both government and private sector interests.

- **Professional bodies**

There are two professional associations serving the IT industry in Zimbabwe. These are the Computer Society of Zimbabwe and the Computer Suppliers Association (COMSA). The Computer Society of Zimbabwe was founded in 1974. The society has approximately 1000 individual and over 200 institutional members. The objectives and activities of the society have evolved over the years with the developments in information technology. It has a number of international affiliations, including ones with The British Computer Society and The Association of Computing Machinery. The society is a full member of the International Federation of Information Processing (IFIP). The views of its members are articulated on a national level through representations on the Research Council of Zimbabwe and the National Manpower Co-ordinating Committee (NAMACO). The society is very active and has a regular series of activities which members can participate in. COMSA is a smaller body representing the needs of the IT suppliers. It attempts to implement a voluntary code of practice for IT suppliers and promotes the industry through computer fairs and other means. Membership is restricted to those in the IT trade.

- **Data communications and networking**

Data communication infrastructure and services is provided by the government-owned Post and Telecommunications Corporation (PTC). Moves to deregulate the telecommunications sector is meeting resistance from many quarters. The PTC has found it difficult to provide the level and quality of service demanded by businesses and households. In 1994 there were only approximately 13 mainlines per 1000 persons.[13] Several local and international companies are waiting to enter the market once the opportunity arises.

Data communication services offered by the PTC are mainly based on the packet switching X.25 protocol. Companies can also lease dedicated lines. Both services are expensive and beyond the reach of all but the very large companies. The growth of the Internet has led to the birth of several local Internet service providers. Internet service provision is technically not legal but the providers have been allowed to operate in a largely unrestricted manner. They provide mostly mail services on a dial-up basis. Internet service is still in its infancy in Zimbabwe. Most service providers lack the capacity to provide comprehensive services for businesses. There is a plan to develop a research network based on the Internet protocol. The Research Council of Zimbabwe is still seeking funding for the project.

4.4 IS/IT deployment in Zimbabwean organisations

Companies and other organisations in Zimbabwe are deploying computer-based information systems with increasing frequency. The character of such deployment is largely unknown. In order to gain some insight into what is happening in organisations a questionnaire survey was carried out in 1993. Ninety (90) IS Personnel - Employers Questionnaires (ISEQ) were distributed to institutional members of the Computer Society of Zimbabwe. Since the intent of the questionnaires was to provide descriptive background information the choice of companies included in the survey was made by the researcher based on an informal assessment of their relative size and importance. A total of 26 questionnaires were returned. Twenty-five were considered usable.

[13] World Bank. (1994) World development report. New York: Oxford University Press, p. 224.

♦ Results of the IS employers questionnaire

• Demographics

The majority (73%) of organisations responding to the survey were located in Harare, the capital city. The distribution of respondents by type of organisation showed that 3 were government departments, 7 private-local firms, 10 were private, foreign owned firms, 4 were parastatals and one described itself as a private company with parastatal shareholders. Ten firms were involved in manufacturing or commerce. Five were business services (i.e. consultants, banking, etc.). Agriculture and forestry were represented by 3 organisations as was communication, transport and utilities. The other respondents came from mining and engineering, education and training and social, health and medical services.

Table 4.6 Business sector by type of organisation

Type of Organisation	Business Sector							Total
	Agro/ forest	Min/ Engin	Man/ Comm.	Comm/ Transp	Social Health	Educ/ Train	Bus./ Bank	
Government*					1	1		2
Private-local	1	1	2				3	7
Private-Foreign	1	1	6				2	10
Parastatal			1	3				4
Other	1							1
Total	3	2	9	3	1	1	5	24

*1 government entity did not indicate area of business activity

• IS/IT implementation

All the organisations reported in the survey have had computers for more than two years. Fifteen organisations have had computers for more than 10 years. Six have had computers between 5-10 years and 4 between 2-5 years. When reporting on the way IS/IT is organised in their companies 11 (42%) respondents suggested that they have a distributed IS/IT organisation. Twenty seven percent (7) report highly centralised systems, while 5 (19%) indicated that they had few centralised applications. One organisation reported an inter-organisational configuration.

Table 4.7 Years of computerisation by type of organisation

IS/IT Structure	Years of Computerisation			Total
	2-5 Years	5-10 Years	Over 10 years	
Ad-hoc	1			1
Few centralised applications	2	2	1	5
Highly centralised			6	6
Decentralised			1	1
Distributed		4	7	11
Inter-organisational	1			1
Total	4	6	15	25

That a majority of organisations in the survey reported having distributed IS organisation was, initially, quite surprising considering the usual propositions of various stage models of IT diffusion (Galliers and Sutherland, 1991). However, many Zimbabwean companies and institutions have operations distributed to various centres in the country. This is especially true with retail and banking organisations and with some parastatals. Organisations describing their IT configuration as distributed are justified in doing so although the number and complexity of applications might be less than those envisaged in some models of IT diffusion. A closer look at the applications in use shows that most applications are transaction processing or reporting and control systems. The range of applications is therefore quite narrow.

It is hardly surprising that 17 (64%) out of the 25 respondents felt that IS/IT was vital to their organisations. A further 24% felt that they were essential while 3 organisations felt they were valuable. Computer-based information systems are becoming indispensable to Zimbabwean organisations.

- **IT applications**

Respondents to the ISEQ were asked to indicate up to five different information systems applications presently implemented in their companies. Table 4.8 provides an analysis of the response. Out of 84 different applications indicated, 71 were either transaction processing or information reporting and control application systems. These include payroll, stock control, debtors, creditors, general ledger, fixed assets, among other key operational and support applications. Office automation systems in the form of word processing, spreadsheet modelling, and graphics applications are becoming more prevalent. For the most part, these applications are implemented as standalone systems. The applications tend to be DOS-based although newer implementations are moving to the Windows environment.

Table 4.8 IT applications deployed in Zimbabwean organisations

Type/Application	A	B	C	D	E	Total	%
Transaction processing	17	8	2	1	1	29	34.5
Information reporting and control	5	10	11	10	6	42	50.0
Office automation		1	4	3	1	9	10.7
Process automation	1	1			1	3	3.6
Inter-organisational						0	0
Decision support and EIS					1	1	1.2
Total	23	20	17	14	10	84	100.0

Process automation systems such as CAD/CAM are slowly finding their way into organisations. The use of decision support systems and executive information systems is almost non-existent. Many large organisations, particularly in the banking sector have extensive IT implementations. However, computer-based systems are implemented to automate key operational processes only. Such systems are not used extensively to support the management processes, except for accounting. A company such as Central Africa Building Society exemplifies this phenomenon.

- **Packaged software versus bespoke applications development**

Applications development prior to 1980 and for most of the 1980's were mostly bespoke systems. This was imperative since access to packaged software was severely limited by the combined effect of sanctions and shortage of foreign exchange. With the relaxing of foreign exchange regulations companies can purchase IT application packages from abroad. A number of IT company managers and most IS managers suggested, during interviews conducted in October 1993, that most organisations are turning to packaged software for a variety of reasons, some of which are outlined below:

- It enables more rapid implementation of systems. There is a vast reduction in time between systems design and implementation.
- Packaged software tend to be cheaper because development costs are distributed over many units. They provide for a quicker return on investment.
- They are proven. Much more effort has gone into making them work across a variety of IT platforms and organisational settings.
- Less personnel is required in the form of programmers and systems analysts.

This move to packaged software implies a possible loss of valuable local software development skills. Organisations now may not have the impetus to continue to develop these skills at a high level. This will have a deleterious impact on the application software development capability of the IT sector in Zimbabwe. The loss of skills could lead to further dependence on foreign sources for software application solutions. This potential loss may be stemmed, however, by the move of many local companies to introduce modern relational database management systems and rapid systems development tools such as Oracle and Informix , among others. This will make the development of bespoke systems easier and will spur some local systems development when readily available alternatives are not forthcoming.

- **Top management's attitude and the strategic role of computer-based information systems**

The ability of computer-based information systems to contribute to organisational success is directly dependent on the role it is allowed to play by the top management of an organisation and the level of top management involvement in shaping organisational IS strategy (Davenport, Hammer, Metsisto, 1989; Johnston and Carrico, 1988). In interviews conducted in Zimbabwe a number of issues related to the attitude of top managers to computer-based information systems was addressed. Most of the interviewees felt that many top managers in Zimbabwe do not perceive information systems as being central to the business. Those who do perceive some strategic role for computer-based information systems are not able to articulate clearly what that role is or should be. Most top managers view information systems in the traditional role of data processing. Information systems is viewed purely as a technical function and as such is perceived as the domain of the technical IT managers. This perception is changing slowly in some quarters, however. Top managers in some organisations are beginning to visualise a more central role for IS. This is especially true of managers working in subsidiaries of multinational corporations or those in organisations that have significant linkages with companies and institutions in the developed world.

Many top managers are resistant to IS taking a more central role in business activities because of the perceived failure of information systems to provide significant returns on investment in terms of improved productivity and profitability. Those interviewed advanced several reasons for this attitude. One observation is that most implementations have fallen well short of expectations and are ever present reminders of the many shortcomings of efforts to implement computer-based information systems. Interviewees suggested that this focus on failure emerges because information systems have not properly been "sold" to top management. On the one hand, the benefits of IT have been "oversold" by IS managers and technology vendors. More has been promised than could actually be delivered, creating a "crisis of expectation". The promised benefits have not materialised as expected by both management and IS practitioners. On the other hand, the benefits of IS to the business have not been

articulated clearly enough. Management in some quarters remain unconvinced of the centrality of the IS role in the organisation.

Some of the interviewees felt that many IS/DP managers do not have a clear and thorough understanding of business needs and processes and how these can most effectively be served by IT. They are perceived as being too technically focused. Many of the current data processing managers came from a technical background and have very little training in business. Some of them actually exhibit very little interest in the business side of organisations. As a consequence, they are not given a significant say in matters that affect the profitability of the company because of their lack of understanding of business imperatives. Again, this is a traditional problem with IS in organisations.

For Zimbabwean IS managers to be taken seriously they have to take steps to increase their knowledge of the way businesses function. At the same time they need to become visible partners in assisting organisations to meet their business requirements. They must move away from focusing only on technical issues and embrace the core strategic objectives of the business.

4.5 Human resources in the IT industry

The availability of highly skilled and experienced IT personnel is critical to the development and sustained growth of organisational information systems capability. While it is generally agreed that there is a shortage of highly skilled and experienced IT personnel in Zimbabwe, very little is known about the character of the IT personnel working in the industry. As part of this research a survey of IT personnel was conducted between October and December, 1993. We present pertinent results from the survey below.

♦ Results of the information systems personnel questionnaire (ISPQ)

The information systems personnel questionnaire was distributed to members, associate members and affiliate members of the Computer Society Zimbabwe. Three hundred questionnaires were sent out by mail. Seventy two completed questionnaires

were returned, all of which were considered valid. This represents a 24% return rate. Although much less than what was desired, anecdotal evidence suggest that this is a good return rate given the history of response to questionnaires by the members of the Computer Society. The data provided by the questionnaires was deemed significant especially when corroborated with evidence arising from the interviews, case studies and from the personal observation and involvement of the researcher in both the activities of the Computer Society of Zimbabwe and in implementing IT projects in Zimbabwe.

- **Demographics**

A demographic breakdown of the IT practitioners responding to the questionnaire showed that out of a total of 71 respondents (one person declined to complete this section), 53.5% were white (Caucasian) and 40.9% were black Africans. Asian and mixed-race (coloured) respondents were 2.8% each. Ethnic classification is shown throughout because of the historical and current importance of race and ethnicity in defining the social and economic status of people in the general economy and particularly in the computer industry. Of the 71 respondents, 60 claimed to be Zimbabweans, 5 British, 2 South Africans, 2 from the USA, 1 Indian, 1 Australian and one person who did not indicate nationality. Seventy nine percent of those responding were male and 21% were female. The average age of the respondents was 37 with the youngest respondent being 21 and the oldest 76. Forty five of them are between the ages of 30 and 40. This high average age indicates a fairly mature IS practitioner community.

Table 4.9 ISPQ survey: gender and ethnic classification of respondents

	Gender			
Ethnic Classification	Male	Female	Total	Percentage
Black African	21	8	29	40.9%
White (Caucasian)	32	6	38	53.5%
Asian	2		2	2.8%
Mixed Race (Coloured)	1	1	2	2.8%
Total	56	15	71	100%
	79%	21%	100%	

The finding that there were more white respondents than black in a country with 99% of its population being black Africans is not surprising given the historical and socio-economic context of Zimbabwe. The structure of the private business sector in Zimbabwe has its legacy in colonial, apartheid Rhodesia. Following independence in 1980 there was a large turnover of public sector personnel. Most white Zimbabweans who decided not to emigrate gravitated to the private sector. The Zimbabwe computer industry is comprised of largely white-owned businesses with a very small number of black-owned firms. Apart from the fact that the IT field is quite attractive to whites in general, the IT industry is one of the areas in which white Zimbabweans do have a controlling interest. The IT industry is relatively small, although quite lucrative. It has therefore not been central to the government's economic and social adjustment programmes and has been left to operate almost autonomously. Most business are closely held private limited companies with very little interference from outside. This makes it possible for organisations to be more selective in who they hire. The pre-independence era gave white Zimbabweans an advantage in access to high technology training. Under apartheid black Africans were restricted in the areas of study and in training opportunities they could pursue. Most black Africans currently holding senior IT management positions are those who studied abroad and returned to Zimbabwe in the post-independence period.

Black Africans are more likely to be found in government controlled organisations. A growing proportion is also employed by multi-national and non-governmental organisations. Most parastatal organisations will have a majority black management and staff. Many of the private sector organisations would tend to have a largely white management with a mixture of white and black staff. The situation is changing and will continue to change rapidly over the next several years. With the increase in locally offered computer and information systems courses and the overwhelming demand for highly trained IT specialists, more black Africans are being drawn into positions of responsibility in the industry.

The finding that most of the respondents were Zimbabweans was expected. The gender distribution also followed the expected pattern. It will become more evenly distributed, however, as more women take up IT-related careers.

- **Educational background of the respondents**

Tables 4.10 and 4.11 present data on the educational qualifications of the respondents to the IS personnel questionnaire. The results show that the majority (88%) had qualifications beyond secondary school. Most of these qualifications are in the IT field. Twenty seven out of the 68 respondents had bachelors degrees and a further 11 had higher national diplomas.

Table 4.10 Highest qualification by ethnic classification

	Secondary	National Diploma	Higher National Diploma	Bachelors Degree	Masters Degree	Doctor of Philosophy / Medical	Total
Black African		7	6	12	1	2	28
White	8	5	5	14	1	3	36
Asian				1		1	2
Mixed Race		2					2
Total	8	14	11	27	2	6	68

N= 68

Of the 60 people that hold post-secondary qualifications 34 obtained these qualifications outside the country. The high proportion of people holding qualifications from outside Zimbabwe can be attributed to at least two factors. The first is the insufficient, and in some cases, deficient IT education infrastructure in the country. The second factor is connected with the historical and political background of the country. During the UDI period, many black Africans were given scholarships to study in various countries. Typically, most went to the United Kingdom with a few going to other countries.

Many of the senior IT people working in the industry (particularly black Africans) are most likely to have received their training in the UK or some other country. The fact that eleven out of the 28 white respondents did their post secondary training in South Africa

is interesting, given the political situation that prevailed in that country until 1994. White Zimbabweans had easy and ready access to South African universities. This was not the same for blacks because of the apartheid policies that prevailed in South Africa until April 1994.

Table 4.11 Country where degree/diploma was obtained: by ethnic classification

	Ethnic Classification				Total
	Black African	White	Asian	Mixed Race	
Zimbabwe	17	7	2		26
South Africa		11			11
United Kingdom	6	7		2	15
Germany	1				1
USA	3	2			5
Australia		1			1
New Zealand	1				1
Total	28	28	2	2	60

N= 60

♦ IT education and training in Zimbabwe

At present there is no national framework for IT education and training in Zimbabwe. In the absence of a national IT policy most organisations providing IT education and training have attempted to articulate their own priorities and philosophy. This has led to an eclectic mix of approaches that make it difficult to achieve coherence in terms the content, level, quality and standard of training. There was also a noticeable gap between IT skills required in industry and the training provided by the various institutions. In order to address the policy absense and the skills gap the education committee of the Computer Society of Zimbabwe, in co-operation with the National Manpower Advisory Council (NAMACO), embarked on a project to develop a skills requirement model and a career path model for the IT industry in Zimbabwe. Following research within the IT industry a draft skills requirements model and career path model was developed. This was

officially presented at the NAMACO conference in October 1995. Table 4.12 outlines the contents of the skills requirement model.[14]

Outlining the IT skills requirement is only the first step in a very involved process. There is a need to develop the curriculum and teaching and resource materials to support the delivery of IT training in the country. Until this is done the problem of non-standard IT training will continue.

Table 4.12 Zimbabwe: IT industry skill requirements model

Skill Category	Description	Skill Requirements
Software and Programming	The technology of programming and software. Emphasis is on knowledge of various computer languages and programming techniques and on how to apply and use them.	3GL programming, operating systems, systems analysis and design, 4GL programming, networks and communications, project management, CASE management (personnel, finance), code of industry practice.
Information Systems	The organisation of hardware/ software operation systems. This emphasises the development and maintenance of business systems.	Systems analysis and design, management information systems, 4GL programming, project management. Business knowledge (finance, manufacturing, etc.). Team building , code of industry practice.
Business Applications	The effective adaptation and use of sophisticated application systems such as database packages, spreadsheets, word processors, DTP, graphics, etc.	Database management systems, spreadsheet analysis, word processing, desktop publishing, graphics (CAD/CAM, operating systems including GUI, CASE, code of industry practice.
Computer Engineering	The technology of computer hardware. Emphasis is on installations, repairs and maintenance of computer systems.	Operating systems, resource management, data communications and networking, configuration management, word processing, DTP, first level engineering, code of industry practice.
Data Processing Operations	The operations and management of data processing facilities and service centres. This includes data capture, quality control and processing to meet users needs and schedules.	Data entry, data control, computer operations, scheduling, resource management, computer security, data capture and collection, operation supervision, code of industry practice.
Specialist Skills	Non-mainstream computer specialists who require a high degree of professional computer knowledge.	EDP auditing, computer security, quality control. Dta communications and networking.
Adjunct Skill areas	Skills required by people working in the IT industry who are not computer specialists.	Management, sales and marketing, training , consultancy.

[14] Information for the tables obtained from Sithole, A. S. (1995) "Zimbabwe's experience in national IT manpower development & its implication for national informatics policy", paper presented at COMNET-IT'95 National Information Technology Policies and Strategies in Commonwealth Countries, October 30-November 1, 1995, Floriana, Malta.
Additional information obtained from documents given to the researcher by A. S. Sithole.

- **Commercial IT Training**

Most IT training is currently offered by commercial training organisations. These are typically operated by local computer and consultancy companies (e.g. CF Tulleys, ICL, Unitech, Deloitte-Touche) or commercial colleges such as Speciss College. The majority of the training courses offered by these institutions are centred around learning various application programmes such as spreadsheets and word processing. Programming, when offered, is typically COBOL or Basic programming. Very little if anything is done with other languages such as C or C++. Although the quality of tuition is good in some institutions, the level of the courses taught is firmly in the lower end of the scale. The focus of training is on application use. System development is more or less restricted to transaction processing systems.

The proliferation of commercial institutions offering IT training produces a bewildering array of standards of training. Some commercial training organisations offer programmes based on foreign standards such as that of National Computing Centre (UK), City and Guilds (London) or Institute of Data Processing Management (UK). Others offer programmes based on what the lecturer has developed locally. Whether based on foreign standards or locally developed there is no guarantee that the programmes offered will produce well-trained IT practitioner. Many foreign IT programmes have not been sufficiently adapted to suit the local conditions and demands. They were designed for totally different social and cultural settings and in some instances are totally inappropriate for the local environment. In contrast, some of the locally designed programmes are more in tune with local demands and therefore are more successful in meeting them.

The lack of agreed standards for the training of IT personnel has been a major concern of the Computer Society of Zimbabwe. The Computer Society has initiated two programmes aimed at raising the standard of training and service provision in Zimbabwe. The first involves the accreditation of organisations providing IT training services. The objective is to raise and maintain a high standard of service provision by requiring accredited organisations to conform to a code of practice. The code of practice outlines minimum standards for facilities, equipment, staff. It also delineates accepted business practice and provides clients with recourse to the Computer Society. The society seeks to

make potential clients aware of accredited institutions by advertising these regularly in the computer and national press. By November 1993 there were 20 accredited training establishments. This is well below the total number of establishments providing commercial IT training. Many of these other organisations are able to continue providing training without accreditation for two reasons. One is the voluntary nature and weakness of the accreditation process. The Computer Society does not have the capacity to monitor appropriate practice and trace violations of the code. It depends mainly on voluntary complaints from customers. The second reason for such low participation is that customers and providers have not been able to discern substantive differences in the performance of accredited and non-accredited institutions. In many instances getting accredited status is purely a public relations exercise.

- **IT training at college and university level**

Three universities in Zimbabwe provide IT education and training to the bachelors degree level. The University of Zimbabwe offers a Bachelors of Science degree in Mathematics and Computer Science. There is also a Business and Computer Science combination. The orientation of the programme at the University of Zimbabwe is towards computer science. Very little focus is given to practical business applications. The aim of the programme ostensibly is to develop conceptual and cognitive computer science knowledge and skills. It does not attempt to train students in the use of any particular programming language or application. It seeks to lay a good theoretical and conceptual foundation upon which students can later build on.

The lack of focus on practical skill development has been criticised from several quarters. Many in the computer profession in Zimbabwe, including former students themselves, feel that graduates of the UZ come to the job market with too few computing skills of immediate practical relevance. In most cases graduates have to be put on extended training programmes to develop skills in programming languages such as COBOL before they can be effectively deployed in the workplace. As a consequence there is a preference among IT managers for graduates of polytechnics or private commercial training institutions whose training tend to prepare them more immediately for the job market.

At Solusi University students undertake a Bachelor of Business Administration degree with a concentration on Management Information Systems. The BBA (MIS) is based on the American AASB curriculum. The MIS curriculum at Solusi covers programming courses in C, COBOL, FORTRAN, Basic and Assembler languages. It has a significant focus on business applications such as databases, spreadsheets, word processing and other microcomputer applications in the business environment. Students have fairly good and open access to the use of microcomputer facilities. Apart from doing computer-oriented courses the BBA has a core requirement of Accounting and Business Administration courses. These core business courses have the effect of giving the student a broad appreciation of business demands and processes. They provide the students with tools which they can use to interpret the application of computers in the context of the business environment.

The third university offering courses in computer science and information systems is the National University of Science and Technology (NUST) in Bulawayo. The university offers a Bachelors of Science in Computer Science. In February 1995, it began to offer a Master of Science in Computer Science. The Master of Science programme was jointly developed and is being funded by NUST and the Management and Training Services Division of the Commonwealth Secretariat in London. The focus of both these programmes is software engineering. In contrast to the programmes at the University of Zimbabwe and Solusi, students at NUST must undertake an industrial placement before graduation. This is usually done in the third year of studies. The industrial placement is designed to give students exposure and experience to real-life business environments. The impact of this programme is still to be ascertained as the first graduates entered the market in 1995.

The setting up of the Masters of Science in Computer Science at NUST is a milestone achievement for Zimbabwe and Sub-Saharan Africa as a whole. The complete dearth of higher level training in computer science has rendered the continent dependent on sending its students outside of Africa for advanced computer science training. The new programs herald an important step in the building up of local individual and institutional capacity computer science and information systems.

- **Problems affecting IT education and training**

IT training at all levels in Zimbabwe face major problems that affect sustainability and growth. The problems are the shortage of IT resources, both hardware and software, the shortage of trained and experienced educators and trainers and the dearth of or poor access to information about developments in the IT field. IT education and training, suffers the same resource problems as all sectors of education. Expensive computer equipment and software exacerbates the situation. Most institutions in both the private and public sectors are unable to afford the amount of computer technology required to run an effective education and training programme. In the private, commercial organisations, where resources are typically more abundant, the cost of tuition and use is exorbitant.

Much of the equipment available in the public sector institutions are donations provided by international agencies or as part of some bilateral agreement. While these donations are welcome, they are not always the result of choices made by the local recipient but by the donor. In many cases, as with other types of equipment donations, the computers donated represent obsolete or discontinued lines. The brand of computers donated might not be of a type that is supported locally. Institutional managers face a problem trying to integrate disparate pieces of equipment to carry out a cohesive IT education and training programme. This is sometimes impossible.

- **University IT education and the needs of the IT industry**

During the interviews with IS and business managers, interviewees were asked to comment on the quality and value of university IS education in Zimbabwe. University IS education is generally viewed as not meeting the real world needs of business. Most of the interviewees considered university IS education as being skewed towards computer science. They felt it lacked focus on business issues and business related problems. Most graduates upon entering the work force go through a long and sometimes painful transition from academia. Interviewees felt that the benefits of university computer science education takes a long time to be realised. Companies taking fresh graduates have to be willing to go through a fairly long gestation period before graduate productivity can become satisfactory. The respondents felt that

companies are generally reluctant to hire university computer science graduates for several of the following reasons:

- Computer science education lacks real world application.
- Graduates have to be sent for additional training of up to six months to a year to make them productive.
- University graduates tend to have high expectations as to salary and pace of promotion, which usually cannot be met.
- They tend to be very mobile, i.e. they change jobs frequently during the first few years.
- Graduates are seen to display what is described as an "attitude" problem. They appear to want to be managers soon after graduation. They do not expect to spend much time in a non-supervisory role.
- Organisations tend to prefer graduates form polytechnics and commercial training centres. They feel that the training received is more practical and geared towards meeting business needs. These graduates are viewed as being more well prepared to handle real world applications much faster.

An analysis of comments made by IS practitioners on their questionnaires seem to corroborate some of the observations of those involved in the survey interviews. Statements regarding the practicality of tertiary IS education suggest that it "operates in isolation....no attempt to tune in to the demands of the job market". Regarding attitudes towards graduates some IT/IS practitioners feel that "graduates have difficulties getting jobs because they lack the practical side of training". This apparent dichotomy between university education and the practical demands of the job market is not a new phenomenon. Similar sentiments are generally expressed in many fields of education and in many other countries.

Some academics express the opinion that it is not their role to train workers for a specific job in the market. They view their role as that of assisting the student to develop his or her conceptual and analytical capacity. The idea of teaching a student to become a productive COBOL programmer for industry is looked upon with disdain. This attitude reflects a particularly traditional approach to university education. On the other side of the coin, practitioner managers reflect a similar lack of foresight in expecting educational institutions to train prospective workers to suit their particular situation. This requirement, if met, would severely narrow the scope of IS education.

Graduate IS personnel complain about the lack of scope in their jobs. Many indicate that they would like to use the analytical and conceptual skills that they have developed throughout their university training but the jobs they are given leave very little room for this. This lack of challenge leads to boredom and contributes to the frequent turnover that plagues the computer industry.

- **Professional development**

Table 4.13 Professional development activities of IS personnel

How often do you												
	Not at All		1		2		3		4		Frequently		Total
	No.	%	No.	%	No.	%	No.	%	No	%	No.	%	No.
Participate in the activities of the local computer society?	6	8.3	13	18.1	15	20.8	16	22.2	12	16.7	10	13.9	72
Attend local C/IS conferences	9	12.5	8	11.1	11	15.3	18	25	18	25	8	11.1	72
Attend foreign C/IS conferences	42	58.3	17	23.6	6	8.3	2	2.8	4	5.6	1	1.4	72
Correspond with foreign persons in the C/IS field	35	49.3	9	12.7	6	8.5	8	11.3	8	11.3	5	7	71
Read international C/IS journals and publications	5	6.9	7	9.7	5	6.9	13	18.1	19	26.4	23	31.9	72
Read local C/IS journals and publications	3	4.2	6	8.3	7	9.7	15	20.8	17	23.6	24	33.3	72
Contribute (papers, articles) to C/IS seminars and journals	43	60.6	10	14.1	9	12.7	4	5.6	3	4.2	2	2.8	71
Conduct research in the C/IS field	44	62	15	21.1	9	12.7	2	2.8	1	1.4	0	0	71

One of the questions on the IS personnel questionnaire attempted to guage the extent to which IS personnel engage in professional development activities. The results are presented in table 4.13. They show that almost as many people do not participate regularly in activities of the Computer Society as those who do. The same applies to local computer conferences and seminars. Understandably, the majority do not attend foreign conferences. Thirteen people claimed they maintained fairly frequent contacts with foreign colleagues. More than 50% of those responding read both local and international journals quite frequently. Journals provide an important source of information on new products and services. Access to international journals was quite limited during the period of tight foreign exchange controls. The vast majority of the respondents do not ever

contribute papers or articles to journals or seminars and almost no one conducts any research in the IS field.

- **Attracting and retaining highly skilled IT personnel**

On the information systems employers questionnaire (discussed earlier), IS/IT managers were asked to comment on the factors they considered important in selecting employees with post-secondary educational qualifications. The findings are presented in table 4.14 below. Sixty four percent of the respondents considered past experience as very important. Academic record was considered very important by 48%. Interview performance was of less importance. During interviews with IS and business managers, it became clear that companies were more willing to hire IS staff with some experience and less academic training than to hire someone with no experience but had high academic training. Companies do not want to have to invest in training IT personnel who may end-up leaving the company for new and more lucrative posts when the training is completed. A paradoxical situation exists, in that, recent computer science graduates find it difficult to get jobs in the IT field even though there is a great demand for IT people.

Table 4.14 Important considerations when selecting IT personnel

	No Basis for comment		Not Important		2		3		4		Very Important		Total	
How important do you consider the following aspects in selecting employees who have post-secondary education?	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
a) Academic record	1	4.0			2	8.0	2	8.0	8	32.0	12	48.0	25	100
b) Interview performance	2	8.0	1	4.0			3	12.0	12	48.0	7	28.0	25	100
c) Selection test performance	4	16.7					5	20.8	9	37.5	6	25.0	24	100
d) Letters of recommendation	2	8.0	4	16.0	3	12.0	4	16.0	11	44.0	1	4.0	25	100
e) Past experience	1	4.0					1	4.0	7	28.0	16	64.0	25	100
f) Physical appearance	3	12.0	11	44.0	1	4.0	5	20.0	4	16.0	1	4.0	25	100
g) Overseas training	4	16.0	5	20.0	5	20.0	6	24.0	1	4.0	4	16.0	25	100
h) Local training	2	8.3	5	20.8	3	12.5	6	25.0	4	16.7	4	16.7	24	100

The term "poaching" is used to describe the aggressive efforts of companies, within the Zimbabwean computer industry, to lure key IT staff from other companies. Most business organisations live in fear of having their most experienced IT people poached by competitors. Staff are targeted by prospective employers and offered enticing pay and

benefits packages to switch companies. The practice has become so widespread that it is viewed by many as the only way to get experienced staff.

The root of the problem lies in the acute shortage of IT personnel with sufficient experience to effectively implement and sustain modern computer-based information systems. Rapid developments in technology, increased competition in the economy, and the advent of peace in the region have combined to create a huge demand for IT personnel. Most successful companies hope to leverage IT capabilities into competitive advantage. To get the most out of computerisation, however, they need to employ people who are competent in deploying and exploiting computer-based systems.

Table 4.15 The Valcol Group: IT salary survey[15] (October 1995)

Operations		Systems Development and Management		Technical Support	
Job Position	**Salary Z$000**	**Job Position**	**Salary Z$000**	**Job Position**	**Salary Z$000**
Junior Computer Operator	24 - 38.4	Jnr. Computer Programmer	26.4 - 42	Jnr Computer Technicians	24 - 38.4
Computer Operator	36 - 48	Computer Programmer	42 - 62.4	Computer Technician (City and Guilds)	42 - 66
Senior Computer Operator	50.4 - 60	Sen. Computer Programmer	66 - 81.6	Computer Technician (graduate)	54 - 78
Shift Leader/Supervisor	57.6 - 84	Programmer Analyst	72 - 90	Sen. Computer Technician	72 - 120
Operations Manager	96 - 144	Analyst Programmer	86.4 - 102	Senior Computer Engineer	96 - 156
		Systems Analyst	96 - 144	Asst. Engineering Manager	144 - 180
		Senior Systems Analyst	120 - 168	Engineering Manager	180 - 240
		IT Manager (Small operation)	144 - 180		
		IT Manager (Large operation)	192 - 300		
		Group IT Manager	300 - 420		

The shortage of appropriately trained and experienced IT personnel is directly related to the problems with IT training enumerated earlier. Companies seeking to employ the skills of highly experienced IT personnel must be willing to offer superior remuneration and conditions of service. Private sector organisations tend to be better able to offer the salary and benefits packages demanded by experienced IT people. Public sector organisations are constrained by the public service employment conditions. They have very little flexibility in adapting to the market conditions because pay and conditions of service are set collectively for the entire public service. Table 4.15 presents a salary survey by Compucol, the computer division of The Valcol Group published in October 1995. It

[15] The Valcol Group, (1995) "IT salary survey", **IT News**, Vol. 3, no. 5, October-November, p. 35

highlights the level of salaries that companies must be prepared to pay to attract the best IT people.

♦ The general state of IS/IT in Zimbabwe

IS practitioners were asked to comment on a number of general issues related to IS/IT capability in Zimbabwe. The issues and the responses are detailed in tables 4.16 (a) and 4.16 (b).

Table 4.16(a) IS practitioners evaluation of local IS issues

	No Basis for comment		Low		2		Average		4		High		Total number Responding	
How would you evaluate the following items	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
a) The level of general computing ability in Zimbabwe	2	2.8	11	15.5	13	18.3	16	22.5	15	21.1	14	19.7	71	100
b) Local ability to identify IS needs and solutions			6	8.5	9	12.7	22	31.0	21	29.6	13	18.3	71	100
c) Local capability to develop large, complex information systems			12	16.9	15	21.1	13	18.3	22	31.0	9	12.7	71	100
d) Need for expatriate consultants on large C/IS projects	3	4.3	23	32.9	16	22.9	9	12.9	13	18.6	6	8.6	70	100
e) Quality of C/IS training provided by local institutions	3	4.3	6	8.6	6	8.6	23	32.9	19	27.1	13	18.6	70	100
f) Quality of locally trained C/IS graduates	3	4.3	5	7.2	14	20.3	20	29.0	19	27.5	8	11.6	69	100
g) Quality of overseas trained C/IS graduates	11	15.9	4	5.8	7	10.1	14	20.3	21	30.4	12	17.4	69	100
h) Quality of C/IS management in the country	3	4.3	3	4.3	8	11.4	32	45.7	19	27.1	5	7.1	70	100

IS practitioners displayed a wide range of opinion on the level of general computing ability in the country. Around 40% of those responding to the question thought the level of computing ability was fairly high. Thirty three percent felt it was low. The local ability to identify IS needs and solutions were deemed fairly high by nearly 50% of those responding. There was quite a mixed response on the local ability to develop large, complex systems. The need for expatriate consultants was deemed low by 39 out of the 70 people responding to the particular question. The quality of local training and graduates from local and overseas programmes was rated as well above average. So too was the

quality of local IS management. By contrast, both the level and quality of local research were viewed by the majority as quite low.

Top management support for the IS function in the organisation was seen as relatively high by about 40% of the respondents to the question. However, a similar percentage felt the level of support was not that high. Job opportunities in the IS/IT field was rated as high as was the tendency of people to seek jobs outside the country. The latter reflects the economic pull of neighbouring countries such as South Africa and Botswana where employers tend to provide better remuneration and conditions of service. Most respondents felt the local computer society was fairly effective, if not overwhelmingly so.

Table 4.16(b) IS practitioners evaluation of local IS issues

	No Basis for comment		Low		2		Average		4		High		Total number Responding	
How would you evaluate the following items	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%	Count	%
i) Level of local C/IS research	7	10.3	20	29.4	22	32.3	13	19.1	4	5.9	3	14.4	68	100
j) Quality of local C/IS research	13	18.6	15	21.4	17	24.3	13	18.6	8	11.4	3	4.3	70	100
k) Support by senior management in your organisation of the C/IS function	11	15.5	8	11.3	7	9.9	16	22.5	12	16.9	17	23.9	71	100
l) Public support of the C/IS field in your country	5	7.1	9	12.9	15	21.4	22	31.4	13	18.6	6	8.6	70	100
m) Job opportunities in the C/IS field in your country	3	4.2	3	4.2	9	12.7	17	23.9	22	31.0	17	23.9	71	100
n) Effectiveness of the local computer society	2	2.8	4	5.6	11	15.5	20	28.2	27	38.0	7	9.9	71	100
o) Tendency of C/IS personnel to seek jobs outside your country	8	11.3	6	8.5	7	9.9	16	22.5	19	26.8	15	21.1	71	100

4.6 Summary

This chapter has attempted to outline the environmental context in which Zimbabwean organisations operate and the factors within the context that pose both challenges and opportunities of organisations engaged in deploying computer-based information systems. Evidence presented in the chapter depict a local situation defined, to a large extent, by its recent political and economic history and current endeavours to create economic wealth. The deployment of computer-based information systems is widespread

but uneven. Most applications, however, are transaction processing or reporting and control systems. These are targeted at automating key operational and support processes.

The country has a deficient IT infrastructure although there are a number of foreign and local companies that can deliver a wide range of IT services. The major challenge in delivering these services is the availability of highly skilled and experienced IT personnel. These are in short supply. Only a small number of such people are being provided by the training institutions each year. The level and quality of training varies from institution to institution. There is currently no way of ensuring high and consistent standards in the training of IT people.

In the next three chapters the experiences of three different Zimbabwean organisations are presented. These case studies trace the attempts by the organisations to deploy computer-based information systems in a bid to transform operational processes. The case studies will show that the organisations face a number of complexities in attempting to successfully deploy computer-based information systems.

CHAPTER 5

Case study: Zimbabwe Electricity Supply Authority (Zesa)

5.1 Background[16]

The Zimbabwe Electricity Supply Authority became a legal operating entity on the January 24, 1986. It has sole responsibility for the acquisition, generation, transmission, distribution and supply of electricity in Zimbabwe. The operations of six separate undertakings were amalgamated, by means of the Electricity Act of 1985, to form Zesa. These entities comprised the former Central African Power Corporation (CAPCO), the Electricity Supply Commission (ESC), and the electricity departments of the cities of Bulawayo, Gweru, Harare and Mutare. Zesa's functions are defined in the Act as, to:

1. acquire, generate, transmit, distribute and supply electricity:
2. investigate new and additional facilities for the generation, transmission, distribution or supply of electricity, and to advise the Ministry of Energy of the results of such investigations;
3. acquire, control and operate other undertakings within Zimbabwe.

The corporation is wholly owned by the Government of Zimbabwe, and falls under the direct responsibility of the Ministry of Transport and Energy. It is one of the largest employers in Zimbabwe with over 7,500 employees. Total capital employed at June 30, 1993 was over Z$3.1 billion (US$478.2 million).[17] Total revenues for the same period was Z$1.46 billion (US$225.2 million).[18] Table 5.1 presents financial and operational highlights for the years 1991/92 and 1992/93. Zesa's operations are geographically dispersed throughout Zimbabwe and fall under two main functional categories. The first category of operations involves the acquisition, generation and transmission of electricity. These functions are accomplished through the power

[16]Most of the information in this section is taken from Zimbabwe Electricity Supply Authority (1994) **Enquiry Document on Information Technology: invitation to consultants for services**, Zesa, March 31, pp. 2-3.

[17] See Appendix G for US$ conversion rates.

[18]**Annual Reports and Accounts**, Zimbabwe Electricity Supply Authority, June 30, 1993.

stations. There are five power stations. These are located at Bulawayo, Harare, Hwange, Kariba, and Munyati. The Kariba station generates hydroelectric power while the other four are coal-fired, thermal power stations.

Table 5.1 Zesa: Selected financial and Operational Results 1991/92 and 1992/93[19]

Indicators	1991/92	1992/93
Turnover (millions Z$)	989	1464.5
Surplus/ Deficit (millions Z$)	(73)	36.8
Capital Employed (millions Z$)	2,397	3,108.6
Energy Sales (Gwh)	9247.947	7730.764
No. of Employees	7500+	7531

The second category of operations deals with distribution and supply of electricity. This is accomplished through five (5) area offices located in Bulawayo (Western Area Office), Chinhoyi (Northern Area Office), Gweru (Southern Area Office), Harare (Harare Area Office) and Mutare (Eastern Area Office). The area offices are directly responsible for assessing electricity use by customers and for billing and collecting revenues from these customers. Each area office may operate semi-autonomous self-billing offices which have authority to process their own bills and collect revenues from customers. There are six such offices located in Bindura, Chitungwiza, Kadoma, Kwekwe, Marondera, and Masvingo. Each area office also operates a number of depots and stores. Depots perform their own meter reading and cash collection but they have to send these to the Area Office for processing. Depots also hold stores inventory and fuel tanks. See Appendix D for a map depicting the location of power stations, area offices and depots.

5.2 The macro-environmental context

The external environment within which Zesa operates has a profound impact on the role and function of the corporation. Zimbabwe is a land-locked country with no natural reserves of oil. Electricity is the dominant source of energy. Zimbabwe has large, easily mined coal deposits and is bordered on its northern side by the Zambesi

[19] Ibid., pp. 19, 23, 45-46

River. The large coal deposits and the water resources of the Zambesi make it possible and rational for Zimbabwe to develop an electricity industry based on thermal and hydroelectric power. As a result, seventy-two percent of the power generated in the fiscal year 1992/93 came from the coal-fired thermal stations. The other 28% was hydroelectric power generated at Kariba. Electricity, therefore, is a very significant and indispensable part of the economic and social life of the country. Both industry and households (in developed areas) are dependent on it as a primary source of energy.

The role and function of Zesa must also be understood in terms of Zimbabwe's political and economic history. Prior to independence in 1980 the supply of electricity was targeted mainly at industry, white urban dwellers and white rural farmers. This was in keeping with the policy of apartheid pursued by the ruling Smith regime. The majority of the population were not considered as potential or priority customers. The fact that Zimbabwe is a vast country with its population dispersed in many isolated rural areas should not be overlooked, however. It was and continues to be very expensive and difficult to provide economically viable services to such a widely dispersed populous.

With the coming of independence in 1980, major shifts in social and economic policies were instituted. The new government began to play an even more central role in the economy. A number of state enterprises were created while others, already in existence, were developed and enlarged. The setting up of Zesa was a direct result of government policy to bring central control to the vital electricity industry. The government felt this amalgamation was necessary in order to provide the base for implementing the policy of providing electricity to all segments of the Zimbabwean population. Zesa is therefore a vital instrument of social policy.

5.3 Organisational mission and strategy

Over the past several years Zesa has sought to redefine itself from a quasi-governmental department to that of a self-financing, autonomous energy corporation. It is currently undergoing a strategic reorganisation exercise and is in the process of developing

a comprehensive strategic plan. In the words of the current chief executive, Zesa aims to "change itself into a blue-chip corporation". Its main task at the moment is to gain autonomy from the government so that it is free to manage its affairs in a way that will make it more responsive and accountable to its various stake holders. One of its primary goals is to change the current mode of regulation, which seeks to control its operations, to one which focuses on the utility's performance based on appropriately defined 'world class' standards.

To give direction and focus to its activities Zesa's has defined its mission as

> To provide a safe, reliable, secure electricity supply service sufficient for the needs of all sectors of the Zimbabwean economy at least cost and within parameters defined by its stake holders; the most important of whom are consumers, government, suppliers, employees and the general public.[20]

Table 5.2 sets out the critical performance areas identified by Zesa's management.

Table 5.2 Zesa: critical performance areas[21]

Dimensions	Criteria
Safety	Preservation of life and property
Reliability	Consistency in quality and supply
Security	Continuity of supply
Sufficiency	Supply and demand balance
Cost effectiveness	Financial, economic, environmental
Stakeholder relations	Fulfilment of stakeholder needs

One of Zesa's main objectives is to improve decision-making within the authority in order to maximise operational efficiency and organisational effectiveness. It is felt that this improvement in decision-making can be most effectively accomplished if managers at a lower level of the organisation are allowed to make decisions on issues within their sphere of responsibility. This contrasts with the

[20] **What is Zesa?**, Zimbabwe Electricity Supply Authority, May 1993, p. 8
[21] Ibid., p. 9

situation that has prevailed until now where even the most minute operational decision had to be referred up the chain of command to directors at head office. To effect this devolution of responsibility and authority, Zesa is proposing to organise its operations around strategic business units (SBUs). With the move to strategic business units, managers will have the opportunity to strive to remove the inefficiencies prevalent in current operations. "world best" standards can then be achieved.[22] The SBUs will consist of the five distribution areas and the five power stations. While there has been a great degree of decentralisation already, some functions such as cost accounting are still being performed centrally. The area offices and power stations are not yet totally responsible for their operations and overall performance.

5.4 Information needs at Zesa

The biggest challenge faced by senior managers at Zesa is ensuring that they have the right information on which to base their decisions. Historically, Zesa has had serious difficulties producing reliable and timely information for managers to use. Much of the operational information produced by the authority had only marginal utility. In a memo to all Zesa staff announcing the formation of the Management Information Systems Unit, dated April 10, 1987, the then Acting general manager wrote;

> The present manual systems, although providing needed information, are sometimes slow and inadequate. Therefore, the information available to management which is necessary for timely decision-making is limited in scope. To cope with the larger flow of data which is resulting from the current expansion of the authority and to provide timely Management Information, it is essential to automate the current systems.

Management felt they did not have a significant understanding of what was happening in the organisation. Decisions were being made without the benefit of concrete and reliable facts. This realisation of the need for more accurate and timely

[22]Mangwengwende, S (1994) Personal Interview, July 28.

information came about mostly as a result of pressure from external agencies which wanted to have a more accurate picture of how the authority was functioning. The Zimbabwean Government has been pushing for the rationalisation of the activities of the parastatals and a general improvement in efficiency. This has set in motion a whole series of initiatives to work towards improvement in the general performance of government-owned entities. On another front, the parastatal was experiencing serious operating crises and needed to get additional funding from its principal, the Government of Zimbabwe, and from international lending agencies and commercial banks. These entities required the provision of certain operating information which was, in most instances, difficult or impossible to produce using the existing systems. The information problems of Zesa, as identified in 1987, were succinctly outlined by Price Waterhouse Management consultants as:[23]

a) Information is not available in a timely manner, and too many information sources are based on overloaded manual systems.

b) Information is not presented in a format suitable for decision-making; there are few analyses, consolidations, or extrapolations. Clerical time is not available for the multiple analyses which are required.

c) Amalgamation and decentralisation activities have changed responsibilities and contributed to many managers being new to their present posts. Thus Zesa management is not, as yet, fully conversant with all its own information requirements. Amalgamation and decentralisation have also contributed to widening the scope of the business and bringing the business into direct contact with many more consumers. These changes have in turn changed the type of information required.

d) Forward planning requires considerable information derived from sources both internal to and external to the authority. Once collected, the means to assess and project trends is vital. Zesa presently has little capability for collecting and saving either internal or external information. Neither does it have the tools for analysing and using collected information in order to develop projections.

Zesa's strategic objectives of amalgamation of disparate service groups and decentralisation of service delivery mechanisms made it impossible for the company to rely on the systems that operated in the past. In essence, the amalgamation exercise

[23] Price Waterhouse (1987) **Zimbabwe Electricity Supply Authority: MIS strategy report**, October 28, p. 11.

was designed to consolidate the provision of electricity service under one central authority while decentralisation sought ensure local responsiveness to customer requirements. This type of centralisation-decentralisation dichotomy could only be successfully addressed by the introduction of a corporate-wide computer-based information system. In order to define information requirements more concretely a number of critical success factors were identified. These were then associated with relevant performance criteria. Table 5.3 outlines a sample of the critical success factors and performance criteria presented in the 1987 MIS strategy report.

5.5 Zesa's MIS strategy of 1987

Soon after the establishment of Zesa it became apparent that the systems then in place were totally inadequate to cope with the demand for timely management information. The need for an information systems strategy was highlighted during a process of assessing the broad requirements for Zesa's management information system. It was found that "the current systems did not fulfil the management information systems requirements of providing reliable, up-to-date, timely, and accessible information for operational purposes and management control."[24] As a result of this initial assessment a major study was commissioned to review the management information systems of Zesa and to draft a detailed computer systems development strategy. The tender was awarded to Price Waterhouse Management Consultants (Zimbabwe) which, with the assistance of the MIS Unit of Zesa, undertook a six month study of the authority's information requirements and systems. Their report was submitted on October 28, 1987.

The main strategy recommendations emanating from the report are summarised below.[25]

1. That a computer-based information and operational system be implemented in user departments. This would allow users to have direct

[24]Zesa IT Division, (1992) **Computerization Project Information Booklet**, Zimbabwe Electricity Supply Authority, February.

[25]For more detail see report **Zimbabwe Electricity Supply Authority: MIS strategy report**, Price Waterhouse Management Consultants, October 2 8, 1987.

access, control and responsibility for the use and administration of relevant applications.

2. The implementation of distributed computing facilities in the head office, areas and some districts and power stations.

3. That careful consideration be given to the selection and implementation of the billing system, which is most crucial for ensuring the financial viability of the whole project.

4. In order to create a corporate database, selection and implementation of computerised applications initially be confined to those applications which constitute the core business systems. These applications should be implemented using "proven" packages where possible.

Table 5.3 Zesa: sample of critical success factors and performance criteria[26]

Department	Critical Success Factors	Performance Criteria (Information)
Consumer Services	I. Continuity of service. II. Management of future needs -Demand management -Provision of new service -Timely revenue marketing III. Provision of customer level services -Bill accurately/ on time -Timely revenue collection IV. Cost control management V. Accuracy of quotations VI. Technical quality of product	1) Percentage of down time 2) Duration of outages 3) Mean time to repair 4) MWHs cost 5) Debtors days outstanding 6) No. of days between meter reading and billing 7) Accuracy of actual usage vs estimate billing 8) Analysis of revenue by type and customer 9) Potential new customers
Finance	I. Correct processing of data II. Funding of operations III. Managing surplus funds IV. Monitoring capital projects cost data V. Cost control (provision of information to operations) VI. Availability of required material - Procurement - Stock control - Accounts payable control VII. Ensure people are paid VIII. Credit rating (with supplier and banks)	1) Cost by area/district 2) Cost by cost centre as appropriate 3) Debt - equity ration (%) 4) Interest cover 5) Value and timing of loan repayment commitments 6) Stock turnover 7) Time to present monthly accounts 8) Pension coverage and commitments 9) No. of pay queries 10) Reasonableness of data produced

Other recommendations included the development of a management information reporting system and the expansion of the MIS department to meet the workload demands. The broad objectives of the MIS (1987) Strategy are described below:[27]

1. The establishment of an end-user computing environment

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[26] Price Waterhouse, (1987) **Zimbabwe Electricity Supply Authority: MIS strategy report**, October 28, Appendix 5 pp. 5-7.

[27] Zesa, (1994) **Enquiry document on information technology: invitation to consultants for services**, Appendix A, Annexe 3, p. 1.

2. The provision of computer hardware and software at head office and at each district office and power station
3. The creation of a small body of technical personnel capable of supporting the computerised system.
4. The use of proven applications packages.
5. The development of a computerised MIS incorporating the following applications: consumer information, financial, materials management, fleet management, human resources management, and planned maintenance.
6. To give priority to the implementation of the Consumer Information System.

The management information systems project was divided into three phases, the development of the strategic plan, the specification of requirements and data model, and the installation and commissioning of the computerised systems. The first two phases were carried out under the leadership of Price Waterhouse Management Consultants. The third phase was led by Unitech (the local IBM dealer). The implementation of the MIS 1987 strategy is discussed in detail in section 5.9 below.

5.6 New IS strategy: 1995-2000

With the MIS (1987) Strategy almost completely implemented, Zesa embarked on the process of developing a new information system strategy. This was made possible by a loan from the International Bank of Reconstruction and Development under the project, Power Plan III. An invitation for proposals was issued on the 31st March 1994 to qualified consultants in a document entitled "Enquiry document on information technology: invitation to consultants for services".[28] This document outlines the broad business and IT objectives of the IT component of Power Plan III. The business objectives of the new IT strategy is focused on the improvement of management efficiency and effectiveness, the improvement of customer service and the better integration of IT into ongoing business processes. The MIS objectives, in support of the business objectives, targets the improvement of access to information through decentralised operations, the improvement of reliability and security of

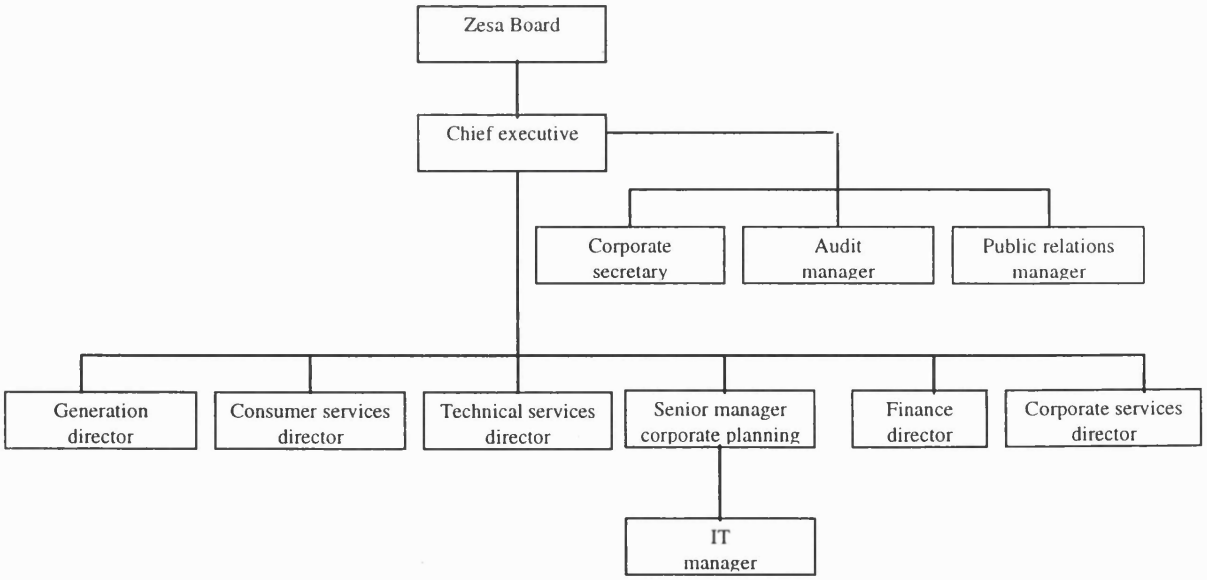
[28]Zesa, (1994) Enquiry document on information technology: invitation to consultants for services, March 31.

computer hardware, software and data and the improvement of monitoring and reporting capabilities. The enquiry document goes into detail as to the products required in the submissions and the expected time frame for completing the work. Price Waterhouse Management Consultants won the tender to develop the new strategy.

5.7 Zesa's organisational structure and governance

Zesa is governed by the Ministry of Transport and Energy through the Zimbabwe Electricity Supply Board which consists of a chairman, vice-chairman, general manager, and directors. The board has overall responsibility for the running of the authority including the development of corporate strategy, policies and objectives. It also has responsibility for recommending, to the Minister of Transport and Energy, the appointment of the general manager and directors. The board is authorised to establish committees as it deems fit. Two committees that have been established are the consumer advisory committee and the finance and procurement committee.

Figure 5.1 Zesa: Organisation chart showing senior responsibilities and relationships (1995)



The day to day management of the corporation falls under the leadership of the general manager who is also the chief executive officer. The general manager is

supported by various executive directors. These include the generation director, consumer services director, technical services director, finance director, and senior manager (corporate planning). Figure 5.1 presents the organisational chart of Zesa depicting the major responsibilities and relationships. The management of Zesa has undergone significant restructuring since 1992. The current organisational structure is the result of efforts to improve the governance of the corporation.

Coming under the direct supervision of the Ministry of Transport and Energy means that the government plays a major, if sometimes unwelcome, role in the running of the authority. In all matters of policy and operations the government is the final arbiter. Decision-making within Zesa is very much constrained by government policy in general and by the specific actions of ministers and other senior civil servants. There is a long history of ministerial interference in the running of the authority. However, this is becoming less of a problem.

Being a government entity, Zesa is subject to the long and tortuous decision-making processes that characterise such organisations. This prevents managers from making key operational decisions in a timely manner. Tendering processes, for example, must follow procedures outlined by the government and funding agencies. The process can be complicated and long. For example, the evaluation of submissions to supply IT resources to Zesa was completed in July 1989. The contract with the selected supplier was signed in January, 1991. The Government Tender Board is pivotal in the decision-making process. It makes the final recommendation to the appropriate body after ensuring that the tendering procedures have being complied with. The long time taken for decisions to be made (e.g. 1.5 years or more) can render a project 'dead on arrival'. Changes in specifications, technology, internal and external circumstances can nullify previous assumptions. Once a tender has been approved, it normally cannot be modified. This results in tying organisations to circumstances and technology that no longer obtain.

5.8 IS-related Resources

♦ IT Infrastructure

The MIS (1987) Strategy called for the provision of computer hardware and software at head office and in each area office and power station. By the end of September, 1994, Zesa had implemented a distributed computing network linking the five area offices and two power stations. The other power stations will get their own computing power in the next phase of the IT project. The hardware installed is the IBM AS/400 range. The computers are linked to each other using dedicated Post and Telecommunications (PTC) lines or Zesa's own power line carrier (PLC) lines forming a wide-area network. The network protocol used is IBM's System Network Architecture (SNA). The wide-area network as it is currently configured is depicted in Appendix E. Each nodal computer supports a local area local area network comprising workstations and personal computers. A total of 170 workstations (excluding PCs) were connected to the network as at March 31, 1994. The network has grown since that time. Table 5.4 identifies the applications that have been implemented or are planned at Zesa. The applications have been categorised as key operational, support, strategic or high potential. Considerable success in implementing the applications has been achieved. The new systems have had a very positive impact on the business.

Table 5.4 Zesa's current and proposed application portfolio (June 1995)

Strategic: Executive information system**	**High Potential:** Computer-aided design* ATM payment system* Hand-held meter reading* Document management*
Key Operational: Consumer information system Load-limited customer system Off-line cash receipting Job costing Materials management Planned maintenance Fleet and transport management#	**Support:** Finance systems (nominal ledger, debtors, etc.) Personnel systems# Property management* Office automation*

* Proposed Applications
\# Applications being tested
** A rudimentary EIS is in place. This needs to be further developed

An end-user computer environment is being implemented where each user is expected to have access to live data for updating and reporting as required and authorised for their function. For example, with the consumer information system, a customer's account is updated instantly and a receipt is provided when the customer pays his/her electricity bill to the tellers in the banking hall. Customers are also able to make on-the-spot enquiries concerning their account. There are plans to integrate bill payments into the local ATM network in co-operation with local banks. The executive information system, although still in its rudimentary stages of development, provides the executive directors with instant access to key performance indicators. Each executive director has access to his own personal computer through which these enquiries can be made.

♦ Human Resources

Zesa's IT department comprises a large well-educated staff. Table 5.5 gives an overview of the educational background and IT work experience of key people in the department. As the chart shows, both the IT manager and the chief systems analyst (de facto deputy IT manager) have in excess of twelve years of experience working in the IT field. All this experience has been obtained in public sector organisations. This is not unusual since most black Zimbabweans returning to the country at or around 1980 (after independence) were quickly absorbed into the public sector. The IT manager undertook his undergraduate training in computer science in the United Kingdom at Coventry Polytechnic and obtained a post graduate certificate in computer science in the United States of America. He has recently (1993) obtained a Master of Business Administration degree through the University of Zimbabwe. The chief systems analyst similarly studied in the United Kingdom, obtaining an HND in computer studies from Thames Polytechnic. She also obtained a Diploma in Management Information Systems and an Masters of Science in Analysis, Design and Management of Information Systems (ADMIS) from the London School of Economics and Political Science. The rest of the IT staff, including those in operations, have been trained to diploma or bachelors degree level. Most undertook their education at the University of

Zimbabwe completing the Bachelor of Science in computing and mathematics. Others received their training in local polytechnics. One systems analyst obtained his degree in computer science in Eastern Europe while another studied for his diploma in Germany.

Table 5.5 Zesa IT department (June, 1995): educational background and IT experience

Job Position	Education	Experience in IT	Years at Zesa	Gender
IT manager	MBA, Postgrad certificate BSc Computers	14	7	M
Chief systems analyst	MSc Systems Analysis, Dip.MIS,HND	12	6	F
Principal systems analyst	BSc Computing & Maths	8	6	M
Principal systems analyst	BSc Computing & Maths	7	5	M
Principal systems analyst	BSc Computing & Maths	8	3	F
Senior systems analyst (a)	Diploma in Data Processing	10	7	M
Senior systems analyst (b)	IDPM Diploma	6	5	M
Senior systems analyst (c)	BSc Computer Science	11	7	M
Senior systems analyst (d)	B.Sc. HND Computer Science	5	4	M
Systems analyst	Cert. Computer Programming	8	3	M
Analyst programmer	B.Sc. Computing & Maths	4	3	M
Analyst programmer	ND Computer Programming	6	3	M
Analyst programmer	ND Computer Studies	3	3	F
Chief operations officer	BSc Sociology, NID Information Processing	5	5	M
Network administrator	NID Information Processing	4	2	M
Senior computer operator	Diploma in teaching	5	3	M
Computer operator	BSc Computer Science	3	2	F
PC support officer	ND Computer Science	2	1	F
PC support officer	-	2	1	F

Like the IT manager and chief systems analyst, most of the IT Staff have worked only in the public sector. There is little, if any, work experience that has been gained in the private sector. This may be because only those who start out in the public sector tend to remain in it. There is probably very little movement from private sector to public sector. Most of the reason for this relates to the pay and conditions of service offered in the public sector.

♦ IS-related competencies

Zesa has developed a number of strategic, technical and operational IS-related competencies over the years. A key strategic competence is the ability to conceptualise and orchestrate the deployment of large-scale computerised systems. The authority has instituted a coherent project management framework that has ensured the successful implementation of computer-based systems. Associated with this is the capacity to effectively manage IT project teams.

The IT department has gained significant technical skills and knowledge over the past several years. They have well-developed capabilities in specifying functional systems requirements and designing the necessary systems. The department has an experienced group of analysts and programmers who are able to undertake bespoke development of business applications or modify purchased application packages to suit user needs. They are also highly capable of implementing and maintaining these systems across the authority without outside assistance.

Zesa has a skilled and experienced IT operations team whose network management capabilities complement those of the applications group. The maintenance of a robust IT network is critical to successful deployment of business applications. Without the network the authority would not be able to achieve the goals of distributed end-user computing which is at the heart of its decentralisation strategy. The network operations team at Zesa is probably the most experienced group of people in Southern Africa (excluding South Africa) capable of deploying IBM Systems Network Architecture (SNA).

One problem facing the IT department, however, is that much of its skills and knowledge are narrowly oriented around IBM products and operating environment. Since IBM systems tend to be proprietary, knowledge and experience gained in that environment are not readily transferable to other settings.

Complementing the skills and knowledge in the IT department are the technical skills of staff in the Technical Services department and the National Control Centre (NCC). The Technical Services department maintains the communications network for the authority using power line carrier methods. They are capable of using the same network to transmit data. The department also can set up local and wide-area data networks without outside help. The NCC can carry out technical systems maintenance and has offered to take on that work for the authority. This means that Zesa would not have to be dependent of outside technical service providers.

♦ Financial capacity

The total cost of supply, installation, and commissioning of computer hardware and software at Zesa was US$ 4.3 million plus Z$10.5 million as at the end of December 1994. Zesa's computerisation was funded by the IBRD (World Bank) under the Power II project. Salary and administration costs for the fiscal years 1990/91, 1991/92, 1992/93 and 1993/94 were Z$1.37 million, 1.6 million, 4 million and 5.1 million respectively. These were funded from operations. Funding for the extension of computerisation and the implementation of the new Five-Year IS strategy will also come from the IBRD. It is expected to cost US$6.25 million.[29] A major portion of Zesa's funding for capital projects is in the form of loans provided by foreign and local banks and financial institutions. At the end of June, 1993 Zesa had loans outstanding totalling Z$2.7 billion.[30]

It would appear that Zesa has the capacity to fund the recurring costs of operating and maintaining its computerised information system but must seek additional resources from outside the company to fund capital projects. The process of obtaining funds provided by the IBRD and similar multilateral institutions require significant involvement and commitment on the part of central government. Many such arrangements take years of negotiation and may depend on the economic and political

[29] Sanhokwe, E (1995) **Information letter**, January 5.
[30] **Annual Reports and Accounts**, Zimbabwe Electricity Supply Authority, June 30, 1993, p.39

standing of the country as a whole. There is a potential that Zesa's operational flexibility may be undermined by the dependence on external funding. Because information technology is subject to rapid obsolescence, Zesa needs to carry out regular systems upgrade without sacrificing the integrity of the current systems. The company must therefore develop sources of funding, more closely related to its own operations, that will guarantee the flexibility and continuity needed to sustain large scale information systems.

♦ Organisational climate and culture

The current organisational climate and culture within Zesa is characterised by persistent institutional and functional change. Zesa's management has undertaken to shed the image of the company as a lumbering, inefficient bureaucracy with not much concern for the customer and replace it with that of an efficient, 'world class' organisation whose primary concern is the customer. The extent to which the company can shed its old image is constrained by the fact that it is still intricately tied to the central government and its processes.

computer-based systems have been instrumental in altering the operating culture of the organisation. The ability to access information whenever necessary has began to remove the information 'hoarding' culture that pervaded the organisation prior to this time. In the past, privileged access to information gave some people power over others. This type of information 'leverage' is now less probable. The introduction of IT has also enabled the implementation of a customer-focused strategy. Customer service personnel are now able to deal with most customer queries at the 'front desk'. Customer accounts are now up-to-date and information on connection status and other services are available on-line.

One of the defining features of the culture of the IT department is the use of the term 'opportunities' to characterise difficulties and challenges faced by IT managers and staff. The term is used profusely in the department, underlining the attitude taken by staff in dealing with difficult problems. A problem brought by a user is an

opportunity for the IT department. The IT manager is the leading exponent of this philosophy. While it is hoped that this philosophy will become pervasive, staff are still learning how to take professional responsibility for problems encountered. For example, the EIS system was not performing up to the standard expected by the chief executive. When he complained the systems analysts working on the project took the criticisms personally. They had to be shown that they needed to look at the complaints as professionals and view things more from the point of view of the user.

Unlike most situations in public sector firms in Zimbabwe, the IT department at Zesa has retained practically the same staff since the inception of the computerisation project. This is due, in a large part, to the motivational content of the project itself. The size of the undertaking, the opportunities for learning and skill development, complemented by the significance of the project has led to much job satisfaction. Anecdotal evidence suggest that despite the fact that salaries are not competitive with the private sector the experience enjoyed by the IT staff has been very positive.

♦ Organisational linkages

In the process of deploying its information systems Zesa and its IT department have developed several key linkage relationships with other entities. These are both internal and external. The entities play a substantial role in supporting Zesa's ability to design, develop, and deploy its various systems. The company, through its IT department, maintains formal external links with Unitech, which supplies most of its hardware, software, and project management expertise and Price-Waterhouse Consultants, which developed the MIS (1987) strategy and led out in the specification of the systems requirements. The links with Unitech were strongest up until the end of 1994. This was the period where major contractual obligations had to be satisfied between the two parties. Unitech provided most of the hardware and software and continues to provide support for the systems supplied.

The relationship between Unitech and Zesa is a mutually beneficial one. Unitech provides access to technology (although largely based on its links with IBM for which it is the local dealer) and some expertise in implementing computer-based information systems. It is a well managed company, whose leadership is proactive and very experienced. The company was Zimbabwean-owned, until bought by IBM in January, 1996, and is committed to developing local expertise in the use of information technology. Zesa benefited from working with an organisation that was committed to the success of the project. Unitech had much to gain from the success of the Zesa implementation. Having taken on one of the largest IT projects ever undertaken in the country it was anxious to demonstrate its ability to carry it off. It could not, however, achieve this success without the help of the management and staff at Zesa. According to the project manager leading the Zesa implementation, `Unitech has learnt an enormous amount from running such a project'.[31] The project has done a lot for Unitech both in revenue and organisational development terms. It provided a significant learning experience. Such was the effect on Unitech that the company had to change its management structure in order to deal with a customer the size of Zesa. The scale and scope of the project has enabled Unitech to better position itself to undertake similar projects in the future.

The other major external link that Zesa has is with the management consultants Price-Waterhouse. Price-Waterhouse was instrumental in developing the MIS (1987) Strategy on which the new information systems is based. They also carried out the requirements analysis with the help of Zesa staff. The major benefit that Price-Waterhouse brings to its relationship with Zesa is the broad and comprehensive contacts it has with organisations internationally. Price Waterhouse Zimbabwe is able to harness the resources and expertise of other organisations within the international Price Waterhouse group. Although the local partners certainly lacked sophisticated technical expertise to deal with a project of the size and scope undertaken by Zesa, they had opportunity to make use of expertise within their global organisation, either embodied in internal publications and reports or in individuals. Another of Price-Waterhouse's

[31]Graham, Rusty (1994) **Personal Interview**, Harare, August 15.

major strengths is its ability to articulate the needs and aspirations of Zesa in a manner that suits the requirements of major bilateral funding agencies such as the World Bank.

The bonds between the two organisations we have discussed and Zesa are cemented mostly by business self-interest. For Unitech and Price-Waterhouse, Zesa is a very significant source of long-term corporate income. Zesa needs access to new information and technical expertise and can look to these organisations for such. It is therefore important for each party to maintain solid and respectful formal and informal relationships with each other.

Zesa's IT department has developed other less formal external linkages. One such link that is being actively pursued is a growing relationship with the IT department of ESKOM, its counterpart in South Africa. ESKOM is a much larger utility with a much more developed and experienced IT department. IT is applied in a more advanced way in the South African utility. More recently links have been sought with other utilities in the UK. A study tour was planned for the latter part of 1995.

The main internal links as far as the IT department is concerned is with the various user departments in head office, the area offices and power plants. This is achieved mainly through the project user groups. These are described in detail elsewhere in the chapter. It is impossible to attain successful implementation of an information system without the explicit and enthusiastic co-operation of the user departments.

5.9 IS-related organisational routines

♦ Implementation of the IS strategy

The implementation of the MIS (1987) strategy began with a detailed analysis and specification of the information systems requirements. This exercise was carried out jointly by the existing MIS unit of Zesa and Price-Waterhouse (Zimbabwe). It began in March 1989 and was completed in November of the same year. The main

product of this requirements-determination stage was a tender enquiry document for the supply, installation, commissioning and support of computer hardware and software. A pre-qualification of suitable suppliers of hardware and software was issued in December 1988 and evaluation of responses was completed by July 1989.[32] The tender to provide hardware, software and support services was eventually awarded to Unitech, a local supplier of IBM equipment. The whole tendering process, while purportedly conforming to Government Tender Board and World Bank procurement practices came under heavy criticism from some rival local suppliers. Criticisms were on two fronts. On the one hand, it was felt that the project was too large in scale and scope to be implemented successfully. No other project of this magnitude had ever been attempted in Zimbabwe and there was a fear that the requisite skills and experience were not available. On the other, criticisms were raised about the capability of the tender winner, Unitech, to manage such a large and complex project. Unitech was seen as being too inexperienced for the job. Charges of corruption were levelled at Zesa management. These were strongly refuted and rebutted.

Unitech's primary role in the implementation of the MIS was that of hardware and software supplier and systems integrator. In the initial stages it also assisted both top management and the IT department in orchestrating the implementation process. The primary hardware supplied was the IBM AS/400 range of computers. Unitech also supplied IBM terminals, PS/2 and PS/1 personal computers along with IBM line and dot matrix printers. Software supplied were mostly third party package software or bespoke systems where no suitable package could be found.

A project manager (with significant experience working for Digital Equipment Corporation in the UK) was brought in to supervise the implementation of the project. In the early stages almost 100 per cent of her time was dedicated to implementing the Zesa information system. In the first months of the project Unitech had 15 people "living and breathing" Zesa. Each person in Zesa's IT department had a Unitech counterpart. The main purpose of this tight link was to ensure that as much learning as possible took place on both sides. Zesa staff needed to study, understand and learn the

[32]Zesa, (1992) **Computerization project information booklet**, p. 4

new technical systems that were going to be implemented and Unitech needed a more intimate knowledge of the context in which they were to implement the new systems. While the Unitech project manager saw Unitech's role as that of delivering tools and expertise to Zesa for them to accomplish their goals, Unitech delivered mostly tools in many instances. Expertise was jointly contributed by the Zesa and Unitech staff. This resulted from the fact that Unitech staff had little or no experience with much of the hardware and software they were supplying (at least not on the scale of the Zesa project). Both groups had to spend a considerable amount of time learning the new systems from scratch. In many instances the `expertise' was with Zesa.

Pivotal roles in the implementation of the computerised systems was played by the IT manager and the project manager from Unitech and their respective teams. Both groups worked together closely in carrying out their various responsibilities. According to the Unitech project manager 'there was nothing that Unitech did without Zesa personnel being involved'.

♦ Establishing and building the IS organisation

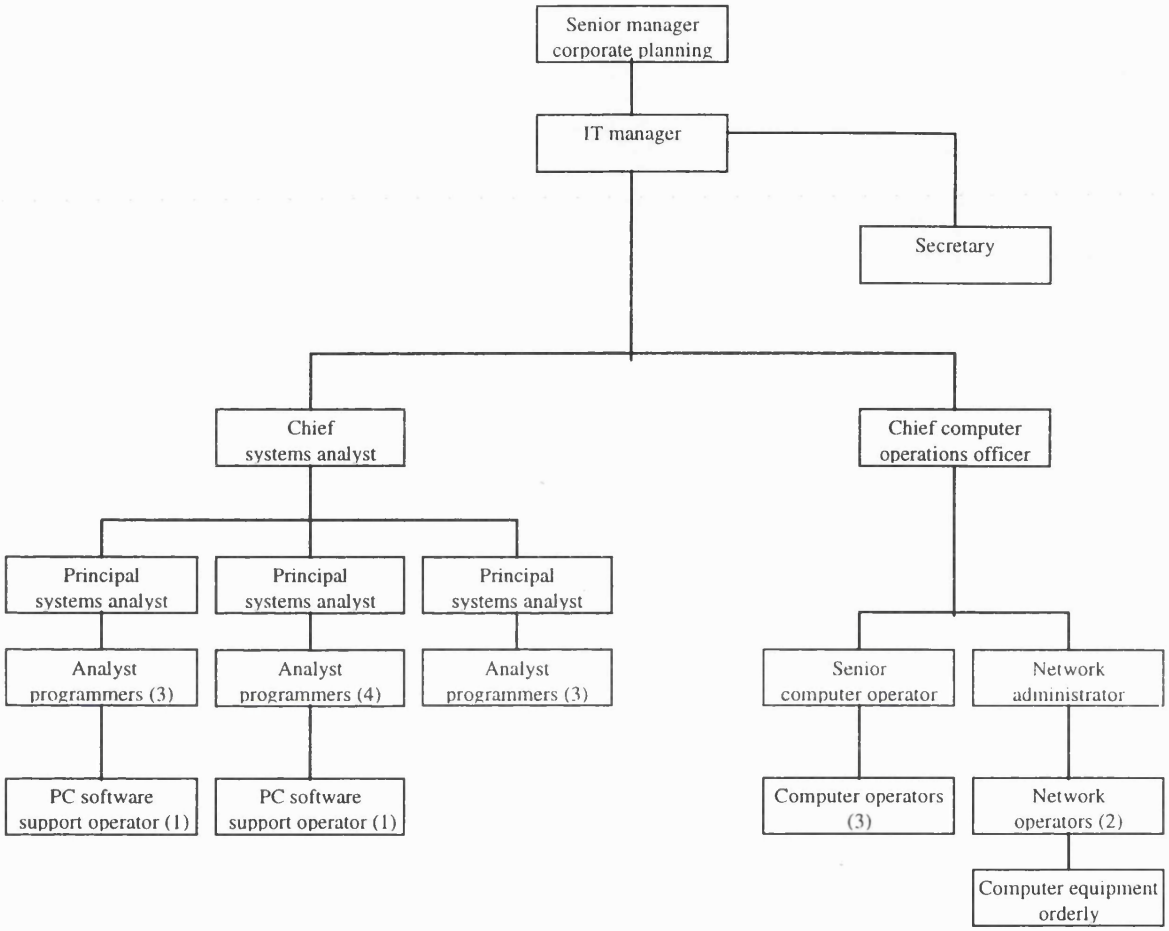
When the MIS department was first created it came under the direct supervision of the chief executive. This was because there was much disagreement as to where the department should be placed. Several departments such as finance and consumer services, wanted IT to fall under their jurisdiction. There was a sense early on that placing the department under one of the major functional areas could create problems. Placing the department under the direct supervision of the chief executive, while giving status and impetus to its work, created its own problems. One major difficulty was that most departments did not know how to relate to the IT department since it was directly accountable to the CEO. Any disagreements between other departments and the IT department would be difficult to resolve since that would automatically involve the CEO who should normally act as final arbiter. The other difficulty was that although the department was given prominence falling under the CEO, he had very little time to champion the work of the department. The MIS manager had difficulty getting access to the CEO to discuss operational issues.

The IT department now falls under the corporate planning department. This resulted from the restructuring process taking place in the authority. The current placement of the IT department avoids the pitfall of having it falling under one of the dominant functional areas such as finance or consumer services. If IT was placed under either one of these departments it ran the risk of becoming exclusively a service of the controlling department as opposed to serving wider corporate needs. The corporate planning department is purely a service department responsible for charting the strategic direction of the authority. Working under the umbrella of the corporate planning department makes it more likely that IT would adopt a broader perspective since the work of the department is more global in scope.

The general manager suggested that the name IT department was given to emphasise the service function of the department. MIS was deemed the responsibility of the line managers.[33] Each divisional director is now accountable for the information systems in his area of responsibility. This change is most vividly demonstrated in the fact that each director is now tasked to produce reports and present the state and progress of information systems development within his department to the IT steering committee.

[33]Mangwengwende, S (1994) Personal Interview, July 28

Figure 5.2 **Zesa: organisation chart of the information technology department (1995)**



The IT department has two areas of emphasis: applications and operations. The IT manager has overall responsibility for the functioning of the department and is accountable to the senior manager (corporate planning). The applications area comes under the supervision of the chief systems analyst. The main responsibility of this section is to undertake systems analysis, design, development, implementation and evaluation. The production environment (operations) section is headed by the chief operations officer and is responsible for technical hardware and software support to end-users. Training is provided to end-users and IT personnel by staff in the application and operations sections. Figure 5.3 gives further details of the organisation of the department.

- **Recruitment and retention of IT personnel**

The recruitment of qualified IT staff was one of the key recommendations in the MIS (1987) strategy. It was estimated that between 28 and 38 persons would be needed to fulfil the requirements of the strategy. The department currently (June 1995) has 27 staff members. One group of staff not evident in the current make up is end-user liaison staff recommended in the strategy. This job is being directly executed by the systems analysts and operations staff themselves. The need for liaison officers is probably not critical and their absence enhances direct communication opportunities between IT personnel and users.

Most of the senior IT staff recruited had previous working experience. The majority came from other public sector organisations. Only one or two had private sector experience. One important characteristic of the staff recruited was that a majority had been educated at or beyond the bachelors degree level in computer science. A number of these received their training overseas. This means that the IT department was staffed with people with demonstrated high-level conceptual skills. They were, however, short on experience at the inception of the project.

Retention of qualified staff in public sector companies is a major challenge in Zimbabwe. Zesa has been fortunate in that most of the key IT staff have remained in the company since the start of the project. The average tenure of applications staff is just under five years. When considered against the average number of years of experience that applications staff have had in the IT industry (8 years) it is clear that most staff have gained a significant part of their working experience at Zesa. Zesa now faces a challenge of retaining these people because they have become highly skilled in their field and are in great demand. This situation was quite aptly demonstrated when Unitech "poached" one of the leading system operators. Fortunately for Zesa, this person did not like the new environment and was attracted back to Zesa after a few months. He is now the chief operations officer. Most recently, the department lost one staff member who was offered a package Z$2000 more per month than Zesa could offer.

To combat the potential loss of experienced staff, Zesa has introduced a 'critical' allowance. This came about after much lobbying by the IT department. The critical allowance is not performance based. It is simply designed to provide an extra payment above the normal salary. Top management recognise that retaining key IT staff will be problematic in the future. Most staff have remained with the group out of dedication to the project and because the job itself is satisfying. The IT manager, however, fears that dedication can only be taken so far. There is a need to find additional ways of motivating staff. The company will need to reassess its policy on staff classification. IT staff have in the past been classified as non-technical. This made them ineligible for certain allowances. IT staff will need to be treated on a basis similar to engineers and other technical professionals within the company.

♦ Integrating computer-based information systems within the company

The sheer size and complexity of the IT project undertaken by Zesa made it necessary for all parties involved in the project to work in harmony in order to achieve successful implementation. This meant that top management, functional business managers, IT professionals and users needed to work in concert in order to guarantee success.

The main impetus behind the process of developing and implementing the computerised information systems has come from the office of the chief executive. From the very outset the chief executive was advised (an advice that was accepted) that the only way to ensure successful implementation of this major organisational change was to lead the effort himself. It is not surprising that in announcing the creation of the MIS unit in April 1987, the incumbent chief executive officer and general manager wrote "MIS will report directly to the general manager..."[34] Although there have been several changes in general managers since the inception of the project, the top level

[34]Zesa Staff Memo, Management information systems (MIS), April 10, 1987

focus has been maintained. While the name of the MIS department has been changed to the IT department and the IT department now no longer reports directly to the general manager, the degree of top level involvement has probably increased. The current general manager has changed the focus away from the issue of computerisation to that of information provision. Moving the IT department from centre stage has put the focus back on the user departments whose job it is to provide the information to support core business activities. IT has more properly been cast in a supportive role.

As a consequence of this change, the director of each operating division within Zesa is now accountable to the general manager for the development and maintenance of the information systems within their sphere of responsibility. They, not the IT manager, must report on the progress of the deployment of the information systems within their divisions. They are the ones who must assess and propose any new applications and must, in co-operation with the various departments, manage the process of implementation. This change of approach was aptly demonstrated at a steering committee meeting attended by the researcher during August 1994. The general manager, who chaired the meeting, requested each director to report on the progress on the implementation of the computerised systems within their division. Although they had been required to provide a written report to the general manager before the meeting, several of the directors had failed to do so. Some blamed their staff for not doing the report. The general manager in a low key but firm manner reiterated the requirement for reports to be done and suggested that those directors who consistently failed to fulfil this requirement may get negative performance reviews. It was clear that the significance of the message was taken to heart, especially since all directors and managers are now on performance contracts.

- **Introduction of computerisation**

Zesa adopted a technology-driven approach when introducing computerisation into the company, initially. The IT department was the major instigator of most operational changes. There was significant resistance at first to the introduction of computerised systems, especially in the finance area. Finance managers feared and

lacked faith in the proposed computerised systems. They also felt IT staff were intruding into a domain in which they were not professionally qualified. The resulting difficulties led to a significant turnover of senior personnel in the finance department.

While a technology-led approach was almost inevitable at the beginning of the computerisation project it was hardly sustainable. In the first place, the IT department lacked the necessary knowledge of the internal processes of the departments they were seeking to computerise. They needed to win the confidence of the functional managers and involve them more in leading the application development process. This required a change to a more needs-driven, user-led approach.

One negative by-product of the IT driven approach to implementation was that the IT department was blamed for any problem experienced by users of the new systems. Even if the problem was strictly in the domain of the users, the IT department would receive the blame. In one instance, figures in the consumer information system were not balancing. The blame for this was being put on the IT department. Although the IT department knew the problem belonged in the functional department it had to go through a process of proving that this was so.

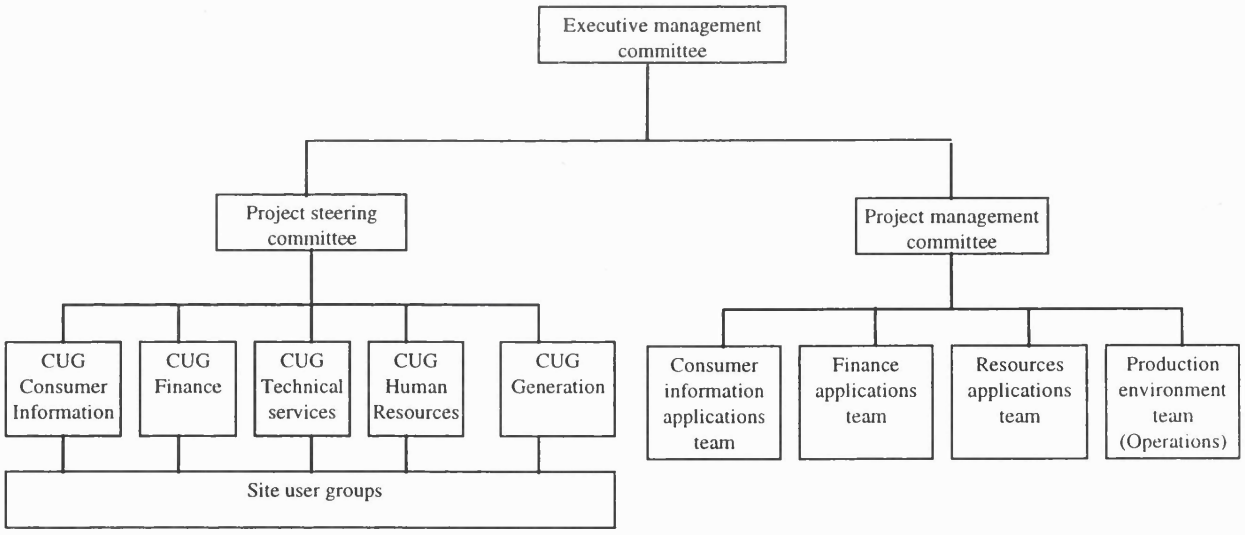
- **Current approach to IT project management**

The difficulties experienced with implementation made it imperative that there be structural changes in the approach taken. Under the leadership of the current chief executive, a new implementation structure was put in place. This began with the restructuring and redefinition of the role of the high level steering committee chaired by the general manager. The members of this steering committee are the senior managers responsible for each of the functional areas. The IT manager is invited to the meeting also. This is a policy level committee responsible for guiding the process of project implementation and dealing with any conflicts that may arise at the strategic level. The senior managers comprising the steering committee are now directly accountable to the chief executive for the implementation of IT systems in their functional areas of responsibility. They can no longer make the IT manager the

scapegoat for problems in their area. The IT manager's responsibility is to support the requests generated by the divisional and functional area managers.

Figure 5.3 below depicts the prevailing IT project implementation structure operating within Zesa. The overarching principle behind this structure is that development and implementation of functional information systems should be instigated and led by functional business managers and supported by the IT department. Key project groups making up this structure are the steering committee, corporate user groups, site user groups, application project teams and the IT operations team. Each of these groups have well-defined terms of references outlining their membership, roles and responsibilities and minimum expected communications.

Figure 5.3 Zesa: structure of IT project management committees and teams (1995)



*CUG = Corporate user group

- **Transforming business processes**

Zesa's managers are concerned that after spending millions of dollars on IT systems the company has not achieved the level of efficiency and effectiveness that they expected. There have been productivity gains made by the introduction of computerised systems. However, the expected savings in personnel have not materialised. In fact the company has more staff now than before. Some of the

increase resulted from Zesa taking over consumer billing from the municipalities. Senior management at Zesa, however, are convinced that there are still benefits to be realised in many areas of operation. They feel that there probably has been too much focus on automation and not enough on process transformation. As a consequence a concerted effort to focus the strategies and action plans of each functional area was begun in 1994. A series of strategic planning workshops were conducted by the consulting firm Organisational Training & Development (Pvt) Limited. Senior managers and staff of each functional department were taken through a two-day workshop in which the strengths, weaknesses, opportunities and threats of the department were assessed. Action plans to deal with the issues raised, with associated evaluation criteria, were drawn up. The outcomes generated in the workshops are expected to be incorporated into the new business and IS strategic plans.

♦ Managing IT-enabled change

The introduction of computerised systems in Zesa represented a significant change in the way the organisation functioned. Prior to 1991, all systems were manual. The organisation functioned in a way that, even though inadequate, was understandable to the operating managers and lower level personnel. The general reaction to the prospect of computerisation was at best mixed. Younger staff were generally excited by the new challenge. Older staff, particularly those in finance, were threatened by the prospect. Others simply feared the new systems. Most did not fully comprehend the magnitude of change that was about to take place.

The agents of change were top management assisted by the IT department and external consultants. One of the most far reaching aspects of organisational change was the massive restructuring of the authority which occurred soon after the inception of the project. The structural changes were initiated to align the organisation to the new business strategy. These changes produced many casualties, especially among senior managers. Many of them could not cope with the proposed changes or felt that the changes would lead to massive chaos. They did not have faith in the direction the company was headed and soon left its employ. Most of the managers that left were

older, white managers who felt alienated and overwhelmed by the changes being proposed. While the changes were taking place, the authority also experienced a high level of political interference.

Computerisation was only one part of a general strategy of structural and functional change within the authority. Major shifts in the way business was to be done were being instituted. To help organisational members cope with the changes, a series of workshops focusing on change management were held. The workshops, while helpful, did not eliminate all the fears that some people had.

- **Top management involvement and support**

The introduction of large-scale computerisation in Zesa was largely a top management initiative instituted as part of a comprehensive restructuring of the operations of the authority. This initiative was instigated by several factors, both internal and external to Zesa. As part of the process of improving general performance at Zesa, top management has been involved in a number of activities geared towards building awareness as to the role that information plays in the process of improving organisational performance. Various projects such as the Performance Improvement Programme supervised by Electricité de France International and Peat Marwick (Private) Limited (Zimbabwe) emphasised the need for the accurate and timely recording of data and subsequent provision of information necessary for decision-making. Top and middle managers along with other personnel were put through computer awareness courses in order to acquaint them with the possibilities offered by computerisation and to reduce fear of and resistance to computers.

Throughout the awareness-building process managers were firmly advised that computerisation was the way forward and there would be no deviation from that goal. Being involved in these activities and being charged with the responsibility of implementing various performance improvement projects, has made top management highly cognisant of the acute need to improve both the content and flow of information

within Zesa. They are, therefore, more inclined to support the introduction of computerised systems within the organisation.

- **Staff response to computerisation**

The introduction of any change within an organisation generally elicits a variety of responses. These range from eager acceptance to outright fear and implacable resistance. The implementation of the MIS (1987) strategy called for the creation of end-user computing within Zesa. This meant that a significant change in the way people worked was to take place. Implementing end-user computing meant that the old batch method of processing transactions would be done away with. Transactions would now be processed on-line and in real time. In the previous set up, one person would record the transaction on a form, another would check the transaction and still a third would input the transaction into the computer. Once input is done another round of verification would take place to ensure all transactions entered into the computer system was correct before final processing and updating of records. In an end-user, on-line situation, the same person would record, enter and verify the transaction. Records would be updated immediately. This change of procedure and technology is significant in several ways. Firstly, the immediate updating of the records means that processing time has been cut from several days to a few minutes. Secondly, fewer people are required to process the same amount of transactions. In one instance it was reported that this change meant that a whole department whose responsibility it was to cross check figures was eliminated. The staff no longer had useful work. Fortunately, the affected staff were re-deployed elsewhere. They assumed the job of cashiers in the banking halls. The third effect was that new skills became important. Those who were adept and keen at using computers found their skills in greater demand than those who were less adept. Speed and accuracy in inputting transactions now took centre stage.

The reaction of the general staff was mixed. Some invariably felt threatened by the implementation of the new computerised systems. They feared the loss of jobs and position. They also feared being surpassed by those who would be able to learn the new systems more quickly. This was especially so among older workers. Other

workers were very keen to get on to the new systems. They saw it as a way to gain new skills and increase their status. Working with computers confirmed greater status. Learning how to use a computer also made them more marketable in the workplace. If they were to lose their jobs or if they wanted a better paying job, having computer skills would considerably enhance their chances of getting new jobs.

The initial response to computerisation by the professional staff was one of muted hostility. Professional staff, especially accountants, saw their hold on specialised knowledge threatened. Most accountants spend many years learning and perfecting the art of drafting financial statements. Accountants were also used to having various clerks doing the `donkey work' such as inputting transactions and following up vouchers while they did the more glamorous work of producing the financial statements. The introduction of on-line transaction processing and statement production made possible by the new computerised accounting systems eroded the traditional power base of the accountant. There was much resistance to the new system since the accountants felt that the IT people were moving into an area that they did not understand. The resistance to the computerisation was of such a level that it resulted in the resignation of the finance director. For this and other reasons there has been a high turnover of accountants at Zesa.

The acceptance of the computerised systems within the authority is now quite high. While there are some people, at all levels, who are still ambivalent about the new systems, they have begun to accept its inevitability. The systems are now well entrenched. The high turnover in the accountants has resulted in Zesa being able to recruit new people who are more at home with computerised systems. There is now a more constructive relationship between the accounting professionals and those implementing the IT systems.

♦ IS-related organisational learning

The success of the computerised information systems implementation at Zesa testifies to the high level of individual and organisational IS-related learning which is occurring in the authority. It is impossible to delineate all the examples of organisational learning that has occurred at Zesa. Table 5.6 presents some indicators the organisational learning that have become evident.

Table 5.6 Examples of IS-related organisational learning at Zesa

Indicators	Previous Situation	Current Situation
Position of the IT department	• under the CEO	♦ Under Corporate Planning
Responsibility for IS implementation	• IT department	♦ Functional Business Unit
Implementation Approach	• IT-driven	♦ Business-led
Purpose of IT Systems	• Process automation	♦ Process transformation
Focus of IT Operations	• Setting up computer systems	♦ Managing production environments
Orientation of user personnel	• Passive acceptance of systems	♦ User defined expectations
Character of Relationship with IT supplier	• Dependence	♦ Partnership

Events surrounding the first three indicators in Table 5.6 were discussed at length earlier in the chapter in the sections dealing with structuring of the IT department and integrating IT systems into the authority. There is now a well-developed understanding within Zesa that the introduction of computer-based systems must have a business rationale and must be business-led. The IT department's role is to facilitate the design and deployment of such systems. Computer-based systems introduced are no longer simply for the automation of current processes. They should enable the organisation to restructure current processes or develop completely new ones.

Computerisation was the main focus of the IT project which ended in December 1994. The main task of the IT Division was to deploy computerised systems across the authority. That has largely been done except for district offices and some depots. Computerisation on its own, however, does not guarantee improved productivity. The capabilities of computerised systems need to be leveraged effectively within a

productive operating environment. Zesa has shifted its focus away from simply computerising systems to developing a production environment in which the various needs can be met.

Users within Zesa no longer passively accept whatever information technology application they get from the IT department. They are now actively involved in defining their own requirements. This is especially the case among the engineering departments. Many of these users have very high-level technical training and are able to articulate their information needs quite effectively. They also get ideas about possible systems applications from visiting other utilities and are anxious to adopt applications that will increase their own productivity.

The relationship between Zesa's IT department and its main IT supplier, Unitech, evolved from one where Zesa was the dependent party to one that is based on a partnership between the two entities. Unitech and Zesa view each other as part of their own success. At first Unitech did much of the development work for Zesa. Now they play a secondary role undertaking work that Zesa doesn't want to do. Unitech concedes that it has learnt an enormous amount from running the project.

- **Knowledge acquisition, retention and dissemination**

Learning within Zesa occurs in a number of formal and informal ways. Apart from the learning that results from defining systems requirements, Zesa has instituted two mechanisms designed to provide structured learning opportunities. One is the post-implementation application sign-off process and the other is the user-satisfaction review. The post-implementation sign-off process is designed to give application owners the opportunity to formally accept the system that has been implemented and to register any concerns they have about the systems implementation process or system performance. This exercise is carried out at each site and for each application. It gives site owners the opportunity to evaluate the relevant application system without undue external influence. The findings of this process are communicated to the corporate planning manager in the form of a report. As part of the sign-off process a user

satisfaction survey is carried out. Users are asked to complete a questionnaire specifically drawn up to assess features of the relevant application. A satisfaction rating is then given to the project following assessment.

Various internally-developed seminars and training workshops are conducted regularly to enhance knowledge and skill development. Some seminars are designed to bring staff together to share experiences and to work on a common project. One such seminar in early 1995 brought together IT operations staff from all the sites. Their main purpose was to collectively revise the Zesa computer procedures manual.[35] IT staff are also given the opportunity to attend seminars outside the organisation. In 1995 some staff were sent to seminars organised by ESKOM in Johannesburg, South Africa. This is in a bid to expose them to IT operations in other 'world class' utilities.

One significant attempt to increase organisational knowledge was the planned course in strategic information systems planning and business process re-engineering to be held in the UK in September 1995. Twelve people, three from the IT division and nine from other user departments were selected to attend. The course was scheduled to include study tours of various power utilities in the UK.

IT personnel are encouraged to engage in their own personal professional development through personal reading, attendance at computer shows, and participation in activities of the Computer Society of Zimbabwe. They are also encouraged to participate in the continuing professional development certification programme offered by the society.

The IT division has taken a number of steps to retain and communicate information. These include minutes of project team meetings, various reports and documents outlining covering decisions and resolutions made. The production environment team has developed a computer procedures manual which outlines the manner in which the production environment in Zesa is run by specifying the individual and collective roles and responsibilities of the user, the operator and the IT

[35] Zesa IT Division, (1995) **IT Project Booklet**, Zimbabwe Electricity Supply Authority, March, p.6.

department. Over the past several years the IT division has put out the Computerisation Project Information Booklet which reviews the progress of the IT project. Contributions are made by all the project teams. Some users also contribute articles. Other documentation include the curriculum vitae of IT personnel and task assignments of the project teams.

IS-related organisational learning within Zesa does not take place in a systematic way although much is being done. It still reflects mostly experiential learning. Almost no systematic R&D is done. There is no information library and personnel have no regular access to IT literature beyond a few local publications. Learning about technology tends to be narrowly focused around IBM products. Much of the literature received by the IT department is IBM literature. IT personnel generally lack exposure to international IT trends. The department needs to take urgent steps to broaden the scope of its knowledge base.

5.10 Summary

Zesa's success at carrying out the requirements of its MIS strategy testifies to the significant growth in IS capability that has taken place in the company in the last few years. The company has put in place the necessary resources to ensure the deployment of the planned systems. Its most important achievement in this whole process has been its ability to retain highly qualified IT staff in the face of strong pressures from the outside. The staff has developed a significant amount of competence in designing and deploying computer-based systems. Zesa, however, must devise new ways of compensating and rewarding its IT staff if it is to continue to retain their services and commitment. It also needs to widen its IT knowledge base and continue to develop ways to systematically enhance its organisational learning capacity.

CHAPTER 6

Case study: Datlabs (Pvt) Ltd

6.1 Background

Datlabs is a Zimbabwean pharmaceutical manufacturer with head office in Harare and production plant in Bulawayo. It is a private company, wholly owned by Adcock Ingram (Pvt) Ltd of South Africa. For the most part, the company is a third party contract manufacturer of pharmaceutical products. It also manufactures under its own name. At the time of this study, Datlabs is the sole manufacturer in Zimbabwe of intravenous products, which are manufactured under license for Baxter Travenol, based in the United States of America.[36] All manufacturing operations are located in Bulawayo while marketing is centred at the Harare office. The location of the marketing office is significant in that 80% of Datlabs customers are located in Harare.

At the end of its fiscal year September 30, 1994, Datlabs had a turnover of Z$78.49 million (US$9.63 million).[37] Profit before tax was Z$9.2 million (US$1.13 million) and after tax profit was Z$3.00 million (US$368,000). It had a total of 388 employees. Table 6.1 provides comparative figures outlining the financial performance of Datlabs for the years 1993 and 1994.

Table 6.1 Datlabs: financial results 1993 and 1994

Indicators	1993	1994
Turnover (millions Z$)	63.66	78.49
Profit Before Tax (millions Z$)	1.51	9.32
Profit After Tax (millions Z$)	1.49	3.00
Number of Employees	389	388

[36] Information taken from leaflet supplied by Datlabs

[37] See Appendix G for US$ conversion rates.

6.2 The macro-environmental context

Datlabs operates in a highly competitive and rapidly changing economic environment. This is in marked contrast to the environment it operated in up until 1992. Prior to that time the company operated in a fairly protected market. This resulted from the efforts of succeeding governments to build local drug manufacturing capacity through the enactment of restrictive national trade practices during the Unilateral Declaration of Independence (UDI) period and in the immediate post-independence era. During UDI and the period between 1980 and 1992 there was an overt tolerance of near monopoly industrial organisations. These periods were also characterised by severe restrictions on the use of foreign currency. Although Datlabs virtually had a captive market, the severe foreign exchange regime significantly thwarted its opportunities to develop and grow.

Since 1992, when the liberalisation of the economy began, the company has had to contend with a diversity of competitors both local and foreign. It must now operate at `world-class' levels and standards if it hopes to survive. The relaxation of exchange and import controls makes it possible and sometimes easier for customers and potential customers of Datlabs to source their supplies of drugs on the international market. They are no longer dependent on a local producer to fulfil their needs. The problem for Datlabs is compounded by the great diversity of prescription drugs available on the international market and the higher quality of these drugs. With the Zimbabwean market not being their primary market, most multinational drug companies can afford to take bigger losses in the local market to maintain competitiveness. The result is that multinational drug companies are generally in a position to sell their products at lower prices thus undercutting local producers. Indian pharmaceutical manufacturers are particularly competitive in the local market.

Although it faces new competition, the new economic environment provides Datlabs with opportunities for investing in new products and plant and equipment. The lifting of the onerous foreign exchange controls and the removal of import barriers eliminated two previous obstacles to timely investment in new product inputs and machinery. There has also been an easing of the restrictions on the repatriation of funds from Zimbabwe. This

makes it easier for the company to attract new investment and engage in new strategic partnership arrangements.

6.3 Datlabs' mission and business strategy

In the face of increasing competition and a fast changing economic environment, Datlabs has sought to redefine its mission and vision. Table 6.2 depicts the evolution of the company's mission and vision statements and objectives between 1993 and 1995. The differences between the statements reflect Datlabs' attempt to articulate its goals more clearly. The specific reference to the parent company in the mission statement reflects both the changing times and a more aggressive posture being taken by Adcock Ingram. In the past, foreign ownership of Zimbabwean companies was not encouraged. Ownership by a South African company in the apartheid period was frowned upon by some people. As a consequence Adcock Ingram maintained a low profile in its dealings with its subsidiary. The new environment, in which foreign investment is being encouraged, coupled with the changed circumstances in South Africa, provide the opportunity for Adcock Ingram to become more assertive in pursuing its business interests in the region.

Datlabs' assessment of its own competitive position has evolved over the past few years. In its 1993/94 strategic plan it considered its main strengths to be: its loyal and hardworking staff; a competent management; excess plant capacity of high standard; ready access to markets in the Preferential Trade Area (PTA) (now COMESA) and Southern Africa Development Community (SADC) regions; strong links with well known international pharmaceutical companies; good rapport with local government. The company conceded some internal weaknesses which include the age of the manufacturing plant and equipment; under capitalisation; lack of depth in middle management. It also recognised various threats to the organisation ranging from the possibility of the principals moving their manufacturing base to South Africa to the threat posed by AIDS. Table 6.3 depicts the management's view of the company's strengths and weaknesses in the 1995 strategic planning period.

Table 6.2 Datlabs: corporate vision, mission statements and objectives 1993-1995

	1993/94 Business Plan	1994/95 Business Plan
Mission Statement	"Datlabs is in the business of healthcare and our vision is to endeavour to provide our stakeholders with: What they want, when they want it, at acceptable levels"	"Datlabs (Private) Limited is in the business of manufacturing and marketing leading health and personal care products in Zimbabwe and promoting the growth of Adcock Ingram in the region"
Vision		"To establish Datlabs (Private) Limited as the leading pharmaceutical company in Zimbabwe"[38]
Objectives	• Developing, manufacturing and marketing healthcare products. • Achieving sustainable growth and profitability • Total commitment to appropriate product quality and excellent customer service. • Long lasting and meaningful contributions to our community and our environment. • Actively promoting good relations with our stakeholders. • Being committed to the development and welfare of our employees and their equitable reward. • Striving for safe, innovative, proactive and ethical management through good team-work".[39]	• Developing **a low cost operation**. • Achieving sustainable growth and profitability • Total commitment to appropriate product quality and excellent customer service. • Long lasting and meaningful contributions to our community and our environment. • Actively promoting good relations with our stakeholders. • Being committed to the development and welfare of our employees and their equitable reward. • Striving for **a competitive edge** and safe, innovative, proactive and ethical management through good team-work[40]

Table 6.3 Datlabs: strengths and weaknesses - 1995 strategic plan

Strengths	Weaknesses
• Fully equipped sterile (distinctive) and pharmaceutical factories with good GMP practices and well defined SOP's • Part of a successful major progressive pharmaceutical company (distinctive), giving us access to new technologies and research and development • Good range of branded products • Inexpensive labour costs (vis-à-vis world standards) • Independent water supply • Local presence (vis-à-vis world competition)	♦ Poor supply chain management ♦ Inability to react fast to changing situations and market needs ♦ Inadequate customer and market intelligence data base ♦ Inability to make effective and full use of MIS ♦ No EDI link with major customers and suppliers ♦ Bar coding not yet established ♦ Age of plant and equipment, especially in LVP and tabletting ♦ Do not have exceptional customer service ♦ Under capitalisation resulting in high gearing and loss of income due to interest payment ♦ Low key rapport with other publics e.g. health institutions, Government ♦ Poor generic product range and policy ♦ Inadequate short-term planning and problem solving

[38] Datlabs (1995) Strategic Plan, p.1

[39] Datlabs (1994) **Budget forecasts for 1994**, p.1-2.

[40] Datlabs (1995) Strategic Plan, p.2

The company's current strategy is to position itself as a low-cost producer of pharmaceutical products. Such a strategy would give it a competitive edge over other local and foreign producers in the region. This strategy is tied into moves by its parent company to become a multinational corporation. To this end a reorganisation exercise is in progress within Adcock-Ingram. Datlabs, in the next few years, will be trying to develop closer links with Adcock-Ingram. This will enable it to take advantage of the latter's resources including its well-developed research facilities. For Adcock-Ingram, Datlabs provides a spring board for the internationalisation of the company and its activities. Datlabs will function as exporter to the African market on behalf of its parent company.

6.4 Information needs at Datlabs

There is a notion within Datlabs that a superior information system will give it competitive advantage over its rivals. One of the most pressing short term needs is for Datlabs to develop closer links with its customers. The pharmaceutical industry is information-intensive and very exacting. Customer requirements need to be quickly and precisely known. There is need for basic information about the customer base, what they have bought over the previous years, what their long term requirements are. This information is not currently being provided by the management information system. In its absence, tactical and strategic planning are significantly handicapped. The company has difficulty responding to the orders and queries of its customers in a timely and efficient way. This is because current systems are not oriented around customer service. They are fragmented and tend to have a finance or accounting focus.

The manufacture of pharmaceuticals involve complex, small batch production methods. At Datlabs this means managing over 1500 different raw materials and approximately 300 finished goods. Sixty percent of the raw materials used is imported. Getting the required input materials when they are needed is very difficult and time consuming. This is due in part to the combined effect of local import/export bureaucracy, shortage of foreign exchange, and the difficulty in actually sourcing the materials internationally at reasonable prices. The problems characterising the input procurement process point to the need to consolidate buying. According to the technical manager who is

responsible for input procurement, there are currently too many suppliers. The company does not have a close relationship with any of them. Building closer relationships with suppliers could lead to Datlabs benefiting from volume discounts and special price arrangements, among other advantages. Doing this, however, means having the right information when it is needed. This has so far proved very difficult.

From the Technical Manager's point of view, the main goal of any production management information system at Datlabs is to get the relevant information from the production systems in order to improve productivity and reliability of service. Information related to input costs, production levels and inventory needs to be incorporated into an integrated management information systems. To manage the very complex processes involved in the manufacturing of pharmaceuticals the management of Datlabs perceives a need for an integrated production management information systems that is linked into an organisation-wide information systems comprising manufacturing, marketing and finance. Such a system should enable information to be shared across and within functions. This will in turn improve sales and production forecasting within the company.

6.5 Deploying computer-based information systems at Datlabs

Datlabs started down the computerisation path using a computer bureau to carry out computer operations and data processing. This was typical of most organisations in Zimbabwe in the pre-independence (1980) and immediate post-independence period. At that time most computer installations were based on either mainframe computers or minicomputers. The typical computer installation was very costly in terms of finance and personnel and could only be afforded by large government departments and large multinational companies. Computer companies and dealers operated bureaux which would process all the data for an organisation. The product of this process was data or information with mostly historical relevance. Very little of what was produced affected the day to day decision-making in the organisation.

As its information requirements expanded, Datlabs felt the need for an in-house computer. A DEC System 5000 machine was installed. It basically served as an accounting

machine. The set-up and maintenance of this machine was done by the vendor. No real in-house capability to maintain the system was developed. The system, however, ran well for seven years.

6.6 Development of an information systems strategy

The combined impact of the computer revolution and the rapidly changing business environment convinced the management of Datlabs of the need to take a more proactive approach to the use of information as a competitive tool. The driving force behind the new information strategy was the desire to improve both the technical and financial efficiency of the manufacturing process. Management had an imprecise idea that a computerised production management information system was needed. Their initial approach to determining the strength of this need was to do a business analysis. This was carried out internally by the finance manager and the production manager. The findings of this analysis indicated that there was a lot of fragmentation in operations. Activities and procedures were not well co-ordinated and there was a lot of duplication. There was an obvious need for a system that would assist in improving co-ordination and operational efficiency. Before deciding on such a system, however, the management felt they would undertake a more detailed study. A major IT vendor providing consulting services was engaged to do the study. Using Structured Systems Analysis and Design Methodology (SSADM) a set of systems requirements were developed. The external consultants were assisted by an in-house 'consultant' who at the time was in charge of production systems and who had previously spent many years as an engineer in the computer industry .

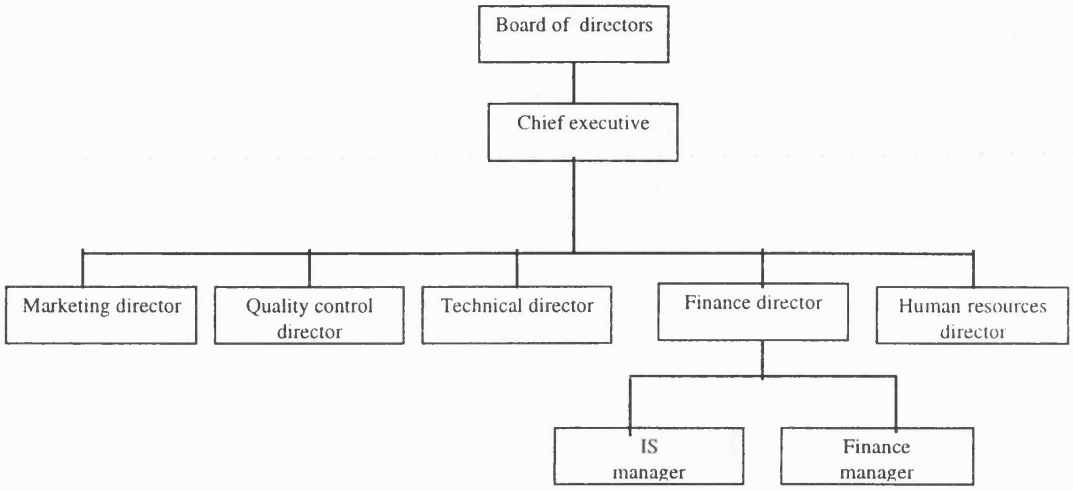
The basic strategy called for the implementation of a computerised financial accounting system that was linked into a production management system. The focus of the new system was to provide a way of more accurately defining the cost of production. The new system would allow for the efficient capturing and recording of costs of finished goods. The predominant bias in the IS strategy at the time was towards product costing and financial record keeping. A broader view of the role that IT could play had not yet developed.

Datlabs produces a comprehensive business plan that identifies what the company plans to do over a five year period. Although implied, the 1994 strategic plan made no specific mention of the role of information systems in the attainment of objectives outlined in the plan. Improved efficiency, effectiveness, forecasting, were major goals outlined, yet the means of accomplishing these were not made evident. The information systems strategy followed was based mainly on the report of the IT consultants. The 1995 strategic plan rectified the omission by making specific mention of the expected role of computer-based information systems. A basic IT plan has also been developed. The implementation of the IS strategy is discussed in detail in section 6.9 below.

6.7 Organisational structure

Datlabs is governed by a board of directors comprising the chief executive (who is also the managing director), the executive directors of various departments, and several non-executive directors. There are 5 executive directors. They are responsible for finance, marketing, technical services, human resources, quality. Under each executive director are various managers. The offices of the chief executive and the marketing director are located in Harare. The main focus of their jobs is the strategic development of the customer base and the marketing of the products. The rest of the directors reside in Bulawayo where the production and other activities take place. There is no resident managing director in Bulawayo. Management of the day to day activities is on a collegial basis where the resident executive directors collectively make decisions. Each director overseas the running of his particular area. The director is normally supported by a manager. Strategic decisions are made collectively by the Internal Business Unit. This body comprises the chief executive and all the executive directors and senior managers. Meetings of this group are held regularly (almost weekly). There are also regular monthly meetings of the executive with their South African counterparts either in Zimbabwe or South Africa. Figure 6.1 depicts the senior management structure of the company.

Figure 6.1 **Datlabs: organisational chart showing senior responsibilities and relationships**



6.8 IS-related resources

♦ IT infrastructure

The computer system, installed in 1992, initially comprised a minicomputer computer, 21 M5 terminals and 5 personal computers (with terminal emulation) in the Bulawayo location. Terminals are located in the various departments and are used mainly for data input. Initially, personal computers were primarily used by the finance department. The directors of other departments did not have personal computers installed, although this had been planned. Since early 1995 personal computers have been allocated to all departments. Departments are now able to access the system without having to depend on the finance or IS departments. The Harare office has six personal computers, with attached dot matrix printers, connected to the minicomputer in Bulawayo. A new local area network based on Novell Netware was put in place in early 1995. Communication between Bulawayo and Harare is done over a dedicated Post and Telecommunication Corporation (PTC) X.25 line. The technical architecture of the Datlabs information systems is depicted in Appendix F.

Table 6.4 Datlabs: 5-year information technology infrastructure development plan (1995 -2000)

Year	Objectives	Details
1996	• EDI in 30 sites. • Internal Communications Network. • PC Acquisitions. • Software Upgrade/Acquisitions. • Other.	• Extending EDI network to 30 sites/customers. • Setting up an internal communications network, & acquisition of comms. software. • Acquisition of laptop/notebook PCs for sales reps & directors. • Upgrade current range of PC software. • Training, maintenance and installations.
1997	• EDI 50 sites. • Product Bar Coding. • Time/Swipe cards. • PC upgrade. • Other.	• Extending EDI network to 50 sites/customers. • Bar code stock items (finished products) and use bar code readers on stock issues. • Introduce swipe/time card system for the employees. • Upgrade all 386 PC's to 486. • Training, maintenance and installations.
1998	• EDI 100 sites. • Mainframe upgrade. • Software integration (imaging). • Other.	• Extending EDI network to 100 sites/customers. • Upgrade the mainframe machine & upgrade the current terminals to graphic terminals. • Acquire software package capable of integrating all systems (finance, HR, production, marketing & operations). • Training, maintenance & installations.
1999	• EDI 100 sites. • Network upgrades. • PC upgrade. • Other.	• Extending EDI network to 100 sites/customers. • Harare office network server upgrade. • MIS software package/ PC upgrade. • Training, maintenance and installations.
2000	• EDI 150 sites. • Link with Adcock Ingram. • Software upgrades. • Other.	• Extending EDI network to 150 sites/customers. • Network link to Adcock Ingram (South Africa). • Software upgrades and acquisitions. • Training, maintenance & installations.

Datlabs envisages a larger role for computer-based data communications in the future. To respond more quickly and accurately to the needs of customers, the company is proposing to establish electronic data inter-change (EDI) links with them. It would then be possible to exchange, electronically, formal documents such as invoices and orders. The company also envisages salesmen carrying notebook computers with which they will be able to remotely access the company's database, making queries and placing orders. At the moment sales personnel do not submit orders immediately but keep them for several days until they have completed their itinerary. They then log the orders when they get back to the office, a delay of several days. In the future it is expected that the orders would be placed directly from the customer's premises so that they can be filled immediately. This would mean less delay in filling the order and an improvement in production planning. The implementation of EDI reflects similar moves already undertaken by the parent organisation in South Africa. The adoption and greater use of IT is expected to improve the competitive position of Datlabs relative to that of other companies both in the near and long term. Table

6.4 provides an outline of Datlabs 5 Year Information Technology Infrastructure Development Plan.

♦ Human resources

The information systems department is a very recent creation which has evolved with the hiring of the information systems manager. Prior to this the company employed two persons who were responsible for computer operations. The department is, therefore, in the very early stages of development. It comprises the IS manager, who has a degree in business and computer science from the University of Zimbabwe. He has worked for over 8 years in the computer field with various companies including ICL (Zimbabwe), Computer Processing Group (now Unitech) and Zimbabwe Steel Company (ZISCO). There are two other employees in the department, a systems administration officer and a computer operator. During the period in which the case study was conducted there has been a change in systems administration officers. The previous administrator was experienced but had a limited technical and academic background in the IT field. The incumbent administrator is better trained with a diploma from the UK but is quite inexperienced. The computer operator has long but limited computer experience. He is in his mid fifties and has only secondary education. The major part of his experience has been gained on the job. He has very limited prospects for future career development. There are no systems analysts or programmers in the company other than the IS manager.

Table 6.5 Datlabs: educational background and experience of IT staff, 1994-95

Job Position	Education	Experience in IT	Years at Datlabs
IS Manager	BSc Computing (UZ)	8	1
Systems Administration Officer	Diploma (UK)	1	.5
Computer Operator	Secondary School	15	15+

The contribution of the chief executive and the finance director to the development of computer-based information systems at Datlabs cannot be ignored. Prior to the hiring of the IS manager, the finance director was the de facto information systems manager. The finance director has been with Datlabs for more than 10 years and has been intimately involved in the development of the computer-based systems. He does not have formal training in IS but is nonetheless well acquainted with the strategic issues surrounding the implementation of computer-based information systems. He has not only dealt with this at Datlabs but also at other organisations, including the Zimbabwe Electricity Supply Authority (Zesa) where he is a non-executive director. The CEO is reported to have a keen interest in IT and is actively involved in investigating new technologies and their applications in business.

In my view, it is clear that the established level of IT personnel is not sufficient to cope with the goals and objectives outlined. Given the stated aims of the company's business and IT strategies, it would appear that the company needs to add at least one to two other persons to its IS staff, preferably including an experienced systems analyst with software engineering background. This person could be charged with spearheading the EDI project. There is an obvious lack of congruence between the espoused business and IS strategies and the actions taken to assemble the skills necessary to carry them out. This deficiency will stymie the growth of IS capability at Datlabs.

♦ Organisational IS/IT competencies

In most respects, Datlabs has very limited organisational IS/IT competencies. The IS manager and the finance director privately hold most of the knowledge the company has about deploying computer-based information systems. Much of this knowledge is tacit and has not been codified. For example, the IS manager has been very successful at solving many of the nagging problems that retarded the full implementation of the financial accounting system. However, it is feared that without proper documentation, the gains made would be lost if the IS Manager were to leave the company.

Within the company, there is very limited knowledge in the area of networking and data communications. This gives some cause for concern since much of Datlabs' current and future strategy is centred around building electronic links with customers, suppliers and its parent company. There is a limited amount of this expertise in the local IT services market. The company can hardly depend on outsourcing arrangements to provide the skills necessary to carry out the mission-critical tasks anticipated with the implementation of EDI. The achievement of its IS strategy will be severely hampered by the knowledge and skills deficiencies that exist both internally and in the local IT services market.

♦ Financial capacity

Datlabs' investment in developing its information technology architecture and the associated applications is funded from its regular operational and capital budgets. Investment in IT was relatively low in 1994 and 1995. This, however, does not reflect the major investment made by the company when it deployed the current IT infrastructure. While the precise figures are unavailable, that investment was substantial. The 1994/95 figures reflect mostly maintenance activities and very small acquisitions that took place during that period. Investment is set to rise more than ten-fold in 1996 and continue to be significant over the next several years. A planned upgrade of hardware and software in 1998 projects IT investments in excess of Z$4.3 million. Current and proposed spending on IT by Datlabs is presented in Table 6.6 below.

Table 6.6 Datlabs: current and projected spending on IT[41]

Year	Value in thousands of Zimbabwe $
1994	92
1995	125
1996	1,552
1997	710
1998	4,320
1999	1,400
2000	1,410

[41] Datlabs (1995) Strategic Plan, Section D p. 5

Datlabs is a fiscally conservative organisation. Although top management is convinced of the value of computer-based information systems they are unlikely to make major investments without carefully considering the financial implications. This conservative approach while admirable is also likely to preclude the company from making more risky but potentially profitable investments.

♦ Organisational climate and culture

One of the defining features of Datlabs' organisational culture is the way it is run. The leadership style that pervades the organisation has been described as participative in nature. As stated earlier, the company's head office is located in the capital, Harare, while the bulk of its operations is located in Bulawayo. The day-to-day management of the Bulawayo operations is left in the hands of the various executive directors. Decisions are made by the directors in consultation with each other. All the directors have offices adjoining each other on the same floor of the administration building except the human resources director whose office is located some distance away on the south side of the factory. This presents a small obstacle to frequent face-to-face consultation with the other directors. The human resources director, at times, may be isolated from the core decision-making process, albeit unintentionally.

The participative style of management is in part made possible by the generally high level of education among the staff. A good proportion of the workers are university or college graduates with high-level technical training. Even those working in the factory tend to be high school graduates. The specialised nature of the business makes it imperative for the company to be staffed with the right calibre of people who are able to carry out their duties without the usually minute level of scrutiny that is common in most manufacturing situations.

The participative style of management is both beneficial and challenging to information systems implementation. It has been suggested that user participation in

the design, development and implementation of information systems is vital to the success of such systems (Mumford and Weir, 1979; Avison and Fitzgerald, 1988). This is based on the premise that if users are involved fully they will be committed to using the new system because of the personal investment they have made in putting the system in place. A system that has been designed using a participative approach will more likely contain the features required by the prospective users. The participative approach has it drawbacks, however. It takes time and needs very skilful and experienced management to manage the competing demands of various coalition of users. As with any activity, people working in groups will try to protect their own interests over and above those of others. If not managed carefully, participation can lead to alienation as a decision is seen to be taken in favour of one group over another.

A facet of Datlabs' organisational culture that is supportive of the introduction of new information technology is the fact that senior management seem genuinely interested in introducing new ideas and new ways of doing things. The most overt champion of new information technology is said to be the managing director of the company. The finance director, a key figure in the acquisition of new technology, is also keen on exploring new approaches. This is exemplified in the efforts he has made to increase his own awareness of the new developments in IT by attending conferences and engaging in supplementary reading of IT publications.

Overall, Datlabs is paternalistic in its approach to dealing with its employees. Several of the executive directors describe the company as having a "family" atmosphere. This presents a generally positive situation. However, being too paternalistic might stifle the initiative of more independent minded employees.

♦ Organisational linkages

One of Datlabs' major external link is with its parent company Adcock-Ingram in South Africa. In many respects what Datlabs does reflects the demands of the relationship between the two organisation. Datlabs serves as a beachhead for Adcock-

Ingram's push into other African markets. It is an integral part of its strategy to become a multinational company. Because of its more developed IS capabilities, Adcock-Ingram provides a valuable source of information and expertise that could support and supplement Datlabs' own efforts to develop significant IS capability. Both organisations feel it would be beneficial for them become more integrated with each other. This will allow efficient resource sharing. For example, Adcock-Ingram has extensive research facilities that could be used by Datlabs. Closer integration of the IT facilities of both companies would enable more extensive information sharing and collaboration. To assist this process, an information systems forum has been created within the group.

Datlabs' links with its customers is probably its most crucial. Given the nature of the pharmaceutical industry, Datlabs is dependent on its customers in a way that differs from most other types of supplier-customer relations. Datlabs' most significant customers are hospitals and pharmacies. The fortunes of the company are inextricably tied to meeting the very stringent demands of its customers, exactly. With the onslaught of new and pervasive competition, it must get as 'close to the customer' as possible. Computer-based information systems provide the mechanism for transforming the relationship between Datlabs and its customers. With better information sharing the company will be able to plan its production and distribution better, to avoid problems of stock shortage or inventory build-up. IT systems will also give the company the opportunity to develop a better understanding of its business which in turn will support better strategic planning. Other key links are with international suppliers of manufacturing inputs and organisations, such as Baxter-Travenol, for which it manufactures products under license. All of these links are important in informing the strategic direction taken by Datlabs.

With respect to information technology, Datlabs' most significant link is with the Bulawayo branch of a major IT supplier. That supplier provided consultancy services in determining systems requirements and is the company's major supplier of IT products. Since Datlabs does not have significant in-house IT capability, it is very dependent on the services provided by the IT vendor. All its major systems have come

from this source. The relationship between the two organisations has not been as close as it ought to be, partly because of the seeming inability of the IT vendor to provide the level and quality of service required by Datlabs. The relationship became very strained when the supplier was unable effectively to implement the financial and production management systems. The problems surrounding this led to Datlabs poaching the systems engineer who was responsible for supporting the systems at the IT vendor to become its own IS manager.

6.9 IS-related organisational routines

♦ Implementation of the IS strategy

Following the report presented by the IT consultants, a decision was made to give a limited tender to IT suppliers which could provide solutions to satisfy the information systems requirements. Several local computer companies responded to the tender by submitting bids. The bids were evaluated by the finance director and the production manager who had served as in-house consultant in defining the system requirements. The finance director asserts that all aspects of the bids were compared. At the time, it was felt that many of those submitting bids had not really bothered to look at the requirements in detail. They offered their own prescribed solutions which did not sufficiently address the Datlabs information systems needs. The IT vendor, whose consultants drafted the requirements specifications, came the closest, on paper, to fulfilling the requirements of the proposed information systems.

Each of the respondents to the tender was required to give a presentation to top management. In the opinion of some directors, three of the companies responding gave good presentations. The others were viewed as being unconvincing. The presentations were targeted more at winning the contract than focusing on the requirements of the proposed systems. Presenters concentrated on what they had to sell. This was probably understandable since at that time most IT suppliers had little flexibility in what they could offer to clients.

One of the main issues driving the decision for choosing a supplier was the amount of foreign exchange content that would be involved in the purchase of software, hardware and consultancy services. At the time Datlabs and all other organisations in Zimbabwe had major difficulties sourcing foreign currency to purchase even the main production raw materials. There was a very tight and restrictive foreign exchange regime in place[42]. Computers were seen as luxuries, the purchase of which would only use up valuable and scarce foreign currency. Companies whose bids had mostly foreign currency content had to be excluded. The IT vendor that developed the strategy was able to lower the foreign currency content significantly.

Another major factor influencing the decision-making process was the hidden or stated preferences of some of the directors. The parent company had IBM equipment installed and felt that Datlabs should go with the same equipment to ease collaboration and co-ordination. However, this option had the most foreign currency content and the presentation made was not convincing. Some of the other directors had personal relationships with some of the computer companies. They were either directors of those companies or friends of the directors. There was a demand for justifying why a vendor was not being recommended. Eventually, the IT vendor which developed Datlabs' IT strategy was chosen. The implementation was to be handled by the Bulawayo branch office of the vendor. In the words of one director, "that's when the problems began".

The chosen IT supplier had good standard operating procedures for developing information systems requirements. After it was chosen, the supplier worked out a very detailed implementation schedule with Datlabs. The finance director felt he had loyal and willing staff members who were prepared to do whatever he asked to get the system operational. This involved transferring files from the old computer systems to the new system. The Datlabs staff tried to implement the system as outlined by the IT supplier but could not get it going. After months of work, including re-keying the information at least twice, the system would not function properly. This led to a lot of frustration both on the part of Datlabs' management and personnel and the IT vendor. One important issue

[42] This problem has now been significantly reduced with the loosening of the foreign exchange regime under the Economic Structural Adjustment Programme.

regarding transferring data emerged. Personnel at the IT vendor did not know how to get the data transferred from the old system to the new one without re-keying. The Datlabs management finally had to call the supplier of the software in the United Kingdom, who advised them what to do. The in-house consultant of Datlabs then wrote a small programme that got the job done.

- **Current status of system implementation**

By early 1995 much of the financial systems had been implemented. A few modules, including fixed assets, are still to be implemented. The company has also implemented an activity-based costing system. The implementation of the proposed systems has suffered numerous delays. The delays have caused untold frustrations within Datlabs and strained relations with the supplier. Datlabs is still waiting on modifications to the financial systems to be completed by the supplier. Production management systems, which were supposed to be at the heart of the information systems have still not been implemented. There are a myriad of reasons for this, some internal, some external.

One major reason was that the production staff were not prepared for such a major change in their work. They did not understand computerised systems. There was genuine fear of what these systems would mean for their work. Another problem had to do with retaining the people that were trained to use the system. Six people were put through extensive training on the production management system, five have since left the company. While there were justifiable reasons for some leaving others left because they were "poached" by companies implementing similar systems.

Another key reason for the problems encountered was the fact that the IT vendor had very little experience implementing the systems it was marketing. It, reportedly, had not really implemented the recommended production management systems before. It had won several tenders to implement similar systems in other companies but it had hardly any experience with the content of the programmes and the context in which they were to be applied. Therefore, it was unable to properly address issues raised by the clients. It was also discovered that the wrong version of the software had been supplied. While they touted that

"latest" system had been supplied, a consultant from the software supplier in the UK discovered that they were actually implementing a much older version of the software. This further undermined the relationship between the client and the vendor.

♦ Establishing and building the information systems organisation

After trying on their own to solve the implementation problems the management of Datlabs decided that they needed a competent information systems manager to deal with the technical and organisational issues involved in the development of an computer-based information system. Having invested so much money and effort, one of their main considerations was to find someone who had an understanding of the systems they were currently running but who also had sufficiently broad experience to direct and implement their IS strategy. They decided that they would do some poaching themselves. Early in 1994 they hired an information systems manager. This person happened to be the main 'expert' at the Bulawayo branch of the IT vendor. He had previously been involved in implementing the financial and production management systems that had been purchased by Datlabs.

The new IS manager is now involved in the process of evaluating the information systems that has been put in place so far, with a view of getting all the systems fully operational. He has so far developed a tactical IT plan for 1995 that addresses the immediate IT concerns and requirements and time scale for getting things in place. An outline of future IT investments has also been drawn up. Major improvements, directly attributable to the work of the IS manager have already been experienced.

The information systems department is quite small at the moment. Most of the systems analysis, development, and implementation work that have taken place so far have been outsourced. There are no current plans to increase the size of the department. As indicated earlier, this could restrict the capacity of the company to deploy the systems anticipated in the future. Datlabs expects to create an end-user environment where the user will be required to perform most, if not all, the operating tasks. It is hoped that IT personnel will focus on supporting and maintaining the systems that are implemented. The

composition of the department is expected to change with time. For example, should the computer operator leave the company he will be to be replaced by someone with much higher qualifications and broader experience. Systems development will continue to be outsourced where possible. Most applications will be in the form of packaged software. IT's main job then will be to ensure that the systems are successfully integrated.

♦ Integrating computer-based information systems within the company

The introduction of computer-based information systems into Datlabs should be viewed in two phases. The first phase covers the period when computers were used for basic financial transaction processing. During this period the major part of the IT operations was outsourced to a computer bureau. They processed the data captured and provided reports to management. Most of these reports tended to be historical in nature and of very little current value. The impact was felt mostly in the financial area. The second and current phase commenced in 1992 with the move to use IT not just for financial transaction processing but for controlling production processes as well.

Staff response to the introduction of current IT systems are, at best, mixed. While there is general enthusiasm for the use of IT based systems, the problems encountered in implementing the systems have had a discouraging effect on many staff members. This is particularly the case with much of the accounting staff who have been at the forefront of implementing the new systems. At the start of the programme the feeling was that the system would solve all their problems. With all the work put into system implementation, the under-performance of the system has had a negative impact on morale. Accounting staff have experienced a very steep learning curve. Part of the problem has to do with the fact that they were "thrown in at the deep end without much formal training. They did not have a good overview of the whole process".[43] According to the finance manager, accounting staff have not taken full ownership of the computerised accounting systems. There is still too much dependence on the IT staff. This was demonstrated by the fact that, until recently, IT staff were involved in

[43] Ndlovu, Phillip (1995) Personal Interview, June 26.

executing routine tasks (e.g. printing reports) for the accounting people. Accounting staff cannot be held totally responsible for this situation, however. The *modus operandi* of the IS department, until mid 1995, was that of an old mainframe shop. Computer operations was seen as the preserve of the computer technicians. Users did not become involved in operations. This has now changed. For example, the line printer has been moved from the computer operations room to the accounting offices. Printing operations are now initiated and executed by accounting staff.

The technical problems associated with the new computer-based system coupled with the inadequacy of training (both in terms of quality and depth) are the major factors retarding the quick uptake of the new systems. Because the systems have taken so long to implement both users and managers had begun to lose faith in the capacity of the systems to deliver effective performance benefits. The work accomplished by the new IS manager is beginning to restore some of this lost faith. With the solving of some of the technical problems staff are beginning to feel more optimistic. In some areas productivity has gone up. It now takes five days to produce the financial statements as opposed to the normal ten. Individual departments can now generate new reports from the system as required.

♦ Managing IT-enabled change

Datlabs' approach to managing the IT-enabled change process could be described as 'informed adhocracy'. There is a general willingness on the part of top management to institute IT-led changes. However, there is a certain reluctance to make large investments in instituting the change itself. Although the need for additional training and staff development is acknowledged it has not been comprehensively dealt with in the past. This probably resulted from the absence of a well co-ordinated IS programme. It appears that this situation will change in the future. One of the goals of the IS department, stated in 1995 Strategic Plan, is to ensure that IS and user personnel are suitably trained to enable the full utilisation of the IT systems. The human resources department has also outlined a plan to upgrade the skills of workers through the institution of a structured training programme.

Although not solely relating to IT, Datlabs has embarked on a process of restructuring and reorganising of its operations. The goal is to flatten the reporting structures, to reduce staffing levels, and to change the composition of the work force. The expectation is that taking these steps, in addition to improving remuneration and benefits packages, will increase employee motivation, commitment and performance. Employees have been offered voluntary redundancy packages (3 months pay with an additional 2 weeks pay for each year of service). Many employees, especially older ones, took up the offer. Key staff have been retained, however. Some functions, such as security, have been outsourced.

The changes are already reaping benefits for the company although it has also increased the stress in some areas. One example of how the changes have been assisted by the information system relate to the marketing function. The reports from the information system helped the marketing director to analyse which clients were being serviced. The director studied the reports provided and was able to identify a number of major clients that had not bought from the company for some time. Follow-up led to the landing of three big orders which allowed the department to exceed its budget for the first time. The reduction in staff increases the need for a well-functioning management information system.

♦ IS-related organisational learning

A close examination of the activities and management processes over the period between 1993 and 1995 indicates that some organisational learning has and continues to take place Datlabs. Table 6.7 highlights a few indicators of IS-related organisational learning occurring in the company.

Prior to the 1995 fiscal year Datlabs' vision of the role of IT was largely unstated. While the actions of the company implied a significant role this was not clearly articulated and was largely understood by only a few of the directors and staff

members. There is now a clearer view as to the role of computer-based information systems within the company. Several of the directors and managers at Datlabs freely acknowledged the absence of any specific IS/IT component in the 1993/94 Strategic Plan. Although IS/IT systems were clearly implied in the plan it was not specifically articulated. This issue was addressed in the 1994/95 plan following the researcher's query about this seemingly obvious omission. Prior to this time managers had a great desire to use IT but they had not really given sufficient consideration as to what to expect from its use. Managers are now beginning to see the application of IT as much more than data processing. They are beginning to use the data captured by the systems more creatively. Departments such as marketing and quality control are now taking data produced by the financial system to create information geared specifically to their own needs. Instead of waiting for the accounting department to produce some sterile historical record of transactions on their behalf, departmental managers are seeking to extract, from the system, information relevant to their own specific needs. This has created a new sense of ownership.

Table 6.7 Examples of IT-related organisational learning at Datlabs

Indicators	Pre 1994	1995
Vision of IS/IT	• Unstated, implied by the actions of the directors	⧫ Articulated and focused
IS/IT in Strategic Plan	• Implied but not specifically addressed.	⧫ Specific IS/IT strategies are articulated in support of business objectives. Tactical IT plan developed.
Orientation of IT Function	• Mainly concerned with financial data processing.	⧫ Moving towards information resource management
Relationship with IT Vendor	• Almost total dependence	⧫ Informed purchaser of services
Position of IS manager	• Functional supervisor	⧫ Member of the corporate management committee.

One interesting area of growth is in the relationship between Datlabs and IT vendors. In the past the company exhibited an almost total dependence on the IT vendors. This was demonstrated in its choice of hardware and software and the

subsequent sense of helplessness that prevailed when the vendor could not get the system implemented as promised. This experience has taught managers to be more vigilant and selective when deciding to engage a particular IT vendor. Managers are now more cognisant of the need to do their own research to enable them competently to make decisions about appropriate IT solutions. This process still needs to be developed further, however. The shortage of personnel and commensurate lack of available skills and experience increases the tendency to rely on the vendors for definitive advice. Vendors, interested in selling their products, are likely to suggest their own IT solution over and above those of other vendors.

A final indicator of organisational learning relates to the position of the IS manager in the organisation. Prior to hiring the current IS manager the IS department was supervised by the finance director. Because of the problems encountered in implementing the IT systems it became clear that there was a need for someone with a more intimate technical knowledge of the IT field to ensure that the systems would be implemented. A new IS manager was hired to fill this role. It was quite evident at the outset that the new IS manager was seen as a technical guru rather than a manager with more general responsibilities. He reported directly to the finance director and had very little autonomy. The successes achieved since his hiring demonstrated the possibilities presented by the application of IT. As a result the directors decided not to follow the prescribed IT budget but to give the IS manager authority to purchase what was needed to support current requirements.

In a further effort to galvanise the commitment of the IS manager and to vest more authority and responsibility in that department, the position of IS manager was upgraded to that of a senior manager in the company. This meant that the IS manager was fully accountable for his own departmental budget, expenses and performance. While he still reports to the finance director, he is now qualified to become a member of the company's Internal Business Unit, a committee of all directors and senior managers of the company, responsible for strategic decision-making. The IS manager

now feels "in a stronger position to deal with the IT issue. He can now sit down with other senior managers to share ideas and give input into decisions on an equal footing"[44]

While organisational learning has indeed taken place at Datlabs it has not done so in any systematic way. The learning exhibited here is mostly experiential, single loop learning (Argyris and Schön, 1978). They mostly result from direct experience and are reactive rather than proactive in nature. The learning achieved has been ad hoc and disjointed. Very little effort has been put into strategic and systematic organisational learning. There is also a very urgent need for the IS department to begin codifying some of the lessons learned in implementing the systems. Since much of what is known by the company about the systems reside in the minds of the IS manager and finance director, the company will face a major crisis should anyone of these people leave.

6.10 Summary

Datlabs' management is interested in appropriating significant business value from the deployment and exploitation of computer-based information systems. The company's experience with its systems so far has been somewhat disheartening. A lot of the blame for this unhappy experience rests with the IT supplier which has not delivered the systems promised. However, deficiencies in Datlabs' technical and IT management capacity were equally to blame for some of the failures. Because it lacked the technical IT capability when the project was conceived, Datlabs' management depended too much on the IT supplier. It did not properly assess the capacity of the supplier to carry out its proposals. It also failed to make adequate preparations for integrating the computer-based systems into the organisation. Not enough credence was given to the substantial organisational issues that would promote or hinder effective implementation.

[44] Mpofu, Ronald (1995) Personal Interview, June 13.

Even though there are good intentions on the part of management to deal with some of the problems faced they need to follow through on commitments made to improve the level of training and support given to staff. Their dependence on the IS manager to deliver the IT solutions virtually on his own is probably unreasonable and highly unrealistic. Additional technical help is needed if the company expects to develop its IS capabilities beyond what it is now.

CHAPTER 7

Case study: The Cotton Company of Zimbabwe

7.1 Background

The Cotton Company of Zimbabwe is a government-owned, private company engaged in the purchasing, processing and marketing of cotton products (ginned seed, planting seed, and lint) in local and overseas markets. Up until September 1994, the company was known as the Cotton Marketing Board. Established under the Cotton Marketing and Control Act of 1968, it was given sole right to purchase and market cotton in both the domestic and international markets. It was also required to purchase all seed cotton delivered to it. In the cotton industry it acted both as a regulator (setting prices, certifying and classifying products) and a commercial agent (purchasing and marketing cotton products).

According to the 1994 Annual Report, Cotton Marketing Board had a turnover of Z$710 million (US $87.1 million).[45] The results for the year ending February 28, 1994 showed an operating loss of Z$101 million (US $12.4). During the same period the Company had a permanent staff complement of 1006 persons. A total of 2258 seasonal employees workers were employed during peak season. Table 7.1 highlights financial and operational figures for the years 1992/93 and 1993/94.

Table 7.1 The Cotton Company: selected financial and operational results 1992/93 and 1993/94[46]

Indicators	1992/93	1993/94
Turnover (millions of Z$)	301.8	710.1
Surplus/Deficit (millions of Z$)	(67.2)	(101)
Capital Employed (millions of Z$)	180.4	264.4
Seed Cotton Production (tonnes)	60,000	205,000
No. of Employees (Full time/ seasonal)	1369/471	1006/2258

[45] See Appendix G for US$ conversion rates.
[46] Cotton Marketing Board (1994) **Annual Report**

7.2 The macro-environmental context

The Cotton Company of Zimbabwe, like most other industrial entities in Zimbabwe, faces an economic environment that is undergoing significant and far reaching changes. The Economic Structural Adjustment Programme (ESAP) currently under way has targeted the rationalisation of government parastatals as one of its major objectives. Some of the largest businesses in Zimbabwe are the agricultural marketing bodies which, until now, operated as authorised monopolies. The original intention of setting up these bodies was to bring order to the purchasing and marketing of agricultural products. However, most of these organisations have consistently operated at a loss and well below expected efficiency. The losses created a significant drain on the public finances. Such was the extent of the problem that a Commission of Inquiry into Parastatals was created to make recommendations to the government on how to improve the profitability and operational efficiency of these entities. The report of the Commission, tabled in December 1988, outlined the deep rooted nature of the operational and administrative problems characterising a number of parastatals and made proposals for correcting them.[47]

The Second Five-year National Development Plan (1991-1995) of Zimbabwe outlined three measures aimed at improving the efficiency of the Cotton Marketing Board as well as eliminating government subsidies. The measures outlined were: a) the rationalisation of the current staff situation to eliminate any possible traces of duplication b) the deregulation of the cotton market to align the prices to reflect market forces, and c) the improvement of handling systems at ginneries and utilisation of transit depots.[48]

The Cotton Company of Zimbabwe has undergone a major transformation in its governance and operations. It became a private company, wholly owned by the Government of Zimbabwe, in September 1, 1994. At the same time the statutory monopoly

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[47]Government of Zimbabwe (1988) **Report of the committee of inquiry into parastatals**. This committee was chaired by Mr Justice L. G. Smith and investigated the following entities: Agricultural Marketing Authority, Cold Storage Commission, Cotton Marketing Board, Dairy Marketing Board and Grain Marketing Board.

[48]Republic of Zimbabwe (1991) **Second Five-Year National Development Plan: 1991-1995**, December, p.32.

of the Board as the sole purchasing and marketing agent for cotton ceased. The company now faces new competition from other companies in the purchasing, processing and marketing of cotton. Following the deregulation of the cotton industry, commercial farmers have set up their own marketing organisation to compete with it. While The Cotton Company still holds the overall advantage, the new marketing company has been able to attract some of the larger commercial cotton producers. They have also been able to offer better prices to producers. This is because The Cotton Company, being government owned, has been directed to sell its products at less than market price in an effort to subsidise the local spinning industry. The general manager, in his 1994 report, expressed the concern that grower confidence is being undermined by such directives. This highlights the difficulties government-owned companies face in charting a course based strictly on commercial principles.

7.3 Organisational mission and business strategy

The Cotton Company of Zimbabwe, in its newly constituted form, seeks to become a highly competitive, world-class, cotton processing and marketing company. To do this the company needs to change the way it does business. This entails a renewed focus on efficiency, quality, producer support, and customer service.

While it operated as a parastatal, the company Zimbabwe became a moribund organisation encumbered by highly bureaucratic modes of operation. Inefficiency, low productivity and low quality services prevailed. Most systems were manual and the organisation was over-staffed. Given the new business environment, the company had to change the way it operated. It needed to gear itself for the new competition by improving efficiency and quality in general operations and customer service. It needed to streamline its processes and ensure that customers are served without the long delays characteristic of the past.

The Cotton Company, cognisant of the issues it faces in the future, embarked on a process of streamlining operations and systems in order to improve efficiency and customer service. A management consultant, Alexander Proudfoot Consultants of South Africa, was

engaged in October 1993 to review the operations of the company, install new systems and train staff. Management and supervisory personnel within the company have undergone various strategic planning and quality awareness exercises. The focus has been on meeting customer requirements. The general manager in his 1994 report indicated that:

> quality...training for all supervisors and managers had a positive impact on productivity, cost reduction and general quality of customer service. Through the process the Board managed to identify significant savings and many of these have been realised. Surpluses in manning levels were identified and plans were underway to reduce staffing levels through voluntary retrenchment in the next financial year.[49]

7.4 Information needs at The Cotton Company of Zimbabwe

The rationalisation and streamlining process began with a focus on the manual systems and processes. While this concentration on the manual systems has allowed for the understanding and rationalisation of procedures there are serious limits to the efficiencies that will result from this alone. These limits are imposed by the sheer volume of transactions. There are over 3 million transactions per day emanating from 19 centres. The company deals with over 150,000 farmers all of whom need to be paid within 14 days of the delivery of cotton to the depots. Payments are done centrally. It is currently impossible to meet the 14 day deadline using manual systems. The turnaround time is generally 21 days or more. Another complication to the whole process of dealing with the accounts of the farmers is that payments have to be matched against advances taken earlier. Farmers are normally given advances towards inputs (fertiliser, seed, etc.) which are to be paid back when the crop is harvested. This means that records of advances and deliveries must be up-to-date and accurate.

Because of the high interest rates prevailing in the country, The Cotton Company is of the opinion that its new competitors are more likely to want to pay farmers immediately at the point of delivery, instead of centrally, as is being done now. This is a strategy that The Cotton Company itself would like to adopt. Paying at the point of delivery means

[49] Cotton Marketing Board (1994) Annual Report, p. 13

having the facility to maintain and manage comprehensive records which can be updated immediately. With the possibility of one farmer being able to make several deliveries to different depots in a given period, The Cotton Company would need to know, at any given moment, what deliveries have been made, where, and what is owed to the farmer by the company or by the farmer to the company. Having such a facility would make it possible for farmers to make deliveries anywhere in Zimbabwe. On-the-spot payment would then be possible. Information technology could play a key role in the accomplishment of this goal.

Processing such large volumes of transactions manually meant that there was a vast potential for errors to take place. As a consequence, steps were taken to reduce and possible negate this problem. Three layers of staff were employed in checking each other's work. Reprocessing was an everyday feature. This meant delays in the processing of transactions and a huge investment in manpower. The Cotton Company would like to shorten the life cycle of transactions and reduce the heavy overhead invested in semiskilled and clerical labour. It wants to cut the life cycle of transactions from the current 14-21 days to hours or minutes. This means having on-line, real time transaction processing.

One other important strategic goal of The Cotton Company is to improve financial and stock control throughout the organisation. With the value of transactions amounting to several billion Zimbabwe Dollars annually, there are many opportunities for loss to occur through pilferage, theft and fraud. It is extremely important that there is transparency in the way transactions are handled.

computer-based information systems are considered as imperative to improving and transforming business processes to achieving competitive advantage. The current general manager feels that having properly functioning IT systems will increase the barrier of entry for other organisations trying to break into the cotton market. He sees computer-based information systems as important to the proper management of the business. The challenge the company faces is to acquire the right technology and skills to implement the required systems. Many companies are waking up to the fact that computer-based information systems contribute to competitiveness. This has led to high competition for the limited amount of skilled and experienced IT/IS people in Zimbabwe.

7.5 The Cotton Company's information systems strategy

The Cotton Company of Zimbabwe's business strategy demands the adoption of a computer-based information systems strategy. In the words of the former assistant general manager (MIS) "IT is a necessary factor in achieving competitiveness". The company envisions a key role for information technology in the management and operation of its business in the near and long term.

The Cotton Company's information strategy has evolved over the years. As far back as 1989, studies were carried out to ascertain computer systems requirements for the Cotton Marketing Board. In July 1990, the company requested Coopers & Lybrand management consultants to prepare an IT strategy for the Board. The subsequent report, completed in November 1990, was adopted by the CMB.[50] The strategy called for the computerisation of activities within the various sections of the board. These would occur over a period of time as manageable projects. Computerisation would start with the ginnery depots, then the transit depots and lastly the head office. The resulting IT strategy was heavily criticised by the MIS team that was created in 1992 to guide its implementation. In a document addressed to the executives of Cotton Marketing Board, a wide range of issues relating to the inadequacy of the IT strategy proposed by Coopers & Lybrand were discussed.[51] The review suggests that the proposed IT strategy lacked an integrated approach that focused on the whole business of the board. It was piecemeal and did not clearly focus on the final product. For example, it proposed the implementation of depot operations without a clear view of how these would be integrated in the existing and future operations of the organisation. The strategy was also deemed inflexible in its approach. It would limit the ability of the organisation to adapt to new and changing circumstances.

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[50]Information in this section taken from **Information Technology Strategy Review**, November 1993, MIS Department ,Cotton Marketing Board.

[51]Ibid.

Further shortcomings cited included the fact that the strategy did not clearly address the role of information technology within the board. Was it a supporting tool, a turnaround tool, a report production tool? The strategy also failed to articulate a much broader conception of information technology to include data processing as well as office automation and telecommunications. The strategy document was said to focus only on the data processing aspects. This clearly limited the extent to which any subsequent plan of action could, in a comprehensive way, address the information needs of the company.

With such criticisms there was obviously a need to revamp and re-focus the articulated IT strategy. The assistant general manager (MIS) proposed that a clearly stated policy on the role of information technology in The Cotton Company be adopted. The MIS department conceptualised a transformational role for information technology within the company. This, given the major structural and commercial changes taking both within and outside the organisation. The resulting information system would support a distributed end-user computing environment with centralised control. It was proposed that PC-based technology be used. This would provide for flexibility in architecture and applications.

The approach to be followed envisaged the following:

- An IT structure that is free to implement applications organisation wide without being monopolised by one department
- An IT department with non-functional authority that will be able to operate across departmental and divisional lines.
- The chief executive being the main change agent within the organisation

The following quote, taken from the executive summary of the Information Technology Strategy Review, sums up the vision of the MIS department for information systems within the Cotton Company of Zimbabwe.

> At the heart of this transformation will be the assumption that information will be available to all who require it to make timely decisions in this new and fast-paced environment.[52]

[52]Ibid., p. ii

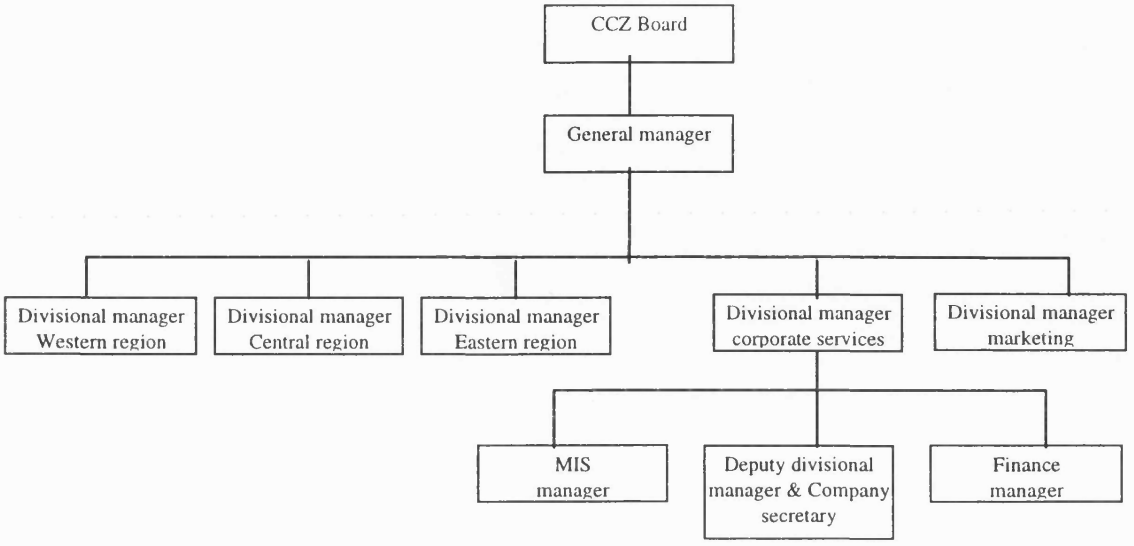
The proposals made by the former assistant general manager (MIS) have not been translated into a formal IS strategy. It appears, however, that current managers are adhering to the principles laid down. There is evidence of this in the tender document issued in December 1994. However, a comprehensive and revised IS strategy is still to be articulated. Section 7.8 contains a detailed discussion of the implementation of the IS strategy at The Cotton Company.

7.6 Organisational structure and governance

Since its establishment as a private company, The Cotton Company of Zimbabwe has undergone a major restructuring exercise. From March 1995 a new decentralised organisational structure has been put in place. Figure 7.1 depicts the organisational chart showing top management responsibilities and relationships. The company now has 5 divisions. These are the Western, Eastern, and Central Divisions as well as corporate services and marketing. The Eastern, Central and Western Divisions have been set up as strategic business units. The marketing division is now a profit centre with additional responsibility for purchasing seed cotton. The corporate services division results from the amalgamation of the finance, administration and MIS departments. It also handles human resources.

The new structure represents an attempt to improve the delivery of services and competitiveness. It is hoped that the creation of strategic business units will create competition among the divisions. This, coupled with performance incentives, is expected to lead to higher commitment among managers and their staff. It is however, too early to tell whether this new structure will achieve its objectives.

Figure 7.1 The Cotton Company: chart showing senior responsibilities and relationships



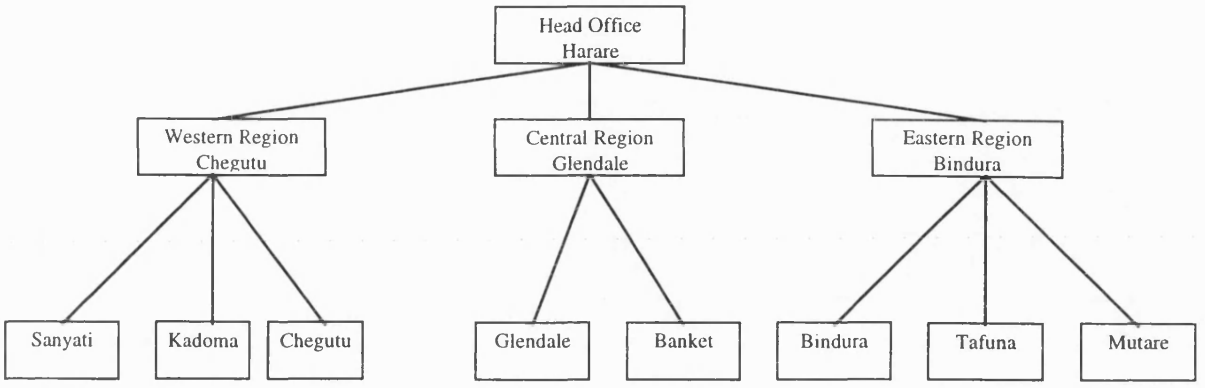
7.7 IS-related resources

♦ IT infrastructure

Prior to the current implementation, the company operated a centralised computer system based on manual batch input. The management and operation of this facility were completely outsourced to a computer bureau, C. F. Tulley Associates. The system was considered inflexible, out of date and totally incapable of meeting the current and expected demands of the company.

The new IS Strategy for the Cotton Company proposed the establishment of a distributed, on-line, end-user computing environment based on a client/server model. The main impetus for this is the need for a computer-based system that will allow for the payment of cotton producers at the point of delivery at the time of delivery. This means that all producer accounts need to be up-to-date at all times and be accessible from any location in the company, be it a depot, ginnery or head office. The systems should also provide information that will assist in business forecasting, managing sales, cash and stocks.

Figure 7.2 The Cotton Company: proposed IT network (January 1995)



The document, Tender MIS/4/94, issued in December 1994 and revised in January 1995, outlined the minimum requirements for the supply of hardware and software for the new computer-based information system envisaged in the IT strategy of the Cotton Company. An Intel pentium-based system was given preference. The IT network was expected to have thirteen servers supporting at least 110 client machines. Three servers were to be installed at head office in Harare and one each in the regional offices and depots. These machines were to be connected to a LAN at most sites and each site connected central hub over a wide-area network. Figure 7.2 outlines the proposed network. Rather than using leased lines as originally envisaged, a dial-up network has been implemented using the Windows NT operating environment. This was deemed a cheaper and very adequate alternative to the leased lines option. In January 1995 when the tender document was finalised the company had the following equipment in place:

a) 13 Pentium 66 MHz, 16 MB RAM, 1 GB Hard Disk, 250 MB TBU, CD-ROM
b) 1 Pentium 90 MHz, 32 MB RAM, 2 GB Hard Disk, 250 MB TBU, CD-ROM
c) 10 486-33 MHz, 8 MB RAM, 425 MB Hard Disk
d) 17 Epson LQ 1170 printers

Table 7.2 presents the specifications for the additional hardware and software outlined in the tender document. The tender document clearly indicates a preference for Intel Pentium machines. This, however, became a point of debate. The consultants, Coopers and Lybrand, preferred Digital Alpha-based servers as opposed to the Pentium-based ones favoured by the MIS department. The tender to supply hardware was won by the local DEC dealer, Realtime Computers. The systems installed since the tender was issued reflect

a compromise. A DEC Alpha server running Windows NT has been installed at head office. There is also a DEC Pentium server at head office that provides the platform for the financial applications. These are both connected to a RAID system which mirrors the data on both servers. The ginning depots have been allocated DEC Pentium servers. Collection points are outfitted with stand-alone PCs.

Table 7.2 The Cotton Company: hardware and software specifications, January 11, 1995[53]

Hardware	3. **Peripherals and other hardware**
1. **Servers** (2 units) • Intel Pentium processor • 32 MB RAM • 512 K cache • 4 GB 9ms SCSI hard drive • PCI SCSI 2/SCSI 3 disk drive • Video graphics accelerator with 2 MB DRAM • DAT - 1-2 GB, TBU 200/500 MB	• 14" SVGA Monitor (112 units) .39 Non-interlaced colour/monochrome EPA Energy Star compliant • 3½" floppy drive (112 units) • Line printers (400 LPM) (10 units) • Cheque printers (10 units) • UPS and monitoring software (10 units) • LAN/WAN connections • Disk mirroring /duplexing
2. **Clients** (110 units) • Intel processor, 486/66 • 8 MB RAM • 128 cache • 32 - bit Vesa local bus • Video graphics accelerator with 1 MB RAM • 425 MB hard disk	4. **Application Software** • Application to be SQL RDBMS based • Be able to use industry standard tools (report writers, programming, OLE, etc.) • GUI driven • To be able to import/export data • Client/server based • To support messaging/workflow or both • To be able to run on several RDBM systems • To easily integrate with office/ secretarial packages for the purpose of information exchange

On the software side, there is a preference for software that support the open systems concept. A Microsoft Windows NT environment has been implemented although a UNIX environment had been a distinct alternative. There is one problem with going for the Windows NT solution. That is, in Zimbabwe, there is very little experience, at the moment, working with this operating system. There are very few reference sites and none of the magnitude envisaged by The Cotton Company system. SunSoft's SunSystems financial package was chosen as the financial application software. It was supplied and is supported by local dealer Total Solutions. Bespoke applications are being developed using Oracle

[53] Cotton Company of Zimbabwe (1995) **Tender No. MIS/4/94: Addendum**, January 11, p. 15

database products. The producer registry and the stock control systems are being developed by the local Oracle dealer, Alpha Systems. The Cotton Company expects to develop the other applications proposed in the IT plan in-house.

Table 7.3 identifies the applications that are to be deployed in the current phase of system implementation. The applications listed fall into categories, key operational and support. This should be expected since these applications are generally targeted at automating current manual processes. While there are hints about the deployment of strategic applications such as executive information systems, these will not be put in place immediately. There is potential for the rapid implementation of strategic applications, however, since there is an abundance of tools supported by the Oracle and Windows NT platforms that have been implemented by the company.

Table 7.3 The Cotton Company: proposed application portfolio (June 1995)

Strategic:	**High Potential:**
Key Operational: Producer Accounts Producer Registry Cash book Transport /Freight Management Sales/Purchase Order Systems Stock Control and Stores Planned maintenance	**Support:** Finance Systems (Nominal ledger, etc.) Personnel Systems Payroll System Fixed and Movable Assets Fleet control

♦ Human resources

There were five staff members in the MIS department at November 1995. This is well below the 11 projected a year earlier. There were plans to establish a fully staffed MIS department but these plans have been put on hold for the time being. The MIS manager is new, having been appointed in September 1995. Table 7.4 gives an outline of staff positions, qualifications and experience of the incumbents. The new MIS manager brings a wealth of experience to his new position. He has over ten years of experience in the IT industry and has been involved in developing and managing large scale information

systems. He was previously data processing manager for the Forestry Commission another public service entity. During his tenure there he led out in the computerisation of the Commission's business activities. He was educated in Germany and holds an MBA in business computing from the University of Frankfurt. Prior to returning to Zimbabwe, he worked for almost two years as a trainee systems analyst in Germany.

Table 7.4 The Cotton Company: MIS department - educational background and IT experience

Job Position	Education	Years of IT Experience	Years at CCZ	Gender
MIS manager	MBA Business Computing Frankfurt, Germany	10	<1	M
IT co-ordinator	BSc Business Studies and Computing, UZ, Zimbabwe	5	1	M
Data controller	Business Dipl. HND Information Systems, UK	10	7	M
Applications analyst	BSc in Business Systems	2.5	1	M
Automation assistant	Business Diploma, Solusi College Zimbabwe	2	2	F

The rest of the staff hold either degrees or diplomas in IS-related subjects. Two have degrees in from the University of Zimbabwe, one studied for an HND in the UK and the other has business studies diploma from Solusi College in Zimbabwe. Apart from the MIS manager, the IT experience of the other staff members is fairly limited in scope. Although one staff member has over 10 years experience in the IT industry, over seven years has been spent at The Cotton Company. His work experience has been in data processing since the bulk of the computer work undertaken in the previous years had been outsourced. The applications analyst previously worked with the local IBM dealer and has some expertise in local area networking.

♦ Organisational IS-related competencies

The IS-related competencies present in The Cotton Company are vested mostly in individuals. Much of what the company knows about IT reflects the personal knowledge of the MIS manager and members of his staff. The loss of the previous MIS manager aptly demonstrated the extent to which the company was dependent on his knowledge and skills. When he left, the IS implementation programme went adrift and only got back on track with help from the consultants, Coopers and Lybrand and with the hiring of the new MIS manager. The new MIS manager brings significant management and technical IT skills to the company. He has been involved in a number of large projects before and has a good understanding of the challenges faced in implementing a country-wide corporate IT network. He has substantial experience working with relational database management systems, particularly Informix. Although it is a different product from Oracle, both systems operate using similar principles. Knowledge and skills developed in one environment can substantially be transferred to another environment. The MIS manager also has a strong finance background. This makes it easier for him to interpret, understand, and translate financial systems requirements into functional computer-based applications. One area in which the previous MIS manager excelled was in requirements analysis and specification. The current implementation is based on the work carried out under his leadership.

One member of the MIS team is said to have some expertise in working with local area networks. This is important for The Cotton Company since their whole IT strategy assumes the deployment of IT networks. This expertise will need to be developed further as more systems are implemented. The MIS department lacks expertise in working in the Oracle applications development environment. As a consequence an Oracle specialist is being recruited to bring Oracle expertise in-house. This person is expected to lead bespoke application development in the Oracle environment.

The IT competencies of the MIS department are supplemented by significant functional user knowledge and experience. For example, the finance department is very

knowledgeable about the financial operations of the company and the information systems needs that emanate from these. They are at the forefront of implementing the financial and producer systems and are invaluable partners to the MIS department staff. Expertise in contract negotiation and financial planning is provided by the corporate services manager who is an experienced chartered accountant and financial manager.

♦ Financial capacity

The IT project, as it is currently conceived, has an estimated cost of Z$24 million (US $3 million). The entire cost of the project is being funded by the company from its own operations. The amounts approved for the implementation of the information technology strategy for the years 1992/3 and 1993/4 were Z$6.65 million and 9.75 million respectively.[54] The company's commitment to the implementation of its IT strategy is underlined by these figures. This bodes well for the long term sustainability of the IT project. Rather than being dependent on aid or some form of subsidised lending, The Cotton Company has incorporated the funding for its IS strategy in its regular budget.

The ability to continue funding the deployment of IT resources is dependent on the company's profitability. The figures presented in table 7.1 indicate that the company suffered severe losses in the two years compared. The profitability of The Cotton Company is not only dependent on effective management but it is subject to the vagaries of the natural environment. When there is a severe drought, as there was in 1992, the output of the company can be severely reduced. The subsequent loss of revenue can severely undermine the company's profitability. One action that will certainly help the newly privatised company to become profitable is the Zimbabwe Government's decision to assume its Z$ 270 million debt that had accrued prior to privatisation. This debt had largely accumulated as a result of subsidies given by The Cotton Company to spinners.

The Cotton Company's capacity to continue the financial support of the IS/IT strategy is enhanced by significant experience of top management in planning, negotiating and securing financial backing for projects undertaken by the company. Much of the

[54] These figures are taken from The Cotton Company annual reports of 1993 and 1994.

company's operations depend on large pre-season borrowings. Managers are therefore constantly negotiating financial contracts which have to be reviewed and renewed from time to time.

♦ Organisational culture and climate

From its inception up until September 1994 The Cotton Company of Zimbabwe operated in the traditional mode of a large government bureaucracy. Even today, vestiges of the bureaucratic culture remain. The initiatives surrounding the transformation of the former parastatal into a private company operating in a competitive market required a major cultural change. This change is being effected by management. Significant restructuring of responsibilities has taken place. The company has been divided into three strategic business units, a profit centre and a cost centre. The impetus behind this is to transfer responsibility and accountability for managing costs, generating profits and maintaining market share to the operating units. This is aimed at enhancing competitiveness. In a parastatal, costs were sometimes treated as irrelevant. If there was a loss the government was expected to cover it. This has now completely changed. In the new set-up, losses will solely be the responsibility of the company.

The organisational climate within The Cotton Company is one that is filled with an uncertain mix of anxiety and expectancy. Any company undergoing dramatic structural and organisational change should expect this. Clearly, the emphasis on implementing new computer-based information systems will have a profound impact on the majority of the clerical jobs since these constitute a significant portion of the employment at head office. Some staff are uncertain as to where they fit into the new organisational framework. Other staff, such as the accountants, are eagerly anticipating the improvements promised by the computerised systems. Once operational, the new systems will eliminate the numerous problems associated with ensuring the accuracy of the millions of transactions that are processed each month. Financial statements are expected to provide a more accurate reflection of the activities of the organisation. The new systems promise to relieve the heavy work load now carried by the finance staff.

Strong top management support and commitment for the implementation of change, in general, and IT-enabled change, in particular, is very much in evidence at The Cotton Company. Managers are attempting to create a new environment based on team work. In getting people to work together, they hope to break down some of the old barriers that were very much in evidence when the company operated as a parastatal. The team concept has been difficult to inculcate despite many training sessions. The MIS department has taken some step towards implementing the team concept. Staff in the department are already organised into specific work teams. Creating the type of team spirit envisaged in the general organisational strategy will take time.

Management is committed to getting the best IT people and technology in place. They are willing to spend a significant portion of their IT budget to make this happen. Having a robust computer-based information system in place is their primary concern. In the words of the general manager 'financial constraints will have to be secondary'.

♦ Organisational Linkages

In relation to the development and implementation its IS strategy, one of the Cotton Company's major link is with the consultants, Coopers and Lybrand. Prior to the hiring of the MIS manager the company was very dependent on the consultants to give direction to the implementation of the strategy. Coopers and Lybrand's project management role has become less important with the coming of the MIS manager and they now serve in an advisory capacity. The consultants played an important role in recruiting the MIS manager. This was significant because The Cotton Company did not have the appropriate links to establish the necessary contacts with potential candidates or the required expertise to ensure selection of the right candidate.

The Cotton Company does not have very strong links with its suppliers. Because of the very unproductive relationship it has had with its previous IT vendor it has developed supplier relationships that are more diffuse. The MIS department does not think the suppliers do much more than provide hardware and software. The do not

consider the suppliers to be of very much help beyond carrying out their contractual obligations.

The Cotton Company has not developed strong links, in terms of its IT initiatives, with similar organisations both within Zimbabwe and outside the country. Managers in the company tend to consider its situation and proposed computer systems unique. The researcher has, however, observed that there are similar projects going on in the country from which the company could learn. While the similarities might not be in terms of the actual processes, other companies are dealing with similar technological issues. The Cotton Company would benefit from developing closer relationships with other local companies. These relationships could lead to the development of beneficial partnerships.

Internally, the linkages were fairly tenuous until the coming of the new MIS manager. Prior to that time the relationship between the MIS department and the user departments was not strong. There was scepticism in certain user departments concerning the work that the MIS department was doing. This lack of internal congruence resulted from gaps in communication. There were no well-defined mechanisms facilitating mutually beneficial user and IT practitioner interaction. Application user groups and application development teams were not yet present within the company. The IT steering committee was in place but it operated at the board level. The situation has now changed. The newly created application teams provide formal links with user departments through a key user.

In general, internal and external linkages, except in a few cases, result from informal personal contacts made by managers and MIS personnel. These relationships tend to be tenuous and arbitrary.

7.8 IS-related organisational routines

♦ Implementation of the IS strategy

The implementation of the IS strategy of the Cotton Company of Zimbabwe will be addressed in two parts. The first part will describe the approach taken in implementing the strategy proposed by Coopers & Lybrand, while the second part will address the current approach to implementation being followed by the new MIS team.

Coopers & Lybrand, after presenting their strategy document to the CMB, was tasked to conduct a systems requirements analysis. Most of this was completed by October 1991, with the remaining head office systems requirements being completed in November 1992. The consultants were also given the responsibility of managing the tendering process for the provision of computerised solutions. Various companies submitted bids to provide the necessary hardware and software. The tender was won by a major IT vendor. The IT vendor proposed using the MAX Accounting package and Informix database for the main financial and database applications. The MAX package, probably a good accounting software in other circumstances, did not fully meet the requirements of the Cotton Marketing Board. The IT vendor offered to modify the package at a cost outside the tender price.

The IT implementation by the IT vendor started at the beginning of 1993. According to the Information Technology Strategy Review document prepared by the MIS department, the process was fraught with problems. It appears that personnel at the IT supplier did not have the required competence to implement the software application packages they had recommended. This does not seem to be an isolated problem with this particular vendor. In several interviews and in other case studies the same scenario emerges. Staff members in the MIS department at The Cotton Company were convinced that personnel at the vendor were simply not capable of delivering what they promised. They highlighted a number of instances when consultants brought in from overseas were able to do in a matter of days what local personnel at the vendor could not accomplish in six months.

With the seeming inability of the vendor to get the systems implemented, The Cotton Company, on recommendation of the MIS department, decided to terminate its contract with the computer supplier and carry out the systems implementation itself. The assistant general manager (MIS) felt he could put together an IT team with enough skills to implement the project as outlined in the IT Strategy Review. The Cotton Company incurred a loss of over a million Zimbabwe dollars as a result of terminating the contract. The company felt, however, that it was better to take the losses at that point in time rather than wait and possibly incur much bigger losses in the future. Following the decision to go it alone several new staff members were recruited. Much time was spent developing new systems requirements for which a tender could be issued. The tender was issued in November 1994 for the supply of hardware and software and separately for the supply of project management services. The tender closed in January 1995 after it had been reviewed at least twice. Evaluation of the tenders began in May 1995.

The period leading up to June 1995 was a turbulent one for The Cotton Company and its MIS department. In looking back, the decision by the department staff to try to manage the project entirely on their own seemed unwise. Much time had been spent on developing system requirements but there was little in the way of substantive system implementation to show for all the effort put in. The pressure for some concrete results was growing. This pressure came mostly from the finance area which was experiencing tremendous problems with its current systems and wanted a new system put in place as quickly as possible. The seemingly interminable strategising and the commensurate paucity of concrete implementation tested the commitment of the business managers to the whole project. Some of the managers felt there was not enough IT project management expertise in the company to carry the project through.

At the same time staff retention in the MIS department became a growing problem. Three of the new people hired earlier left the company. One is reported to have left out of frustration and the other two because they were offered better salary and benefit packages elsewhere. The former assistant general manager (MIS), who was the key figure behind the project, also resigned because of internal conflicts. This loss, in some way, took the heart

out of the MIS department. The department was left with staff who were regarded by management as insufficiently competent to carry out the implementation. The need for experienced IT leadership became acute.

While it contemplated how to deal with the inadequacies in the MIS department, The Cotton Company hired Coopers and Lybrand Management Consultants to manage the IT project. At the same time the consultants were tasked with helping to recruit a new MIS manager. Coopers and Lybrand's consultants were quite familiar with the operations of the company. They had drafted the previous IT strategy and were presently involved in conducting a change management programme within the company. The consultants took over the initiative for getting the project implemented from the MIS department. This move, at the time it was taken, severely undermined the morale of the staff in the MIS department. The stated intention was that the Coopers and Lybrand consultants would work closely with the MIS staff. However, the MIS staff became concerned that they are not being involved as part of the team. They felt that the roles of the consultants and the MIS staff had not been properly defined. As a consequence the MIS staff were unsure of their position within the company's overall plan.

From the researcher's observation, it was not quite clear who was taking the initiative for moving the project forward. There was no doubt that the leadership should have come from the management of The Cotton Company. However, without a significant top level IT management competence in place at the time, management seemed to rely heavily on the management consultants. This was not a desirable situation.

The circumstances changed significantly after September 1995. With the help of Coopers & Lybrand, decisions were taken and contracts issued for the supply of hardware and software. A new MIS manager, with significant experience, was hired to provide the leadership needed to get the systems in place. After the arrival of the new manager immediate steps were taken to get the implementation on track.

There is great pressure for the new systems to be implemented rapidly. The manager of the Corporate Services Division has suggested that if the new system was not in place by

the next season (1996), The Cotton Company may have to close up shop. The focus of the initial implementation effort was to get the financial accounting system deployed at head office and in the area offices. Personal computers were installed on most desks at the head office and a local area network was put in place. The SunSystems accounting package was chosen. Between October 1995 and February 1996 significant effort was made to get the financial system up and running. During January and February 1996 staff from both head office and the area offices have worked on the system using live data. The March 1996 financial statement is expected to be the first full implementation of the system country-wide.

The producers accounts and the stock control systems are being developed by a local software house, Alpha Systems. The software developer is using the Oracle relational database management system as its systems development tool. The producer accounts and stock control systems are critical to the effective operation of the company and are urgently needed. The MIS department proposes to develop the other planned systems, in-house, also using Oracle.

Prior to the arrival of the new MIS manager, the manager of the corporate services division was confident that it was possible to carry out the implementation internally with help from Coopers and Lybrand. However, the lack of IT expertise made this proposition difficult. The division manager is very effusive about the contribution made by the new MIS manager since his arrival. 'Without him we wouldn't be where we are'. The experience and expertise of the new manager has led to a significant reduction in the use of consultants. The Cotton Company had budgeted Z$ 2.5 million for consultants' services. By November 1995 they had only spent Z$200,000 and were not expecting to spend much more. Coopers and Lybrand has now been requested to play an advisory role only. They attend meetings and provide advice as requested by the company.

♦ Establishing and developing the IS organisation

The Management Information Systems department is a relatively new department in The Cotton Company. Before the restructuring exercise, which took place in early 1995, it

was headed by the assistant general manager (MIS). This meant that MIS was represented at the highest level of the organisation and was on the same level as finance and marketing. Since the restructuring the department has been incorporated, along with the finance department, into the corporate services division.

The composition and alignment of the MIS department were discussed earlier in the chapter in the section on human resources. Since the arrival of the new MIS manager the MIS department has been divided into two operating teams: the financial systems team and the bespoke development team. Both teams are headed by the MIS manager. The financial systems team will concentrate on supporting the SunSystems financial software package and associated software developments. The bespoke applications development team will be involved with developing and supporting the other applications proposed in the strategy. Network operations will be supported by one member of the MIS staff who has had significant experience in this area from previous employment.

- **Recruiting and retaining high quality IT personnel**

The Cotton Company Zimbabwe has difficulty attracting and retaining high quality IT personnel, a challenge faced by the majority of companies in Zimbabwe. The problem is especially acute for public sector organisations and government owned companies. There are at least two major constraining factors. The first is the acute shortage of highly skilled and experience IT practitioners in the country as a whole. The second factor is the intense competition for available skills brought about by the dual phenomena of an exploding demand for high quality skills and the shortage of such skills. As a consequence suitably qualified IT personnel are finding themselves in great demand. There is intensive poaching of experienced IT personal among companies in Zimbabwe. The high salaries and good conditions of service offered are often very tempting to IT people.

The two newly recruited IT staff that left the company soon after they were hired left because they were offered better salaries and conditions of service elsewhere. Being a government owned company, The Cotton Company does not offer the level of

salaries possible in other private sector companies. This has been a major problem for the company when trying to attract good quality staff. Despite the problems, the senior managers of the company have expressed commitment to getting the best available staff . Financial considerations will not deter this goal. Management demonstrated their commitment by hiring a very experienced MIS manager. The cost to the company was significant.

While salary level is a major factor in the process of attracting and retaining quality IT staff, other considerations also come into the equation. One of these is the possibility of career development within the organisation. IT staff, in common with other personnel within a company, are concerned with the growth and development of their careers. They are increasingly concerned about where their careers are headed and will change to employers who promise greater career advancement. Staff within the MIS Department at The Cotton Company perceive very little prospect for career advancement in the present circumstances. They expressed concern about the lack of clearly defined career structures within the company. The present structures do not reflect the current IT situations elsewhere. IT people are not sure what positions will be open to them in the future. The fact that the company does not have a fully developed human resources department, which would deal with such issues, heightens the sense of career drift. If the company expects to attract and keep high calibre staff it must pay attention, not only to the remuneration package, but also to the career possibilities of current and prospective employees.

The seeming dependence on the use of consultants is another factor undermining the confidence of IT personnel within The Cotton Company about the direction of their careers. While consultants are necessary in many instances, there is a perception among the staff that dependence on consultants have become a part of the culture of the company. The result is that staff development is perceived as having a low priority. The IS applications development and operations staff feel an acute need to develop new IT skills but are unsure just how this will come about.

According to the Coopers and Lybrand managing consultant advising The Cotton Company, the nature of the job and the technology being used are important factors in the attraction and retention of highly skilled and capable IT personnel. Most highly skilled people are motivated by challenging work. They get a sense of accomplishment for having engaged in something that is novel and moderately difficult. Most Zimbabwean companies have basic financial transaction processing systems in place. Implementing and maintaining these present little challenge to many IT staff. This is especially the case for graduate calibre people. The systems configuration being implemented at the Cotton Company present many challenging opportunities for IT staff. The complexity of the proposed system and the level and quality of technology to be used could attract high calibre staff. This must, however, be combined with competitive remuneration and conditions of service.

- **Integrating computer-based information systems within the company**

People involved in the implementation of computer-based systems are frequently admonished to ensure substantial user involvement in the design, development and deployment of such systems. The concept of user involvement was taken to heart in the implementation of the IT strategy at the Cotton Company. The finance manager confirms this by emphatically declaring that the requirements of the proposed systems were not imposed. Each area was approached to define its own requirements under the guidance of the MIS department and the consultants that preceded them. Users, particularly those in the finance area, were very involved and are very aware of the objectives of the new systems. The finance manager did not anticipate any resistance to the implementation of the financial systems. The shortcomings of the old system were well known and its impact had been felt by everyone. Most people had to constantly put in overtime to keep up with their work. They anticipate relief from this burden when the new systems are fully implemented.

Perhaps the heavy involvement of users in the requirements specification process heightened their awareness of the need to get the systems implemented quickly.

Users, particularly those in the finance area, became disenchanted by the slow progress being made. They demanded that action be taken to get the systems deployed. They had depended on the MIS department to provide the leadership but were unhappy with the seemingly long delays and the subsequent attempts to explain them.

The MIS department has embraced the a team approach to systems implementation. Project teams are structured around the applications being implemented. Each team comprises the relevant application team from the MIS department along with a key user or users from the functional department. For example, the key user on the financial accounting system is the finance manager. The corporate services manager is also involved, ex oficio, in key implementations. General oversight for the implementation exercise in given by MIS manager, corporate services director and finance manager with input from the general manager.

In implementing the financial system the company took the novel approach of bringing all the relevant people together at head office to work on the live data for two months. This took place during January and February, 1996. During this time the finance staff got the opportunity to learn the new system thoroughly and were able to deal with any significant problems that arose. Working together provided the opportunity for sharing experiences and for building confidence in using the new system and methods. Once the training was completed, those working at depots returned to their offices taking their computers with them. They are expected to produce their financial information using the new system from March 1996 onwards.

The implementation success achieved up to March 1996, has created renewed optimism in the company. The MIS manager attributes the success to the strong commitment of top management and the hard work of both the MIS and functional departmental staff. Much time, including weekends, was spent in getting the systems implemented.

♦ Managing IT-enabled change

Change in the Cotton Company of Zimbabwe is not simply about implementing computerised information systems. It represents a fundamental rethinking and restructuring of the way the organisation is governed and how it operates in the market place. The introduction of computer-based information systems is a key tactic in the bid to change the operating culture and practices of the company. Information systems provide the opportunity to improve the management of the business as well as create competitive advantage.

The introduction of IT-enabled change is encapsulated in a more general change management strategy embarked on in preparation for privatisation. Two mutually reinforcing objectives at the basis of the change management process are: the bid to improve quality of products and services, and a re-orientation of services towards a focus on meeting customer needs. This is a tall order, especially in a company where the needs and concerns of clients previously took second place to that of perpetuating an inefficient and bloated bureaucracy.

To tackle the problem head on, a large scale change management exercise was initiated. Change management consultants were brought in to reinforce the transformation taking place and to maintain momentum. A variety of consultants with different professional specialties and from various organisations were employed. The specialties included quality management, accountancy, merchant banking, cotton marketing. Managers were at the forefront of the change process, beginning with their involvement in the training exercises. They were expected to lead by example. Those managers who refused to accept the new regime were dismissed. Change management was also taken to the shop floor. According to the general manager, up to 80% of all the regular employees have gone through change management training.

Change comes slowly in an organisation such as The Cotton Company. While there is an appreciable change in attitude and orientation among workers, some old habits still persist. The company is continuing the various training programmes and hopes that this will help to instil a new culture in the organisation.

With so much focus on change and the need for change, the introduction of computer-based systems did not pose any real problems. The finance manager insisted that the requirement for change was so widely recognised and anticipated that he did not foresee any resistance to the new financial systems being implemented. The real challenge was for managers to ensure that the systems promised were implemented. This required managers to keep focused on the main strategic objectives without becoming side-tracked.

♦ IS-related organisational learning

The Cotton Company's experience in deploying computer-based information systems is one characterised, initially, by a number of false starts and failures. These, however, have provided significant learning opportunities for the managers and staff of the company. Table 7.5 highlights a number of evidences of organisational learning that are deemed to have occurred in the organisation over the last few years.

Earlier attempts to implement computerised systems in The Cotton Company focused on automating transaction processing without any clear concept of what this would mean for the organisation as a whole. This issue was brought out clearly in the Information Technology Strategy Review conducted in November 1993. Those involved in developing requirements failed to anchor their proposals within a well articulated organisation-wide plan. Subsequent to the strategy review, IT implementation is regarded as more than simply a way of automating transaction processing. Although most of the proposed applications tend to focus on automation, they are just the initial part of a larger strategy. The current IT implementation is the cornerstone in the whole decentralisation process. Top management views computer-based information as a key weapon in its bid to dominate the production and marketing of cotton in the new competitive environment in Zimbabwe.

Table 7.5 The Cotton Company: examples of IS-related organisational learning

Indicators	Previous Situation	Current Situation
Reason for IS/IT implementation	• Automation of transaction processing	◗ Organisational transformation
Implementation approach	• MIS led	◗ Business / MIS partnership
Organising principle	• Individual jobs	◗ Teamwork
Role of IT consultants	• Project management	◗ Advisory
Relationship with IT vendors	• Dependent	◗ Wary, sceptical
Need for top level internal IT competence	• Desirable	◗ Essential

The current assertiveness of the user departments in forcing the pace of IS/IT implementation contrasts with the more passive role adopted up until the end of 1994. Previously, functional departments, like finance, took their cue from the MIS department. MIS was in the driving seat. The functional departments became frustrated by the delays and the accompanying 'techno-speak' that was used to explain away the problems. Today, rather than a relationship leveraged on superior technical knowledge in favour of the MIS department, a new partnership is emerging based on mutual dependence and trust.

Teamwork is being embraced as the new operating principle at the Cotton Company. There is a conscious attempt to inculcate this principle into the organisational culture. The success of this is still difficult to measure. Beyond the hype, management is convinced that the concept of teamwork is very important to the success of their efforts to improve the quality of products and services.

IT consultants have played a central role in IT implementation at the Cotton Company throughout its history of developing and deploying computer-based information systems. Earlier in the case studies several instances where the management consultants played the leading role have been highlighted. As late as June 1995, the management consultants Coopers and Lybrand were being asked to take a leading role

in managing the project implementation process. It has become clear to the management of the company that outside consultants cannot substitute for in-house IT management expertise. There are many issues that cannot be addressed effectively by consultants whose allegiances are to another entity. Consultants can provide excellent advise but the actual work of management has to be done internally. Consultants are also careful about their contractual arrangements and are unlikely to undertake any job not specified without additional compensation. The management of The Cotton Company saw the value of having their own expertise when the new IS manager was hired. They were able to significantly reduce the involvement of the consultants almost immediately.

The Cotton Company has had a turbulent relationship with IT vendors. As indicated earlier, one vendor promised more than it could deliver. The result was that the contract had to be terminated with a loss of approximately Z$1 million to the company. Managers at The Cotton Company have become wary of the promises that vendors make. They have taken steps to ensure that the systems they require are specified in detail and that vendors are completely aware of what is expected. From the point of the of the MIS department, the vendors are only marginally useful to them beyond supplying and supporting the equipment and software. Most vendors are seen as mere conduits of equipment and supplies rather than credible IT service providers.

As important as learning is for the Cotton Company, perhaps its most important challenge will be to unlearn many of the habits inculcated while it operated as a parastatal monopoly. It is commendable that the company extols lofty principles of quality and customer-focused service provision. The achievement of these goals, however, is much more difficult to orchestrate. The Cotton Company needs to ensure that the lessons they have learned are diffused throughout the company. The continual changes make the learning, deemed to have taken place, tenuous

- **Knowledge acquisition, retention and dissemination**

One of the key ways of increasing an organisation's ability to learn is the creation of an environment that provides consistent mechanisms for the acquisition, retention and dissemination of information. The Cotton Company currently has no such mechanisms. According to personnel in the MIS Department, developing new IT knowledge comes through personal initiative. Knowledge is gained through contact with colleagues in other companies, from previous employment, and through personal reading. There are no formalised access to published IT information. There are no magazine subscriptions, for example, which makes it difficult for IT personnel to keep up-to-date. Like many other organisations in Zimbabwe, most of what the company knows about IT is what staff is fed by vendors of IT hardware, software and services. There is little capacity within the company to test and measure the validity of the claims being made.

Some attempts have been made to record the lessons learned and decisions made. The document, Information Technology Strategy Review of November 1993, is an example of one attempt to document lessons learned and to give some direction for the future. Other documents such as the tenders issued, system requirements reports, records of meetings and correspondence are important repositories of information that will help to provide some continuity should people leave the organisation. The publication, "Cotton On", is a newsletter put out by the Public Relations Office of the Company. This is a very good publication and could be used more effectively to disseminate information about the MIS activities.

7.9 Summary

This review of the activities associated with the implementation of computer-based information systems at The Cotton Company of Zimbabwe illustrates the difficulties the organisation faces in deploying such systems. Top management within the company is demonstrably committed to the implementation of computer-based systems. The company has a clear vision of what it expects out of the systems.

Management has made substantial efforts to assemble the necessary resources. However, they still faced significant implementation problems. The problems faced can be attributed to difficulties in project management. The MIS department, until recently, was unable to translate the strategic IT plan into concrete products. This frustrated the user departments that were anxious to move on with the deployment of the planned systems.

IS capability is at the early stages of development in the Cotton Company. Much of the success achieved so far is still tenuous. The routinisation of the lessons learned and the successes achieved are critical to the building of IS capability within the company. Management must pay specific attention to staff development in the MIS department. To attract and retain high calibre staff it must consider, along with appropriate remuneration, the career opportunities that it offers it staff.

CHAPTER 8

Summary and Analysis of Cases

8.1 Introduction

This chapter contains a summary and comparative analysis of the three case studies presented in chapters 5, 6 and 7. The findings of the research are also discussed. We present the analysis and findings with reference to the three strategic dimensions of information systems capability discussed throughout the research: contexts, resources and routines. The first section of the chapter provides a brief summary of each case, highlighting the main issues. In the second section the findings accompanied by a comparative analysis of the cases are discussed. The analysis begins by considering the nature of the organisations studied. It then goes on to explore each of the dimensions covered earlier, beginning with the macro-environmental context, followed by the resources and then the routines.

The case studies detail the experiences of three organisations engaged in the implementation of strategic, computer-based, organisational information systems. The organisations are at different stages of the systems implementation process. The Cotton Company is in the early stages of deploying a new strategic computer-based information system. The company has operated a centralised data processing system for over 20 years. This system has proved, however, to be inadequate in supporting the current business requirements.

Datlabs is further along the implementation path than The Cotton Company. Its financial system has been put in place and is currently accessible from the various operating locations. The company has implemented a wide-area network linking its Bulawayo operations with those in Harare. A local area network is also now in place in Harare. Organisationally, Datlabs IT department is still emerging. It does not currently possess sufficient resident skills to effectively deploy the systems envisaged in its IT strategy.

Zesa's implementation of computer-based strategic information systems is by far the most advanced, extensive and complex of the three cases studied. Most of the key operational and support systems have been deployed across the authority and there are well-developed processes for expanding the deployment of future systems. Zesa's IT department has achieved a fair amount of organisational maturity and has confidence in its ability to implement IT systems proposed for the future.

8.2 Summary of the Cases

♦ Zimbabwe Electricity Supply Authority

The Zimbabwe Electricity Supply Authority is a large government-owned electricity generation and supply utility. Operating as a virtual monopoly, the company has operations spread across the country consisting of five power stations, five area offices and a number of district offices and depots. A major constraining factor for Zesa is its lack of commercial independence. All major decisions must be scrutinised and approved by the Government before they can be enacted.

Zesa desires to become a "world-class" electricity generating and supply utility. In its drive to improve efficiency and effectiveness in the delivery of services it has undergone significant changes in its structure and operations. To facilitate this, the company has implemented a large-scale, distributed computer-based information system. Zesa based its systems implementation on the MIS 1987 strategy developed by Price Waterhouse Management Consultants (Zimbabwe) in conjunction with the Zesa IT department. By June 1995, the major provisions of the 1987 strategy had been implemented. A new information systems strategy is being developed.

The new information system has allowed the authority significantly to improve its cash flow and service to customers. The consumer information system allows for customers to be billed in a more timely and accurate fashion and for payments to be receipted on-line. The improved collection of payments has reduced the borrowing needs of the authority.

Financial statements are now being produced shortly after the end of the month. More time can now be spent on analysis.

Since 1987, Zesa has developed a crucial capacity to define and implement new computer-based information systems. It has highly qualified IT staff, most of whom have remained with the organisation throughout the life of the project. The scope and success of the project itself has provided some motivation and incentive to staff to remain with the organisation. Retaining and developing the current team will be an enormous challenge to managers, however. The skills that have been developed over the years are now highly marketable.

Currently, Zesa has not instituted a systematic way of acquiring, retaining and disseminating new knowledge about information technology and computer-based information systems. It is very dependent on IT suppliers and consultants for information. It needs to improve this situation to enable the authority to become more discriminating in its choice of technologies and solutions.

♦ Datlabs (Pvt) Limited

Datlabs (Pvt) Limited is a pharmaceutical manufacturer that is wholly owned by Adcock-Ingram (Pvt) Limited of South Africa. It operates in an industry characterised by competition from both local and international sources. During the UDI and immediate post-independence periods, Datlabs operated in a protected market. Since 1992 the company has had to deal with increased competition from foreign pharmaceutical vendors. This presents an immense challenge to company managers.

Datlabs' overall business strategy is focused on becoming a low cost producer of pharmaceutical products and "getting closer to the customer". This means being able to control the costs of production and to provide quality products to satisfy the requirements of customers. The company has determined that a computer-based information system is an essential part of its bid to remain competitive. The Datlabs IT strategy envisages the

deployment of key operational, support systems as well as inter-organisational systems such as EDI. So far the whole implementation process has been beset by severe problems. Much of the blame for this rests with the IT vendor which has not delivered systems and services as promised. Although the new MIS manager has been instrumental in getting some systems operational, the delays in implementation have caused much frustration among the Datlabs management and staff.

The company is quite dependent on the vendor because it does not have sufficient resident manpower and skills to carry out the implementation by itself. With only three full time IT staff there is not sufficient breadth of knowledge and experience within the company to tackle all the demands and challenges that derive from implementing the systems. The requirements of the IT strategy are not supported by a commensurate investment in developing internal IT competence.

Datlabs maintains a strong external link with its parent company Adcock-Ingram. This relationship could be exploited further to assist the company in developing its computer-based information system. The company has no formal IT information gathering, retention and dissemination mechanisms. It depends on the ad-hoc efforts of individuals such as the finance director and the MIS manager.

♦ The Cotton Company of Zimbabwe (Pvt) Limited

The Cotton Company of Zimbabwe (Pvt) Limited is a government-owned private company, engaged in the processing and marketing of cotton and its by-products. With the restructuring of the cotton industry in 1994, The Cotton Company now faces competition from other marketing organisations. To become more commercially focused, the company has undergone significant restructuring and reorganisation of its business.

In the face of new competition, The Cotton Company seeks to become a highly competitive, 'world-class', cotton processing and marketing company. One of its main goals is the efficient and timely servicing of its more than 150,000 cotton producers. A

computer-based information system is seen as imperative in assisting the organisation to achieve competitive service levels. The company has embarked on the implementation of a distributed, computer-based system using a dial-up system based on Windows NT.

The Cotton Company has faced a myriad of problems related both to an earlier failed implementation by a major IT vendor and the more recent failure of the MIS department to demonstrate a successful implementation of a proposed computerised system. After a protracted period of requirements analysis, the company is in the process of implementing the finance systems. The producer registry and stocks systems are being developed.

The whole implementation process was severely affected by the large scale turnover of staff in the MIS department. The loss of the former assistant general manager (MIS) and at least three staff members created a crisis of confidence in the ability of the department to carry out the IT strategy implementation. As a consequence of the problems faced, Coopers and Lybrand Management Consultants were called in to manage the entire implementation process. The situation has since improved dramatically with the hiring of the new MIS manager.

Top management in The Cotton Company have shown much commitment to the implementation of the IT strategy. They are willing to allocate the funds necessary to get the best skills and technology in place. They, however, face the challenge of keeping managers focused on the main goal of organisational transformation and profitability. Like the other companies studied, The Cotton Company of Zimbabwe's approach to IT knowledge acquisition, retention and dissemination is very ad-hoc and dependent on the initiative of individual staff members.

8.3 Findings and comparative analysis of the cases

The findings of the case studies are summarised in tables 8.1a, 8.1b, and 8.1c below. There are twenty-one findings in all. Table 8.1a presents three findings related to the organisational environmental context. Eight findings concerning IS-related resources are presented in table 8.1b and the remaining 11 regarding IS-related routines are contained in table 8.1c. The findings, when taken at face value, are not novel. While they are limited in their generalisability to other contexts beyond that involved in the study, they seem to indicate that organisations in Zimbabwe face similar problems and issues, when implementing computer-based information systems, to those faced by organisations in industrialised countries.

Table 8.1a Findings of the case studies: macro-environmental context

Variable	No.	Finding
Nature of the organisations	1	• The ownership and governance structure of an organisation influences its ability to make timely decisions in response to environmental and business demands.
National political, economic, and regulatory polices	2	• National political, economic and regulatory policies can encourage or inhibit the capacity of organisations to invest in computer-based information systems.
National IT infrastructure and skills base	3	• Deficiencies in the national IT infrastructure and skills base severely restrict the development of IT capabilities and create major distortions in the pricing of IT services.

The findings relating to the environmental context highlight the dominant impact of the context in directing the IS deployment agenda. Those concerning IS resources emphasise that successful deployment and exploitation of computer-based information systems is possible only as that appropriate and sufficient IS resources are put in place. Success in deploying and exploiting the systems depend on managers and personnel carrying out a variety of socially complex organisational routines.

Table 8.1b Findings of the case studies: IS-related resources

Variable	No.	Finding
IT Infrastructure	4	• The successful implementation of an IS strategy is dependent deployment of an appropriate and robust IT infrastructure.
Human Resources	5	• The probability of effective and speedy IT implementation increases when an organisation possesses a core group of highly competent and well trained IT staff who have a range of complementary business and technical skills.
	6	• An experienced IT/MIS manager, possessing well-developed business, project management and technical skills is pivotal to effective IT implementation.
Organisational IS/IT Competencies	7	• Organisational IS/IT competencies will develop only as staff, working as a team, successfully routinise effective and successful systems design, development, and deployment behaviours. Such competencies are developed and maintained more easily where the IT group is large enough to provide some overlap and cross-functionality.
Financial Capacity	8	• To sustain the development of IS capabilities an organisation must be able to access and allocate sufficient financial resources to acquire, maintain and update IT resources and services.
Organisational Climate and Culture	9	• Effective implementation of computer-based systems is promoted in a supportive organisational environment.
Organisational Linkages	10	• Partnerships with external organisations are important mechanisms for IS/IT knowledge transfer if these relationships are based on commercial interest, mutual trust and respect.
	11	• Successful and effective implementation of IT is made possible when a mutually trusting and supportive relationship exists between IT personnel and internal business managers and users.

The findings clearly support the notion, emphasised throughout this research, that no one factor is sufficient in guaranteeing the effective deployment of IT based information systems. There is significant congruence between the findings emanating from the research and a number themes emphasised in chapter one. By focusing on the strategic dimensions of IS capability as presented in table 1.6 we have been able to present a comprehensive and integrated view of the issues affecting successful IS deployment and exploitation. This is in contrast to approaches taken in a significant proportion of extant IS research, which tend to overemphise the contribution of one factor or another to effective IS deployment.

Table 8.1c Findings of the case studies: IS-related routines

Variable	No.	Finding
Information systems strategy	12	• A well articulated IS strategy, aligned to overall business strategy, is necessary to guide the effective deployment and exploitation of computer-based systems.
	13	• To attain organisational transformation, IS strategies must encompass more than the automation of support and key operational processes. They must address a re-examination of key operating premises and processes.
Establishing and developing the IS organisation	14	• The successful deployment of computer-based information systems is promoted when IS managers, operating at the most senior levels of the organisation, are able to influence the development and execution of IS policies and strategies.
	15	• Competitive financial remuneration is a necessary but not sufficient condition for retaining skilled IT staff.
Integrating computer-based information systems	16	• Top management commitment to the development and implementation of computer-based information systems is critical to project success.
	17	• The effectiveness of IT implementation increases when business unit managers assume ownership and full responsibility for IT deployment within their areas of responsibility.
	18	• Successful and effective deployment of computer-based systems is promoted if both supplier and client organisation possess well-developed IT and business integration skills.
	19	• Small, incremental successes in implementing systems build general commitment to IT implementation. Implementation failures de-motivates business managers, users and IT staff, decreases confidence in IT and reduces commitment to the implementation process.
Managing IT-enabled change	20	• Commitment to IT implementation will develop in organisations that are willing to invest in retraining and re-deploying staff affected by the organisational change process.
IS-related organisational learning	21	• Information systems capability develops as organisations consciously expand their IS -related knowledge base and take systematic steps to embed new IS knowledge into organisational memory.

In the next section each finding is presented and discussed. The discussion will concentrate on explicating key aspects of the findings through comparative analysis of data from the case studies. We begin our discussion with findings relating to the environmental context.

8.3.1 Context

♦ Nature of the organisations

Finding 1:

The ownership and governance structure of an organisation influences its ability to make timely decisions in response to environmental and business demands.

Table 8.2 Comparative data : nature of the organisations

Research Dimensions	Research Elements	Zesa	Datlabs	Cotton Company
CONTEXT	Nature of the Organisation:	Government Parastatal, Public Utility . Technically oriented organisation with operations spread country-wide 7000+ employees 1993 Revenues Z$1.46 Billion	Private, foreign-owned company Technically oriented with operations in Harare and Bulawayo. 350+ employees 1993 Revenues Z$64 million.	Private company, wholly-owned by the government Agriculturally based. Operations in 19 centres around the country. 1000+ full-time employees , 2000+ seasonal. 1994 Revenues, Z$710 million.

Table 8.2 presents comparative information on the nature of the three organisations studied. The data contained in the table highlight a number of differences between the organisations relating to their ownership and governance structure, their size and composition and their revenues. Although each of these factors affect the development of information systems capability in some way, the case studies have accentuated the consequential impact of the ownership and governance structure on the decision-making capacity of the organisations.

A privately owned organisation, such as Datlabs, is free to make decisions in response to its own commercial interests. When the managers of Datlabs realised that they had made inadequate provisions for IT in the 1994/95 budget, they were able to reverse this in mid-stream, allowing the MIS manager to draft a supplementary budget.

This was approved by the directors of the company without any significant delay. In contrast, both Zesa and The Cotton Company are mandated to refer all major procurement decisions to the government. IT procurement intentions must be referred to the Government Tender Board and must follow tendering procedures stipulated by it. The decision of what to purchase is not necessarily made on the basis of the best solution but often on what is cheapest or politically expedient. The tendering process can often be quite long and difficult. It can take more than a year to make a decision follwing the submission of the bids. By the time the decision is made the requirements and technology might have changed drastically. The inflexibility of the tendering process makes it virtually impossible to adjust quickly to new situations.

Government owned entities may also be required to execute mandates of a social and political nature. In many instances they must carry out the government's economic, political or social agenda which may conflict with strictly commercial considerations. Two examples emerge from the case studies. Zesa is tasked with carrying out the mandate of providing electricity for all Zimbabweans by the year 2000. This is an ambitious agenda which cannot be justified on normal commercial grounds. However, the company must find ways to make this goal attainable. There is also the example of The Cotton Company being required to subsidise cotton spinners to enable them to sell their products competitively. This action significantly undermined the profitability of the company.

The differences in ownership impact the human resources and compensation policies of the organisations. In private companies these policies are more closely aligned to what the market demands. Government practices in these areas are stipulated by the public service regulations. These regulations govern human resource and compensation practices in the whole civil service. As they are currently implemented, they tend to give very little discretionary room to local managers in the hiring and compensation of employees. This reduces the flexibility local managers have in crafting the required IS organisation.

♦ The macro-environmental context

There are common features in the external environment that affect all organisations in Zimbabwe. These may affect individual organisations positively or negatively. They also impact upon local organisations' capacities to effectively deploy computer-based information systems. The character of the impact is dependent on the nature of the organisation, its business objectives and its internal capacity to pursue these objectives. Three specific areas of significant impact will be focused on here. These are: the impact of the economic structural adjustment programme (ESAP) and its underlying features of trade and currency liberalisation; the current state of the technical IT infrastructure in Zimbabwe; and the availability and capacity of local IT personnel. These have been discussed in detail in chapter 4. The impacts are compared in Table 8.3.

• The effect of national political, economic, and regulatory polices

Finding 2:

National political, economic and regulatory policies can encourage or inhibit the capacity of organisations to invest in computer-based information systems.

Lederer and Mendelow (1990) assert that changing government regulations have significant effect on IS management. This emerged quite emphatically in the cases. The economic environment in which all three organisations operate is characterised by significant and far-reaching structural changes brought about by the economic structural adjustment programme (ESAP). The programme has three major objectives: liberalisation of the economy, removal of foreign exchange controls and reduction of government participation in the economy. The details of the programme's major objectives have been presented in chapter 4.

The liberalisation of the economy combined with the relaxation of foreign exchange controls have created a new, more flexible and attractive operating climate for most businesses. When compared to a few years ago, companies find that they are able to take

economic decisions without an inordinate amount of interference from government. The liberalising of the economy is a two-edged sword, however. While companies are now able to operate with fewer restrictions they now have to face up to increased foreign competition. With the ready availability of foreign currency, potential and current customers are no longer dependent on local sources for the products they wish to purchase. They have the option of acquiring the product from various sources on the world market. To be able to compete, local companies, such as Datlabs, must offer products and services that conform to world-class standards. Local companies can no longer depend on excessive trade barriers to protect their markets.

The effect of the liberalising trends on the way companies operate is demonstrated in the current ability of companies to acquire necessary inputs and equipment without first having to justify these purchases, before the foreign exchange is released, to a myriad of government agencies. Datlabs, for example, had to go to great lengths to get the necessary foreign exchange to purchase computer equipment and services in order to implement its IT strategy. It had to include all the requirements of the IT strategy in a more extensive plan to build a new factory. IT was given very low priority in the allocation of foreign exchange under the previous restrictive regime. During that period many companies had to adopt extreme tactics, including resorting to the black market to get the necessary foreign currency to meet their IT requirements. The procurement of foreign exchange became such a strategic issue that it consumed the time and efforts of many company directors. In a number of instances company directors, in their efforts to secure foreign exchange, ended up in prison having been found guilty of contravening the exchange control laws.

During the period of strict foreign exchange control companies were virtually at the mercy of suppliers. In most cases they had to accept what was being offered by the IT suppliers. IT suppliers charged very high prices for less than adequate equipment and services. In the new regime, the companies have access to the best and latest technology. They are now able to purchase equipment and services internationally off the technological shelf in much the same way as organisations in other countries. There is no tedious process of justifying the purchases. In this new scenario, the three companies are not confined to

procuring equipment and services available locally. While they prefer to acquire locally supported hardware and software, they are more focused on getting the products that suit their needs best. The new liberalised foreign exchange regime give them new opportunities to more satisfactorily fulfil their IT needs.

Table 8.3 Comparative data : the macro-environmental context

Research Dimensions	Research Elements	Zesa	Datlabs	Cotton Company
Macro-environmental Context	Socio-economic situation	Intense external pressure to operate on a commercial basis. Highly regulated industry, obligated to executing government policy in the energy sector. More freedom to source inputs internationally.	Increasing competition from foreign and local companies. Customers have greater choice of pharmaceutical suppliers both locally and internationally. More freedom to source inputs internationally.	Cotton industry has been deregulated. New competition. Company has been privatised, although all shares owned by government. More freedom to source inputs internationally.
	IT Infrastructure	IT service providers have limited skills in implementing large-scale information systems. Heavy dependence on foreign packaged software. Supplemented national data network with its own system.	Severe shortage of IT skills to implement manufacturing systems and EDI. Heavy dependence on foreign packaged software. Unreliable X.25 data communication services provided.	Limited local experience with PC-based distributed, on-line IT systems similar to the one proposed in the IT strategy. Deficient and expensive data communications network forced the company to implement a dial-up system.
	IT Personnel	Struggling to retain staff developed internally.	Poached MIS manager from supplier.	Lost staff to other companies with better conditions of service. Poached MIS manager from other company.

The transformation of The Cotton Company of Zimbabwe, from a parastatal monopoly to a private company facing competition, is a demonstration of the impact of the new policies concerning government's role in the economy. The privatisation trends makes it imperative for the former public companies to demonstrate their viability in the face of competition. They can no longer depend on the government to pick up the losses that they incur. This has forced the companies to take a serious look at the way they do business. They are forced by the new circumstances radically to improve their efficiency and effectiveness in delivering products and services to the market. Even a company such as Zesa, though still a parastatal, is being forced by a stricter policy regime to operate on a

commercial basis. There is no automatic expectation that losses will be absorbed by the public purse.

♦ National IT infrastructure and skills base

Finding 3:

Deficiencies in the national IT infrastructure and skills base severely restrict the development of IT capabilities and create major distortion in the pricing of IT services.

Chapter 4 presented the challenges posed by the deficiencies in the IT infrastructure and skills base in Zimbabwe. These challenges reflect the situation prevailing in many developing country settings (Bhatnagar, 1992; Waema, 1996; Woherem, 1992). In pursuit of their business strategies Zesa, Datlabs, and The Cotton Company envisaged deploying distributed, end-user computing environments. With operations spread across the country, good access to reliable telecommunications facilities becomes a crucial requirement. While significant investments have been made in improving the local telecommunication infrastructure, the current system provides adequate service to only a small segment of the country and its population. Basic telephone service is available in the cities and towns. Even here, however, the infrastructure on which these services depend is woefully inadequate. There are long waiting lists for basic voice services.

Establishing wide-area networks require extensive and reliable telecommunications. Datlabs currently has operations in the two major commercial centres of Zimbabwe, Bulawayo and Harare. One would expect that the telecommunication facilities between the two locations would be adequate. However, Datlabs has experienced problems resulting from unreliable packet-switching service. Datlabs' proposal to develop electronic links with its customers and suppliers will be severely hampered by the inadequate and unreliable telecommunications. Customers, such as hospitals and pharmacies, will need reliable data lines over which to transmit orders and queries. The availability of such lines are not guaranteed in the near future.

The Cotton Company's plan for a distributed, on-line, real time network was found to be ambitious given the state of telecommunications facilities. This was complicated by the fact that most of the cotton processing depots are located in rural or semi-rural areas. These areas are currently inadequately served by telecommunication facilities. The cost of putting dedicated leased lines to these sites have proved to be prohibitively expensive and impractical. As a result, The Cotton Company has had to carefully reassess the strategy promulgated earlier. They have implemented a dial-up network in the interim.

To overcome some of the inadequacies of the telecommunication facilities, Zesa has over the years built its own network using power line carrier (PLC) methods. However, the network does not extend to every part of the country and some areas must be connected to the network using local PTC lines. Even if the internal network is extremely reliable, its reliability could possibly get downgraded at the point of interface with the PTC system. Most of Zesa's present telecommunications needs within metropolitan areas can only be fulfilled by the PTC. The company is therefore not immune from the inadequacies of the telecommunication system.

Evidence presented in chapter four suggested that attracting and retaining highly skilled IT personnel is a very difficult problem for Zimbabwean organisations. As indicated, companies must be willing to pay superior salaries in order to attract and retain the best IT people. Zesa faces the tremendous problem of holding onto the highly skilled IT people it has so painstakingly developed over the years. Although it has not experienced significant losses of personnel over the years it is in a very vulnerable position as far as retaining its staff is concerned. As a public sector entity it is not able to offer salaries comparable to those offered in the private sector. It has, however, been able to retain most of its staff despite its comparatively weak position.

Both Datlabs and The Cotton Company successfully poached their IS managers from other organisations. They had to offer very good compensation packages to the persons they were able to attract. Poaching has it drawbacks, however. A company which

has engaged in it becomes very conscious that it can be on the receiving end of a similar action in the not too distant future. Datlabs managers have expressed the fear that they could lose their own IS manager through this means. They are actively taking steps to win his long term commitment.

Although the movement of IT personnel is a good way of transferring skills and knowledge, the uncertainty and upheaval caused by unplanned movement of people can reduce the level of commitment companies make to developing their own staff. Many companies are reluctant to invest in higher level training for staff. They fear being used as a training ground for other companies. Datlabs experienced this when all the people trained in running the production management system subsequently left the company for 'greener pastures'.

8.3.2 IS-related resources

♦ IT infrastructure

Finding 4:

The successful implementation of an IS strategy is dependent deployment of an appropriate and robust IT infrastructure.

All three organisations have operations distributed across the country and therefore needed to establish some type of wide-area network to fulfil their information sharing needs. In the case of Zesa and Datlabs, the choice of technology, to a large extent, was dictated by the choice of supplier. The Cotton Company followed a different path. It actually specified the technology before choosing a supplier. Zesa chose Unitech, the local IBM dealer as its supplier. As a consequence, it was supplied with IBM equipment and software products that supported that equipment. It also implemented the IBM SNA network architecture. Datlabs chose another major IT vendor because it offered the best financing package at the time. The technology supplied was a proprietary unix-based minicomputer system. The technology selected by The Cotton Company was microcomputer-based.

Table 8.4 Comparative data: IT infrastructure, human resources and IS/IT competencies

Research Dimensions	Research Elements	Zesa	Datlabs	Cotton Company
IS-related Resources	IT Infrastructure	IBM AS400, WAN, distributed end-user environment Modified packaged software covering a range of operational and support applications. Some bespoke systems. Rudimentary EIS in place. New systems proposed targeting office and process automation.	Minicomputer, unix , link between factory and head- office. Packaged software for finance and production management systems. Proposals for EDI and office automation.	PC-Based, dial-up WAN based on Windows NT. Packaged software for finance systems. Bespoke development using Oracle for other systems. Operational and support applications are currently targeted.
	Human Resources	Large, well-educated and experienced IT staff. IT experience fairly well distributed among staff.	Small staff, with significant disparity in IT skills and experience between IS Manager and staff.	Small , well educated staff complement, not expected to grow beyond six people. Very experienced MIS manager in place.
	IS/IT Competencies	Ability to independently carry out large-scale systems analysis, design, development and implementation. Ability operate and maintain large distributed WAN. Competencies too narrowly focused on IBM architecture.	No real system development capability. Most competence in troubleshooting and operations. Limited networking and data communication skills. Most competence tacitly held by MIS manager and finance director.	IS systems development and project management skills are mostly held by the MIS manager. Some networking and data communication competence held by one member of staff. No current competence in working with Oracle.

The year in which the system was procured also played an important role. In the case of both Zesa and Datlabs the systems were procured prior to the removal of many foreign exchange restrictions. The companies did not have the luxury of shopping around for the best available technology. They were restricted by the circumstances accept the best available overall package that would satisfy the requirements. The Cotton Company, in contrast, procured its systems in 1995. By this time restrictions on foreign currency had been significantly reduced. The company was not obliged to focus locally. At the same time, significant developments in PC-based technologies had taken place. PC-based systems had developed to the point where they could replace mini-computer systems. They also had more flexibility and were widely supported by a variety of vendors. Clearly, if both Zesa and Datlabs were choosing their technology today, they would more than likely make different choices.

The Cotton Company's ability to implement a dial-up network as a substitute for one based on dedicated leased lines owes much to the network operating system it has implemented. Windows NT is designed to operate effectively in dial-up and dedicated modes. It can support a range of implementations from the single user to the corporate network. The IBM AS400 and the minicomputer systems are geared to supporting corporate networks. They both lack the inherent flexibility of the Window NT based systems. They, however, provide more robust integration and security.

The choice of hardware platform has to a large extent dictated the software options open to the companies. The PC platform is supported by the widest range of software. With hundreds of millions of PCs installed world-wide, software developers are more likely to target this platform rather than the more restricted ones. Even if software is developed originally for another platform it is likely to be ported to the PC environment as soon as practicable. The AS400 is widely used in corporations around the world and therefore has a fairly good range of software available for it. It is very robust and proven technology. IBM has continued to develop and support the product range, bringing out new models and incorporating increased functionality and newer technology. Zesa is planning to upgrade its current systems to the new range. The minicomputer is more limited in its installed base and therefore has more restricted software options.

All the companies have taken a two-pronged approach to software acquisition. They have implemented packaged software where such software is able to meet their requirements without extensive modifications. Bespoke development of software is undertaken when either no alternatives are readily available or the capacity to develop the system in-house or locally is available at reasonable costs. The use of new relational database management systems such as Oracle is making bespoke development of simpler systems more practical. Hence, The Cotton Company opted to install the Oracle database server platform and plans to do most of the required bespoke development, in-house.

In choosing the PC platform, The Cotton Company is able to implement all its requirements using the same network equipment. To implement effective office and process automation, both Datlabs and Zesa will have to set up separate, PC-based, local area networks. While the PCs can serve as terminals to the corporate network through emulation, the mini-computer terminals cannot operate as PCs. They have very restricted and limited functionality.

♦ Human Resources

Finding 5:

The probability of effective and speedy IT implementation increases when an organisation possesses a core group of highly competent and well trained IT staff who have a range of complementary business and technical skills.

One factor that distinguishes Zesa from the other two companies studied is the number and quality of its IT staff. Zesa has over twenty IT personnel in its corporate IT department. This does not include staff performing IT work in area offices and power generation plants. By contrast Datlabs has only three members of staff directly involved in IT work while The Cotton Company currently has only five.

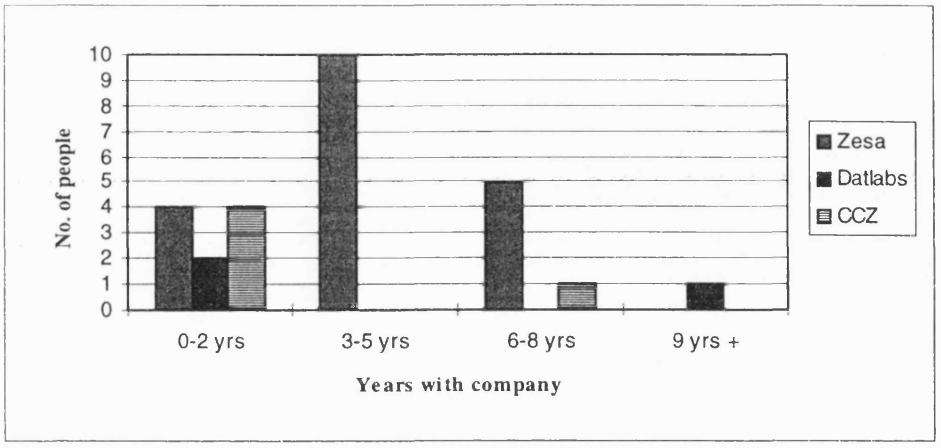
When it was initiated in 1993, The Cotton Company's IT department was expected to grow rapidly to at least 11 highly skilled and experienced IT people. The department was led by a competent and experienced manager and new staff had been recruited. The subsequent turmoil in the department led to the loss of four top level people. The loss of staff caused a setback to the company's IT implementation plan. The hiring of a new MIS manager has introduced a substantial amount of IT development and management competence into the organisation. The new manager does not plan to increase the staff beyond one other person with Oracle systems development expertise. He feels that with new, easy to use tools, systems development and implementation would be less arduous and require less staff.

The size of the MIS department at Datlabs reflects deliberate management policy. At the moment the management does not anticipate the need for a larger staff. They feel that the high levels of skills within the company as a whole should make end-user computing much more possible. They fear being saddled with a large and under-used IT department once all the proposed systems are in place. Given the plans for the deployment and use of computer-based systems, it is quite evident that sufficient base skills are not present in the company. The shortage of highly skilled support staff places quite a heavy burden on the MIS manager, who though technically experienced in systems implementation, is relatively new to management. The MIS department at Datlabs would be more effective in carrying out the proposals of the IT strategy if it had at least two more people with skills and experience complementary to that of the MIS manager.

The current size of the IT department at Zesa adheres closely to the specification outlined by Price Waterhouse Consultants for the effective implementation of the proposed IT systems. Upon approval of the 1987 Strategy, Zesa moved quickly to recruit the necessary staff. As table 5.5 shows, most of the current staff are university graduates. All, except one, have at least a diploma in computer science or its equivalent. Most of the staff have developed their on-the-job experience while working at Zesa. As a consequence they have been able to grow with the systems that have been implemented over the last several years.

An important factor that underlies the differences in capability demonstrated in the cases is the length of tenure of IT personnel with the current employer. Figure 8.1 presents a comparison of the length of tenure of IT personnel with the three companies. In the case of Datlabs, for example, the figures are distorted by the length of tenure of one person who has spent about 15 years with the company. The other two members of the IT staff have been with the company for just over a year and less than a year, respectively. At The Cotton Company all, except for one person, have been with the company for two years or less.

Figure 8.1 Years of tenure of IT staff: comparison of Datlabs. Cotton Company and Zesa



The situation at Zesa is different from the other two companies. Most of Zesa's IT staff have been with the company for more than three years. Many of them have been with the departments almost since its inception. This has provided a good basis for the development of a competent IT team. The length of tenure of the IT staff with the company is quite unusual given the current experience in most companies in Zimbabwe. It is even more unusual when one considers that Zesa is a company in the public sector where pay and conditions of service tend not to be competitive with the private sector.

Finding 6:

An experienced IT/MIS manager, possessing well-developed business, project management and technical skills is pivotal to effective IT implementation.

The pivotal role of the IT/MIS managers was exemplified in all the cases studied. The IT manager at Zesa has been singled out by both the Unitech and Price Waterhouse as the key player in the successful implementation of the IT systems in the company. His general and project management skills created the conditions for the development of effective internal and external relationships. The IT manager at Zesa is qualified both in computer science and business. He holds an MBA from the University of Zimbabwe. Both the former and current MIS managers at The Cotton Company hold MBA qualifications. The project management skills of the new MIS manager was demonstrated in that he was

able to get the financial systems implemented within a short time of joining the company. Because of his abilities and experience the senior managers of Cotton Company felt they were able to dispense with the full time services of the management consultants. The MIS manager at Datlabs, although not as experienced as the other two, has also made a substantial difference to the company's effectiveness in deploying its IT systems.

♦ Organisational IS/IT Competencies

Finding 7:

Organisational IS/IT competencies will develop only as staff, working as a team, successfully routinise effective and successful systems design, development, and deployment behaviours and practices. Such competencies are developed and maintained more easily where the IT group is large enough to provide some overlap and cross-functionality.

Among the companies studied, Zesa has been most successful at developing organisational IS competencies. While both Datlabs and The Cotton Company do have certain IS competencies these tend to be proprietarily held by individuals rather than being heterogeneously distributed throughout the IT organisation. In the case of Datlabs, for example, most of IT competence is tacitly held by the IS manager. Since the department is very small there is little scope for developing broader competencies except as more functional business staff are drawn into performing more IT-related tasks. The Cotton Company has greater potential of developing organisational IS competencies. However, because of the numerous organisational problems the department faced in the recent past, it is still trying to develop into a cohesive unit in which knowledge development and transfer can take place. Individual competencies provide the main basis for implementation success.

The heterogeneous development of organisational IS competencies in Zesa can be attributed to a combination of factors. Prominent among these are: the size and composition of the IT department team, the relative stability and success of the IT team, and the nature of the IT project itself. As indicated earlier, the IT department is comprised of a very well-educated staff. Their relative success in designing and deploying a number of large-scale IT projects has resulted in the development of a fairly cohesive and well-

functioning work group. The nature and magnitude of the IT project has enabled Zesa's IT department to gain expertise in developing and deploying distributed, corporate-wide IT applications. They have also become experts at operating and managing a complex wide-area network. The expertise of the department is such that they are capable of acting as consultants for at least two major applications which they have implemented. These are the JBA financial package and the Daffron consumer information package. Zesa capabilities have developed to such a level that it, reportedly, has been approached by its IT vendor, Unitech, to join it in its bid to supply IT equipment, applications and services to a power utility in another African country.

Zesa IS capabilities are not vested solely in individuals. Should any of the staff, including the IT manager, leave, the department would be able to carry on with its work without much difficulty. One problem the department faces, however, is the fact that its capabilities are too narrowly tied to the IBM platform. It will need to broaden its IT knowledge base if it is to expand its IT/IS capabilities.

♦ Financial Capacity

Finding 8:

To sustain the development of IS capabilities an organisation must be able to access and allocate sufficient financial resources to acquire, maintain and update IT resources and services.

Adequate funding is crucial to the success of any IT project. Funding is not only necessary for the initial IT implementation but is imperative for the continued development and sustenance of the project. Zesa, Datlabs, and The Cotton Company have demonstrated their commitment to IT by allocating significant amounts of funds to their respective IT projects. The funds allocated by Datlabs and The Cotton Company are generally derived from local sources and form part of their overall capital budget. For both its initial and current IT projects, Zesa has been dependent on low cost financing provided by the International Bank of Reconstruction and Development (IBRD). Under the Power Plan III

project funds have been allocated to finance the development of the new IT strategy covering the period 1995-2000.

Table 8.5 Comparative data: financial capacity, organisational culture & climate, organisational linkages

Research Dimensions	Research Elements	Zesa	Datlabs	Cotton Company
IS-related Resources (contd.)	Financial Capacity	Dependent on World Bank funding for project implementation.	Able to fund IT strategy requirements from own funds.	Funding for IT strategy incorporated in capital budget.
	Organisational Culture & Climate	Conventional bureaucracy. Professional, collegial environment in IT department. Fairly high level of support for IT among management and staff.	High level of collegiality at managerial levels. Conservative, paternalistic style of management. High level of commitment to IT among managers. More muted support by staff.	Major effort underway to replace conventional bureaucracy with high performing business units. Some anxiety among staff. Strong top management commitment to IT. High level of commitment among finance staff.
	Organisational Linkages	Internal links formalised through user groups and steering committee. Strong links with IT vendor, Unitech. Formal links with other utilities being developed.	Internal links not formalised. Based mainly on personal contacts. External links strongest with parent company. Weak links with IT vendor.	Internal links are being formalised through application teams. Strong external link with consultants, Coopers and Lybrand. Tenuous links with IT vendors.

Zesa's dependence on external financing does not augur well for the long term sustainability of IT implementation and development within the company. After making such significant investments in IT, the company may well find itself unable to progress should external funding dry up. IBRD financing is also subject to the government being able to meet the conditions outlined. Zesa's ability to make future investments in IT could be held hostage to any difficulties that the government may have with the international financial institutions. If computer-based systems are to become part of the fabric of Zesa's operating environment, funding for its deployment and enhancement must be incorporated into its regular operating and capital budgets.

♦ Organisational climate and culture

Finding 9:

Effective implementation of computer-based systems is promoted in a supportive organisational environment.

All three organisations are extensively engaged in efforts to change their business and operating culture. These efforts are made more urgent and crucial by the significant political, economic, social and technological changes characterising the macro-environment in which the businesses operate. IT is seen as a major catalyst for change in all three cases. The implementation of computer-based information systems is vital to the achievement of organisational objectives.

A supportive organisational environment is essential to effective implementation of computer-based information systems. The creation of such an environment begins with top management. Overall support for the implementation of computer-based information systems is high among top managers of all the organisations. The managers are not only supportive but are involved in more concrete ways. Each corporate director at Zesa, for example, is directly responsible for information systems implementation in his functional area of responsibility. The finance director and other key managers at Datlabs are involved in the oversight of the IT budget and the IT related activities of their divisions. At the Cotton Company the MIS manager along with the corporate services director and the general manager provide guidance to the IT implementation project.

Top level support is not easily translated to lower levels in the organisations which are more likely to be affected by the changes brought about by the deployment of IT systems. Finance managers and staff at Zesa opposed initial attempts to implement new systems. This contrasts with the situation at both Datlabs and The Cotton Company whose finance departments are at the forefront of new systems implementation. The difference arises out of the implementation approach taken. In Zesa's case the new systems were being

imposed because of the perceived failure of the department to get the job done. In the other cases, the new systems were being demanded by the departments.

Resistance can be broken down by mutual trust and respect. However, managers sometimes have to take the extreme measure of removing the obstacles. This was necessary at Zesa. Uncompromising managers and accountants were replaced by others who had worked with computerised systems and who were more supportive of the systems implementation process.

♦ Organisational Linkages

Finding 10:

Partnerships with external organisations are important mechanisms for IS/IT knowledge transfer if these relationships are based on commercial interest, mutual trust and respect.

Finding 11:

Successful and effective implementation of IT is made possible when a mutually trusting and supportive relationship exists between IT personnel and internal business managers and users.

Contractual obligations or ownership arrangements created the basis for the most significant IS-related external links developed by all three companies. Zesa's strongest external link was with its IT supplier, Unitech. Datlabs' most significant external relationship is with its parent company, Adcock-Ingram. Adcock-Ingram has much more advanced computer-based systems. Both organisations are working to co-operate more closely in the future. The Cotton Company has strong relations with the management consultants, Coopers and Lybrand, which act as advisors to the company.

The character and quality of the relationships are different for each partnership. Zesa and Unitech's relationship was based on mutual obligation and a desire to carry out a

successful implementation of the IT systems. Both organisations had much to gain from success and a lot to lose if the project failed. The relationship between the two organisations was such that Unitech actually implemented significant changes in its own management structure in order to effectively serve Zesa which was its major client. The poor relationship between Datlabs and its IT vendor and The Cotton Company and the same vendor contrasts both in the quality and effectiveness with that enjoyed by Zesa and its supplier. Datlabs and its IT vendor endure an unhappy marriage. The Cotton Company divorced its previous IT vendor at a cost of Z$1 million.

Zesa, among the three, was the only one that has pursued other significant links that were not contractually based. They have sought to develop professional links with IT departments in other electricity utilities such as ESKOM of South Africa. These links are being expanded throughout the region. Most other external links come about through personal initiative. IT staff in all three companies have their own personal networks of contacts that they can draw on. These links are mostly informal.

Formal internal links are most well developed at Zesa through the various committees and user groups. At Datlabs, internal links are more personal and collegial. This reflects the character, size and culture of the organisation. The character of the links also reflect the fact that IS implementation is carried out in a more ad-hoc fashion than would be the case in larger organisations such as Zesa. At The Cotton Company, formal internal links are being created between the MIS department and the functional departments and business units. These are being achieved through the application teams that have been put in place. Personal links with individual managers and staff are also important.

8.3.3 IS-related organisational routines

♦ **Strategy**

• **Information systems strategy**

Finding 12:

A well articulated IS strategy, aligned to overall business strategy, is necessary to guide the effective deployment and exploitation of computer-based systems.

The new competitive dynamics brought about by the economic structural adjustment programme and the general move to liberalisation of world trade has forced companies in Zimbabwe to rethink and restructure their entire approach to doing business. An enduring theme in the strategies of the three companies is that of becoming "world-class" in the products and services delivered to customers. While what is considered "world-class" may differ from company to company, there is the persistent idea that companies cannot expect to get away with bringing inferior products and services to the market. As a consequence, two major factors underpin the information systems strategy of all three companies: the intense need for more timely and reliable corporate information and the need to deliver more effective customer service.

All three organisations have engaged in extensive corporate strategic planning. Zesa and The Cotton Company, in particular, have initiated a number of planning exercises that are designed to help transform the way the companies operate. While the need to deploy computer-based information systems has been assumed in all the cases, a careful link between overall business and IS strategies has not always been made. One well-articulated prerequisite for successful information systems implementation is the requirement that IS/IT strategies should be closely aligned with overall business strategy (Galliers, 1993; Kovacevic and Majluf, 1993). The information system is not implemented for its own sake but is developed to serve the business needs of the organisation in which it is deployed.

Zesa's MIS 1987 strategy was developed in the absence of a formally articulated corporate strategy. The Cotton Company's IS strategy comprises an amalgam of a number of initiatives which have evolved over time. The link with corporate strategy can be traced more readily in managerial action than in what has been formally articulated.

Senior managers and IT personnel, in each of the companies studied, were clearly acquainted with the concepts of strategic fit of IS/IT strategy with corporate business strategy. There have been instances, however, when this theoretical understanding is not effectively translated into practice. Datlabs provided a classic example of this when it made inadequate provision for its IT needs although their corporate business plan intimated a large IT component. The extent of Zesa's awareness of the need to integrate business and IT strategies is reflected in the following statement by the IT Manager.

> The Authority is now preparing for the next phase of the computerisation project which is to be funded under the Power III Project. This will commence this year, 1995 with a review and update of the 1987 IT Strategy. The outcome of this exercise will be the formulation of a new 1995 Strategy. The new strategy will be closely aligned to the new Zesa Business Plan which should be finalised by mid-1995. (Zesa, 1995, p.2)

The extent to which this awareness is translated in actuality will be demonstrated when the plans are promulgated.

- **Transformation rather than automation**

  Finding 13:

  To attain organisational transformation, IS strategies must encompass more than simply the automation of support and key operational processes. They must address a re-examination of key operating premises and processes.

All the companies identified the need for an information strategy and engaged consultants to help them develop such strategies. The resultant strategies, however, were heavily premised around computerisation. The strategies developed by both Datlabs and The Cotton Company narrowly focused on the automation of key support and operational processes. Zesa's strategy, for the most part, had a similar focus although attempts were made to address broader organisational issues. The narrow focus of the strategies reflects the technological imperative that underpin much of the conception of information systems. It also reflects the commercial interests of computer consulting organisations which stand to benefit from concrete implementations of software and hardware applications.

Scott Morton (1991) suggests that, in applying IT, organisations go through three stages in response to changing environments: automate, informate and transformation. (pp. 16-17). The automate stage is focused on cost reduction. This involves the automation of clerical and repetitive production work. The informate stage is characterised by the emergence of new information tools and new ways of using information generated as a by product of automation. "Knowledge workers" with new skills are required at this stage. In the transformation stage organisations make fundamental changes in the way they are organised and do business. They may even arrive at new ways of conceptualising their mission, market and products.

Because of the immediate problems of producing up-to-date information efficiently and on time, the IS strategies of the three organisations studied tend to emphasise automation of essentially clerical and accounting functions. Very little focus is given to the processes that underlie the documentation and recording of the business transactions. As a consequence, there is not sufficient demonstrable difference in the way things are done now. The significant productivity improvements expected with the introduction of computerised systems have not materialised to the extent anticipated. Zesa, for example, has witnessed an increase in staff rather than the expected decrease. Some of the increase can be explained by the fact that Zesa has now taken on additional activities that were previously outsourced. However, senior managers feel that the computerisation should have made the increase in staff unnecessary.

There is evidence that some informating is taking place. Quality assurance and marketing personnel at Datlabs are now making use of data captured in the financial accounting system to produce information related to their jobs. For example, quality assurance people find that they can now access and manipulate data themselves without having to depend on others to produce the information on their behalf. As a consequence, they are able to keep track of stock levels to avoid stock-outs and find that they are better able to respond to customer requests. At Zesa, staff in customer service areas can now deal more effectively with client queries because they are able to access client data covering a wider spectrum of activities.

After having implemented their initial strategies both Zesa and Datlabs are recognising the need to rethink and restructure the way they carry out their business. Zesa's new IS strategy will emphasise restructuring of business processes in recognition of the new operating and technological environment faced by the company. To this end, Zesa's IT department has developed a draft strategy that calls for its transformation into a strategic business unit. As a separate business it would offer IT services to the company on a fee for service basis.

♦ Establishing and developing the IS organisation

Determining size, composition and placement of the IS department within the overall organisational structure is a function of both the size and complexity of the IS project and management's conception of how much internal IT capability is needed to effectively carry out the project. In most instances, the determination of these factors does not follow any scientific principle. It is often based on the management's 'feel' for what the 'right' combination ought to be.

All the companies need to re-examine the composition of their IS/IT departments in light of the business and IS strategies they are pursuing. This is particularly urgent in the case of Datlabs and The Cotton Company. Both organisations' staffing approach appear to lack congruence with the espoused requirements for computer-based information systems.

There is a gap between what they hope to accomplish using these systems and the skills established to perform the required tasks.

- **Alignment of the IS Department within the organisational hierarchy**

Finding 14:

The successful deployment of computer-based information systems is promoted when IS managers, operating at the most senior levels of the organisation, are able to influence the development and execution of IS policies and strategies.

IT/MIS managers encountered in the case studies were second-tier managers reporting to a senior manager. Table 8.5 identifies the titles used and reporting relationships of the IT/MIS managers. Prior to its latest restructuring, The Cotton Company had an assistant general manager responsible for MIS. The amalgamation of the MIS and finance departments into the corporate services division has effectively downgraded the position of MIS manager.

Table 8.6 Title and reporting relationships of IT/MIS managers (December 1995)

Company	Title of person Responsible for IT	Title of Person Reported to	Committee Overseeing IT Policy (Composition)
The Cotton Company	MIS manager	Director corporate services	Board IT steering committee (Board members)
Datlabs	MIS manager	Finance director	Internal business unit (Directors and senior managers)
Zesa	IT manager	Senior manager corporate planning	Corporate IT steering committee (Directors)

In the evolution of IT departments it is not uncommon to find IT managers reporting to a line department such as finance. This is a common feature in many organisations in Zimbabwe since IT has traditionally been linked with financial data processing. At Datlabs the major initiative for implementing computer-based information systems has come from the finance department. The finance director was the major force behind the

computerisation project until the recent (1994) hiring of an MIS manager. This position has been strengthened recently. The MIS manager now serves as a member of the decision-making internal business unit which comprises directors and senior managers.

At Zesa, deliberate steps have been taken to keep the IT department from coming under the control of one of the functional divisions such as finance or consumer services. Although these divisions are two of the major users of computerised systems, it was felt that putting IT under one of them would constrict its corporate-wide vision. The IT department could end up being the exclusive servant of the operating division. IT at Zesa reports to the senior manager (corporate planning). This enables the department to assume a more proactive corporate role. With IT playing such a major role in Zesa's corporate transformation, its relationship to the corporate planning division ensures IT issues are incorporated into Zesa's corporate strategies. Plans to transform IT department into an strategic business unit are still under consideration.

The current placement of the MIS department under the corporate services division of The Cotton Company suggests a certain ambivalence on the part of the company as to where best to place the department. It reflects some frustration about the seeming lack of effective performance by the department when it had more autonomy. Putting it under corporate services is designed to add more high-level oversight. However, this may result in the department becoming more narrowly focused on the need for financial and administration systems.

The level of discretion that IT/MIS managers have in executing the IT strategies is one issue that surfaces when discussing the structure and placement of IT departments. From the researcher point of view, it seems that the autonomy of the IT manager at Zesa is severely constrained by the onerous organisational decision-making processes of the company. The proposed plans to convert the IT department into an independent business unit should guarantee greater autonomy and put it on a competitive basis with other IT service providers.

The level of autonomy that the MIS manager at The Cotton Company enjoys cannot be ascertained at the moment since the new set-up is in its early stages. What is clear, however, is that this will depend to a great extent on the incumbent executing his role effectively. At Datlabs, the finance director still has an over-riding influence on what happens in the IT department. The fact that the MIS department and its current manager are very new to the company is a major contributing factor here. Increased autonomy will depend on the success of the MIS manager in effectively managing his department and executing his responsibilities.

- **Recruitment and retention of IT personnel**

Finding 15:

Competitive financial remuneration is a necessary but not sufficient condition for retaining skilled IT staff.

The intense competition for highly effective and experienced IT staff and the commensurate shortage of such people in the general economy presents each of the companies with the concomitant challenge of recruiting and retaining such staff. Companies with high quality IT staff are in constant danger of losing them to other organisations which can provide better terms and conditions of service. At the same time, those wishing to recruit high quality IT staff must be willing to provide competitive salary and benefits packages. Datlabs and The Cotton Company were forced to engage in the common practice of 'poaching' an experienced IS manager from another company. This can be an expensive process. Both companies experienced immediate short term benefits. The long term is not secure, however. The companies are faced with the possibility of these managers being enticed away by even more lucrative remuneration packages. In fact, this is one of the reasons that led Datlabs to upgrade the position of the MIS manager.

Companies can opt to develop their own staff from within. This takes time and is very expensive. Many companies can produce a litany of examples of people in whom they invested much only to lose them to other companies. Most companies fear being treated as

a training ground for other companies. In a real sense, Zesa, up to this point, has succeeded in restricting the loss of staff it has developed. Both the IT manager and the senior manager for corporate planning feel that most of the IT staff have remained with the company because of the nature of the IT project. There is a real concern that the commitment of the staff cannot be sustained into the future without significant improvements in the conditions of service. Zesa faces a real dilemma as far as retaining IS staff is concerned.

IS staff in all the companies have concerns about their career development potential. Career path models for IS staff are not well developed in most companies. In many instances staff are unsure of where their careers are going. This is compounded by the relatively small number of career development and promotion options available in the IS area. In most other careers, promotion to a higher position means more pay and benefits. In Zimbabwe this could mean getting a company car or having access to housing loans, etc. IS staff at Zesa, for example, see very little potential of moving into the categories that would attract these additional benefits. Since there are only a few management positions in the IS area, most staff have very remote chances of ever getting into management. Their only option within the company may be to move into general management positions in other departments. The chances of this happening is very small. Many may see moving to another company as the only way of improving their positions. The companies will need to explore new options for compensating and promoting their IS staff that will not strictly follow a hierarchical system.

♦ Integrating computer-based information systems within the company

Finding 16:

Top management commitment to the development and implementation of computer-based information systems is critical to project success.

The drive towards the implementation of computer-based information systems in both Zesa and Datlabs was almost entirely a top management initiative. At Zesa, this

emanated from the overall programme for rationalising and improving the performance of the entire authority. There was substantial resistance to the idea in the early stages of implementation. Rather than being part of an overall strategic management programme, Datlabs efforts in implementing computer-based systems reflected a more general feeling among some top managers that the introduction of new systems would help improve productivity. This view was not endorsed, initially, by all the senior managers. At The Cotton Company, the introduction of new systems also emanated from efforts to create a more effective organisation. However, there was substantial agreement between top managers and functional managers about the need for the new systems. This was particularly the case with the finance area.

It is not entirely surprising that the initial introduction of IT systems in both Zesa and Datlabs followed an IT-driven approach. At Zesa, this was necessary to break down the resistance that came from many of the functional departments which did not want to change the way they were operating. The IT driven approach met substantial resistance and had to be abandoned before significant progress could be made. At the same time many of those resisting the changes either resigned or were dismissed. The failures experienced at Datlabs did not emanate so much from overt resistance but more from the inability of the implementers to get the systems functioning. Resistance was a more latent phenomenon that evolved because systems were performing poorly and unreliably. It should also be said that while the chief executive and finance director are champions for the introduction of the new systems, some of the other directors and functional managers are less sanguine about the it.

Finding 17:

The effectiveness of IT implementation increases when business unit managers assume ownership and full responsibility for IT deployment within their areas of responsibility.

The ultimate responsibility for the successful design, development, implementation and management of IT lies with organisational business managers. They can best understand the resources they have responsibility for and can apply them to day-today issues

(Boynton, et al., 1992). While certain technical tasks can be delegated to others both within and outside the company, business managers must effectively manage the processes for putting the technical and operational systems in place. Substantial user involvement and leadership is viewed by all the companies as necessary for successful implementation. This has always been recognised at The Cotton Company and accounts for the effectiveness with which the finance department has been able articulate its requirements. The setting up of application teams to guide the implementation and support processes is a bid to consolidate user participation and leadership and to ensure effective focus on user requirements. Zesa's organisation for user participation and involvement is the most extensive and formalised. The hierarchy of user groups, the IT project teams, and the implementation review mechanisms are all designed to ensure effective design and deployment of systems. Datlabs organisation of user involvement in systems design and development is more ad-hoc and less formalised. However, the extensive collegiality that pervades the organisational culture does compensate to some extent for the lack of formalisation. Business unit managers at Datlabs have still not taken full ownership of the systems affecting their area of responsibility. This may result from their lack of awareness and exposure to managing computer-based systems.

Finding 18:

Successful and effective deployment of computer-based systems is promoted if both supplier and client organisation possess well-developed IT and business integration skills.

Analysis of the IS implementation experience of the three companies highlight the fact that effective implementation is dependent on both the capabilities of the organisation and those of its IT suppliers. The experience of both Datlabs and The Cotton Company (during a prior attempt at IT implementation) show how an insufficiently capable IT supplier can make it almost impossible for a company, without sufficient access to technical IS/IT knowledge and IT project management skills, to effect successful implementation of computer-based information systems. The IT vendor signally failed in both cases to deliver

the solutions promised to the companies. This led to The Cotton Company cancelling its contract with the supplier, incurring a substantial loss of over a million Zimbabwe dollars. The experience of Zesa contrasts sharply with the experience of the other two companies. Although there were implementation problems, both the client and the supplier had sufficient internal capability to deal with the difficulties faced. Unitech also demonstrated a high level of professional commitment to its client throughout the whole implementation process. Both organisations worked very closely together and were able to positively address the implementation difficulties they faced. Datlabs' IT supplier was reported to demonstrate less commitment after the contracts were signed. Some systems had not been delivered more than two years after the implementation began.

Having a well developed IS strategy is a necessary but not sufficient condition for effective IT implementation. The case studies show that without significant internal IT project management skills, even the most well developed IS strategy will have difficulty being implemented. Again this was aptly demonstrated in the cases of Datlabs and The Cotton Company. The Cotton Company found on two different occasions that using highly qualified management consultants was not an effective substitute to having their own resident IT project management expertise. Both Datlabs and The Cotton Company found that implementation progressed significantly and more quickly when they hired experienced MIS managers. In the case of the Cotton Company, corporate financial systems were implemented within the first six months of the new MIS manager's tenure.

Finding 19:

Small, incremental successes in implementing systems build general commitment to IT implementation. Implementation failures de-motivates business managers, users and IT staff, decreases confidence in IT and reduces commitment to the implementation process.

The failures in implementing proposed computer-based systems at both Datlabs and The Cotton Company engendered much frustration among top managers and business unit managers. Managers at The Cotton Company were clearly frustrated by the lack of progress

from requirements specification to the implementation of concrete systems. The dissatisfaction may have contributed in some way to the assistant general manager (MIS) leaving the company. Managers at Datlabs began doubting the value of investing in IT systems because there was so little progress towards full implementation. The small successes achieved by the new MIS manager since his arrival have restored some measure of faith among business managers regarding the contributions computer-based systems can make to the performance of their work. The support and commitment of business managers to IS implementation is promoted when evidence of implementation success is produced. Managers are more willing to make extended commitment to IT systems if they can anticipate that the systems will be deployed effectively.

♦ Managing IT-enabled change

Finding 20:

Commitment to IT implementation will develop in organisations that are willing to invest in retraining and re-deploying staff affected by the organisational change process.

The introduction of computer-based systems at Zesa and The Cotton Company is part of a general programme of strategic and organisational change that has been undertaken by both companies. The whole change process is therefore being directed from the top and has the support, involvement and commitment of the top managers. Strategic change is evolving at Datlabs. Computer-based systems are expected to play a central role in the delivery of products and services. In the process of introducing change, senior managers in all the companies have been involved in a variety of change management activities. Zesa and The Cotton Company employed a series of international and local consultants to assist managers and staff in articulating, designing and enacting organisational change. Managers at Datlabs have been involved in activities organised and sponsored by the parent company, Adcock-Ingram. The net effect of all these activities is that senior managers are very conversant with the requirements and content of organisational change efforts.

The Cotton Company has attempted to involve a majority of its staff in change management training exercises. Approximately 80% of the staff have gone through such training. The same cannot be said for the majority of the staff at Datlabs and Zesa. Most have not undergone any change management training.

Resistance to IT implementation was most prevalent in situations where employees were concerned about the impact on their jobs and autonomy. This was the situation at Zesa during the early implementation. Latent or passive resistance is emerging at Datlabs because some staff are unsure of their positions. Clearly, top managers in all three companies are anxious to reduce staff. They must be careful about how this is accomplished, however. They need to ensure that staff are given attractive options that will allay fears they might harbour about the change. This may include offering retraining and redeployment alternatives. Datlabs has taken the step of offering voluntary redundancies to some staff. Several have taken up the offer.

♦ IS-related organisational learning

Finding 21:

Information systems capability develops as organisations consciously expand their IS-related knowledge base and take systematic steps to embed new IS knowledge into organisational memory.

Learning, in all the organisations, is more or less ad-hoc and incidental. Some of the companies, Zesa for example, have instituted mechanisms for learning about the implementation process and the challenges and opportunities associated with it. However, these learning interventions reflect a conventional understanding of what is considered best practice in IT implementation rather than forming part of a comprehensive organisational learning agenda. Various managers in the organisations are notionally aware that organisational learning is important. However, unlike concepts of strategic planning which are now widely understood and practised, concepts of organisational learning are essentially unknown.

Efforts to acquire, store and disseminate IS-related knowledge are unstructured and inconsistent. Knowledge acquisition is mostly a personal matter in all the companies, except as it relates to the specific products and systems implemented in the organisation. Most IT departments rely on their IT suppliers for information on products and services. In no case have the organisations developed structured and consistent mechanisms for acquiring, evaluating and disseminating IT-related information. This reflects similar findings by Clark (1990) in interviews with senior IS executives in the United States. There are no established information libraries or even subscriptions to a variety of vendor independent computer magazines. Attendance at local computer shows and conferences are encouraged but this depends on personal interest and availability of funds.

8.4 Summary

The case studies have highlighted a number of issues which have been analysed and discussed in this chapter. Twenty-one key findings resulting from the case studies and background data were presented. The cases were analysed and findings presented in relation to the three strategic dimensions of IS capability identified throughout the thesis, namely: contexts, resources, and routines. At the most superficial level, the successful design, acquisition, and deployment of computer-based information systems clearly is a complex undertaking. All the factors, whether regarded as elements of the contexts, routines or resources, are necessary elements in the development of organisational information systems capability. However, no single factor or limited combination of factors is sufficient to bring about a high level of such capabilities. All factors must receive appropriate attention if the organisation is to achieve success. Organisational IS capabilities were more developed at Zesa which had a large stable IS staff. It had a more constructive relationship with its IT supplier and has the appropriate organisational mechanism effectively to manage the implementation process.

The analysis of the case studies points to the fact that strategies for acquiring and deploying computer-based information systems are heterogeneous across organisations. Those organisations that give significant attention to the issues raised will be in the best position to develop the sought after capabilities. Managers should be aware that success in developing IS capabilities will require much organisational commitment. A purely dilettantic approach to any area of concern will undermine achievements in other areas.

The themes brought out in our analysis of the cases are not all entirely new if taken individually. In most instances they confirm many of the findings in other works, albeit in a different context. What we have achieved, that is different from most other approaches, is the integrated way in which we have been able to address the issues concerned with helping organisations to gain maximum benefit from their IT investments. By focusing on the strategic dimensions we have been able to avoid the pitfall of emphasising the contribution of one factor over another. This is consistent with our central theme which stresses the heterogeneous nature of IT implementations. The success of IT deployment is highly dependent on the circumstances prevailing in each organisational setting.

Our analysis of the case studies has demonstrated the utility of our approach to systematically addressing the key issues relating to the effective deployment of computer-based information systems. We have been able to provide a consistent way of treating the cases and presenting the subsequent analysis that can be find additional applicability in future case studies. Our approach could also be usefully applied in re-interpreting past studies. In chapter nine we present a comprehensive framework for understanding and analysing information systems capability that incorporates the approach developed so far. This is accompanied by a simplified proposal for IS capability building and an extensive discussion of how organisations can develop such capability.

CHAPTER 9

Building IS Capability

9.1 Introduction

In this research we have presented theoretical and empirical evidence to support the notion of information systems capability. This chapter provides an explanatory framework that will assist organisations intent on developing IS capability to: (1) gain an understanding of the key dimensions of IS capability development; (2) recognise and assess their current level of capability; and (3) suggest approaches to routinising effective organisational behaviours that can promote the development of IS capability. To draw attention to the issues raised we present a quick review of some of the key notions discussed so far.

In chapter one we defined information systems capability as an organisation's capacity to orchestrate the process of acquiring, deploying, exploiting and sustaining computer-based information systems in support of its strategic and functional objectives. An organisation that has substantial information systems capability is positioned to derive maximum benefit for the use of IT. We also identified three strategic dimensions of IS capability, namely routines, resources and contexts. Information systems capability was shown to have a variety of characteristics. IS capability tends to be firm-specific in nature. It develops in ways that are idiosyncratic and localised to a specific organisation. An organisation's routines, resources and contexts create a unique combination of circumstances and outcomes that cannot be exactly replicated in other firms. The development of IS capability requires the presence of a number of organisational factors. These factors, while necessary, are not, by themselves or in aggregation, sufficient to bring about the condition. IS capability develops in an incremental and evolutionary fashion and can be constrained or promoted by past decisions and investments. For example, investment in IT assets are necessary building blocks for IS capability development. However, the effective use of these assets are constrained by the particular setting and the competencies and commitment

of managers and organisational staff in deploying and exploiting them. Having the assets alone is not sufficient to bring about capability.

A significant proportion of the knowledge on which IS capability is built is tacit, embodied in people and organisational processes. Thus, having an experienced IS manager leave a company could create a huge knowledge gap that might not easily be filled. IS-related competencies possessed by individuals are as mobile as the individual in which they are embedded. Organisations face the possibility of losing specific capabilities if efforts are not made to codify tacit IS-related knowledge and incorporate them into organisational memory. Such knowledge, once captured into organisational, memory becomes organisational rather than individual knowledge. The possibility of the knowledge being lost to the organisation is significantly reduced.

Determining which IS strategy to pursue, the IS/IT architectures to adopt, the IT equipment and personnel to acquire is characterised by much uncertainty. Managers are constrained by their inability to effectively assess all possible scenarios and must therefore make decisions based on incomplete or uncertain information. In so doing they must accept a significant amount of risk. The situation is compounded by the incessant and dramatic developments taking place in the IT field. A decision that seemed entirely rational one week could prove injudicious in the following week.

IS capabilities developed in one organisation cannot ever be precisely replicated in another organisation. However, capabilities developed in one time frame or setting may be imitated or superseded by surperior capabilities, resulting from the application of new technology and skills. Organisations may acquire competitive advantages with respect to the degree to which their capabilities are inimitable. Organisations can find, however, that having invested in developing certain capabilities, they have become locked in paths of competitive disadvantage because their capabilities have been made redundant by new technologies and circumstances.

The central message that this chapter conveys is that an organisation cannot buy IS capability nor can it be acquired overnight. It must be developed internally and

incrementally. While it is possible to buy certain necessary resources and competencies (through outsourcing and other arrangements) it is not possible to outsource the organisational routines that are central to the co-ordination and integration of computer-based information systems. There is no point at which IS capability can be said to be fully developed. IS capability building is a continuous, dynamic process which evolves in anticipation of and in response to the opportunities and challenges presented in the organisational context. Simply accumulating the necessary IT resources will not lead to capability development. Indeed, there are numerous instances where organisations have accumulated the latest and best technology, have well-educated staff, and much money, and have still been unable to develop computer-based systems that appropriately serve business needs. Developing IS capability does not only involve the accumulation of the necessary resources. It also entails the enactment of organisational routines that provide the basis for co-ordinating, integrating and transforming organisational endeavour towards the attainment of substantial business value. Capability arises and grows as organisations, repeatedly and effectively, execute and refine their routines, acquire and deploy appropriate resources and become more prescient in translating their understanding of environmental opportunities and challenges into a precise agenda for action. Effective management and execution of IS-related routines is the source of organisational IS capability. Managers, therefore, have an essential role to play in deploying and managing IT resources and processes (Henderson, 1990; Mata, et al., 1994).

We have examined the concept of information systems capability by studying organisations operating in a developing country context. This has been beneficial to our research in that the concerns for the development of IS capability are heightened by the persistent and pernicious failure characterising organisational efforts in such setting to deploy and exploit computer-based systems. By studying capability in such settings we have been able to highlight the important part played by the macro-environmental context in defining paths taken by organisations in building IS capability.

9.2 A framework for organisational information systems capability

Figure 9.1 presents the proposed framework for organisational information systems capability. The framework portrays the inter-relatedness of the theoretical constructs introduced in this research. The three strategic dimensions of IS capability are presented in relation to three levels of IS capability (individual, work group and organisational). While the focus in this research is on organisational information systems capability, the model emphasises that organisational information systems capability is ontologically related to individual and group IS capabilities. An organisation is only as effective as the individuals and teams comprising it. Although organisations are more than the composite collection of individuals, no organisation would exist without individuals. Individuals are the primary unit in organisations. Knowledge, skills, aptitude and experience are all characteristics of individuals. Individuals design, programme, manage and operate computerised systems. The importance of individual capability was demonstrated in the case studies. Through the hiring of new IS managers, Datlabs and The Cotton Company of Zimbabwe significantly improved their capacities to implement their information systems. Without the right combination of individual competencies organisations will find it extremely difficult to execute the tasks dictated by their strategic plans.

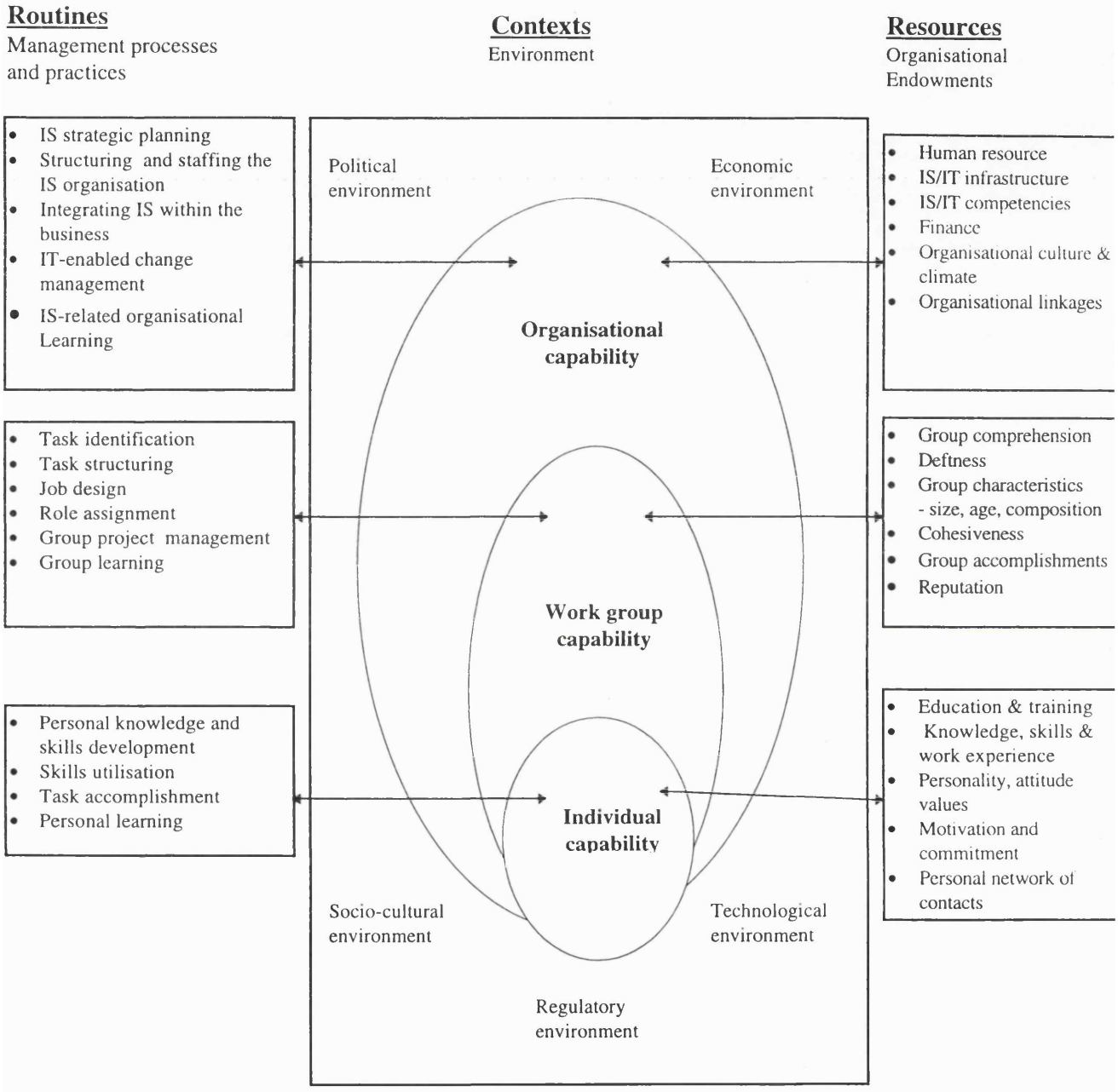
The case studies have shown that individuals, however capable and experienced, are limited in their capacity to carry out the full requirements of an organisation's strategic or functional objectives. Without the effective support and complementary knowledge and skills of others, a competent individual will find it difficult to make significant impact on organisational performance. Even though the IT managers in all three case studies are highly capable in their own right they could not have accomplished the tasks of deploying the information systems on their own. They needed the support and complementary skills of their own staff, top management, users and external partners. The multi-functional nature of organisations dictate that people work in partnership with each other as work groups or project teams to plan, design and execute various functions and projects. The development of work group or project team capability is related to: (1) the capacity of the group to understand what combinations of resources are needed to achieve the objectives and; (2) the

group's ability to create working relationships that allow for the effective execution of tasks necessary for achieving the objectives (McGrath, et al., 1995).

The framework depicts organisational IS capability as encompassing both individual and group IS capabilities. The depiction represents more than the simple aggregation of such capabilities. Organisational capability includes, yet transcends, individual and group capabilities. Such capabilities are not only manifested in the organisation's routines and resources, but are also resident in the unique corporate culture and network of relationships that characterise the organisation (Collis, 1994).

IS capability building is influenced by forces within the macro-environment. The experiences presented in the case studies gave apt recognition to the substantial impact of the environmental factors in influencing the decisions about making investments in IT. The model represents political, economic, socio-cultural, regulatory, and technological forces as key factors in the external environment. In building information systems capability organisations must be able to anticipate and respond with prescience to challenges and opportunities presented by the environments.

Figure 9.1 **Framework for organisational information systems capability**



9.3 Building IS capability

The characteristics of information systems capability identified in chapter one highlight the complex nature of the phenomenon. Building information systems capability

is therefore a very complicated undertaking. It requires the concerted and co-ordinated action of managers and other organisational members. Information systems capability is not simply an attribute of the IT department in an organisation. It is a characteristic of the entire organisation. computer-based information systems are normally designed to serve the entire business and therefore requires the involvement of all levels and functions to ensure their successful deployment and exploitation. The capabilities necessary to deploy, exploit and sustain such systems must therefore be invested in the entire organisation.

To build information systems capability organisations must engage in three strategic behaviours outlined below. They must

- establish and enact organisational routines that will ensure the effective co-ordination of the processes for designing, acquiring, deploying and exploiting computer-based information systems.
- acquire and deploy the organisational resources necessary for supporting such systems.
- develop a prescient understanding of the challenges and opportunities presented by the contexts in which they operate and how these affect the processes of acquiring and deploying IT resources.

These behaviours are not expected to be executed in linear fashion as presented above. They occur together in varying degrees of intensity depending on the stage reached in the capability building process. IS capability building must be conceived of as an inherently dynamic, adaptive, integrative and iterative process.

We do not intend to prescribe a 'correct' starting point or sequencing of events for IS capability building. We recognise that in real world environments organisations are at various stages of their IS capability evolution. The case studies presented examples of three organisations that are at different stages of IS capability development. Zesa, Datlabs and The Cotton Company have all made significant investments in IT systems. All three organisations have made decisions about strategy, technology and approaches. Staff have been hired and systems have been implemented. Contractual relations with suppliers and

other service providers have been formed. Rather than being sterile and neat, real world situations can be quite messy.

Decisions about making strategic investments in computer-based information systems are likely to begin with formal strategic planning where such formal procedures are entrenched as part of normal organisational routine. This was the case at Zesa and to some extent at The Cotton Company and Datlabs. Zesa went through a very long process of problem identification and requirements analysis before significant investment was made in acquiring IT resources. One should note, however, that in order to carry out the task of defining requirements Zesa had to make an initial investment in accumulating appropriate IT staff to manage and carry out the process. The company also had to put in some basic IT infrastructure.

IS capability building is conceived of as integrative, dynamic and iterative because no amount of planning will account for all the contingencies that are likely to arise over time. Managers can only hope to lay out a road map for achieving organisational objectives. The actual experience of pursuing those objectives will necessitate adjustments, refinements and even abandonment of certain preconceived notions and decisions. In their strategic planning exercises in 1994, managers at Datlabs thought they had made sufficient provision for IT resources in their 1994/95 budget. However, when the new MIS manager developed his IT plan to dovetail with what the company wanted to achieve over the next couple of years managers realised that the budget allocated was woefully inadequate. This led to a major revision of the IT budget for 1994/95.

In reality the three processes of establishing routines, acquiring and deploying resources and understanding the environment overlap significantly. The level of overlap increases with time. After the initial phase of IT implementation, organisations must constantly be engaged in reinterpreting environmental signals and refining and augmenting their routines. IT assets will need to be augmented and upgraded. Capital and operating financing procured. Changes will inevitably occur in the organisational culture and climate and internal and external partnerships will be developed and strengthened.

9.4 Establishing the IS-related routines

Organisational IS-related routines represent the practices and activities of management and non-management personnel in conceptualising, designing, deploying, managing and exploiting computer-based information systems. The pivotal role of information systems management processes has been extensively discussed in the IS literature (Scott Morton, 1991; Weill, 1992; Boynton, et al., 1994; Mata, et al., 1995). Each organisation develops routines, through the effective integration and co-ordination of organisational activities, that are important in ensuring the performance of organisational tasks. IS-related routines create the environment in which computer-based information systems are conceived, designed, deployed and exploited. The IS related routines adopted by the organisation help to define the organisation's IS culture and climate. This in turn has a decided impact on the ways computer-based information systems are subsequently deployed and exploited. IS-related routines do not fall into place overnight. They evolve as organisations gain more experience and adroitness in managing the process of deploying computer-based systems. The routines improve with time as organisations refine their IS management processes by engaging in structured organisational learning.

9.4.1 IS/IT strategic planning

Evidence presented in this research confirm the importance of a well articulated IS strategy as a necessary guide to effective use of computer-based information systems. Such importance is well documented in the IS literature (Brancheau and Wetherbe, 1987; Johnston and Carrico, 1988; Kovacevic and Majluf, 1993). Many researchers advocate a causal link between a well-developed IS/IT strategy and effective systems development and deployment. Classical strategic management research present strategy development and implementation as a somewhat sterile and linear process. It tends to ignore the complications presented by both the context in which strategy is developed and the content of the strategies themselves (Barney and Zajac, 1994). In the IS field, research on the strategic management of information systems adopt assumptions similar to those accepted in the wider strategic management field. They assert the primacy of the strategic vision as a

precondition for successful exploitation of computer-based information systems (Scott Morton, 1991). In such circumstances IS acquisition and deployment are expected to be preceded by a well-developed IS strategy which is closely aligned to overall business strategy.

In all three cases, attempts were made to articulate some type of IS strategy. What is evident from the case studies is that: (1) IS strategies are mostly focused on bringing about the computerisation of certain support and operational processes; and (2) the strategies are only tentatively linked to overall business strategy. IS strategy development in all three cases presumed computerisation. The links made to overall business strategy were either backward links made after computerisation was decided on (Datlabs) or informal links made in the absence of a formally articulated IS strategy (The Cotton Company). In the case on Zesa, the links between MIS 1987 strategy and overall business strategy tended to be predictive because they were developed in anticipation of a formally articulated corporate strategy.

Strategic IS planning also should be recognised as a very dynamic, adaptive and iterative process. It is not complete when a strategy document has been endorsed by top management. In effect, such a document is only the initial step in a continuous process. This is especially crucial given the dynamism of the IT sector and the volatility of the macro-environmental context in a country such as Zimbabwe. To effectively articulate a strategy that will be relevant to the changing requirements of the organisation, managers need to focus instead on creating a coherent IS strategic planning trajectory. This entails identifying the path along which IS strategy will evolve in the short and long term. This will move the focus away from prescribing finite solutions to challenges that are unstable, to creating a framework for tackling opportunities and challenges when they arise. In such a situation, Datlabs, for example, would not focus intently on trying to select a particular solution for its EDI requirement, but would instead concentrate on developing a framework within which an acceptable solution can be arrived at when needed.

Periodic formal reviews of the IS strategy are needed to ensure a consistent fit between espoused IS strategy and the strategic reality. Adjustments to IS strategy made by

all three organisations have been highlighted in the case studies. Although it is clear from the decisions taken that the adjustments have been made to cope with new situations and demands, these modifications have not necessarily been formally articulated. It makes it difficult, therefore, to translate a consistent strategic vision of information systems within the organisation.

Evidence presented in this research suggests that there is a gap between managers' espoused commitment to computer-based information systems as a transforming agent and what is actually done in practice. Senior managers' behaviours suggest some equivocation about using IT as a transformation tool. In many organisations the deployment of computer-based information systems is approached purely from a technological standpoint. The primary focus in such implementations is the automation of support and operational processes such as accounting and transaction processing. Such sub-optimal deployment of computer-based information systems have one of two explanations. First, it may reflect management's restricted understanding of the strategic role that computer-based systems can play in creating competitive business value. Management and others in the organisation may see the systems simply as technological artefacts, designed to carry out repetitive data processing tasks. No greater role for the systems is envisaged. Evidence for this emerged in the interviews reported in chapter four.

The second explanation is that managers may be reticent to accept the financial, organisational and political risks that implementing radical computer-based strategies would entail. This is especially the case in public sector entities and closely held private concerns. Managers in these organisations do not have the latitude to make far-reaching decisions without the consent of the government or the owners. In the case of Zesa and The Cotton Company all major decisions have to be referred to the government. Datlabs' managers take their lead from the parent company. Managers tend to be more cautious and less radical as a result of their circumscribed power to act.

Managers must avoid approaching the implementation of computer-based information systems in a half-hearted manner. They need to commit themselves and their organisations to cultivating a well-developed understanding of the role that computer-based

systems can play and devise effective means to minimise the risks that implementing such systems bring. To create IS capability, an organisation's vision and strategy for implementing computer-based information systems should extend beyond the mere automation of key operational and support processes. This is a key finding (number 14) emanating from the analysis if the cases. Evidence from the case studies show that although automation is a necessary first step, it may not be sufficient to bring about the long term business value anticipated by managers. Automation on its own may encourage the entrenchment of dysfunctional processes and structures. To create substantial value, organisations may have to engage in the re-conceptualisation and transformation of organisational processes and may have to restructure the mechanisms through which these processes operate.

9.4.2 Establishing and developing the IS organisation

A major decision that managers face when planning to deploy computer-based information systems relates to the type of IS organisation that will be required to carry out the demands of the propounded IS strategy. Such a decision is a non-trivial one since, once made, it will have a direct impact upon the ability of the organisation to carry out its IS strategy. Managers need to be aware that implementation success will depend to a large extent on the organisation's capacity to deploy the required managerial and technical IT competencies. Weak IS organisational arrangements (whether they are entirely deployed in-house or are provided through outsourcing arrangements) increase the risk of IS failure. The decision about the size of the IS organisation and the scope of its work cannot be made based purely on financial considerations. Finance is only one part of the overall equation. Organisations must deploy the necessary managerial and technical competencies in order to ensure the success of computer-based information systems.

The configuration in which these competencies are deployed, in terms of in-house or outsourced components, will depend on the type of IS project being undertaken and the degree to which the organisation is concerned with developing its own, in-house, managerial and technical IT capabilities. In a developing country context, like in Zimbabwe, this will also depend on the extent to which there are alternatives available in the local market. This

research has shown that managerial and technical IT competencies are in short supply in the local Zimbabwean factor market for IT services. Companies such as Datlabs and The Cotton Company are putting themselves at risk by relying too heavily on outsourcing arrangements. Finding 5 in chapter 8 highlighted the importance of organisations having a core group of highly competent IS people to promote the successful and effective deployment of computer-based systems. Organisations should develop their own internal competencies in at least three areas: systems analysis and design, systems development and integration, and network systems operations. At the very least this should mean three dedicated IT staff plus the IS manager. Where core systems, such as production and EDI are envisaged (as is the case at Datlabs), this could mean an additional person for each system. The staff should be organised in a multi-disciplinary fashion emphasising team learning and multi-skilling. Managers should be careful not to design jobs that militate against the objective of creating multi-skilled teams. For example, jobs making strict distinctions between programmer, analyst, operator, etc. will ensure that the intended multi-skilling and cross-functionality is not achieved. The organisations that fail to develop their own managerial and technical IT competencies, in situations characterised by extreme market failure for such knowledge and skills, will find it virtually impossible to carry out successful IT systems implementation.

Developing a core group with competence in the specialisms indicated above does not mean that the resultant IS department will carry out every job on its own. The use of outside consultants will still be necessary on specific projects. The objective is to provide the organisation with the capability to understand and manage the design and deployment of the computer-based information systems envisaged in its strategy. This internal capacity would help avoid the type of situation in which Datlabs and The Cotton Company found themselves in their early attempts to deploy computer-based systems. The lack of internal managerial and technical IT competencies left the organisations exposed to failure when their IT suppliers were unable to deliver the systems and services promised.

- **Determining the structure and alignment of IS organisation**

The well-known convention that structure should follow strategy is equally applicable when deciding on how to structure the information systems organisation within a business. Organisations must first identify the knowledge and skills needed to carry out the deployment of computer-based information systems and determine the extent to which those skills need to be developed internally or can be acquired through outsourcing arrangements from the local or international IT skills market. The IS organisation should be structured to make it responsive to the requirements of its business clients. The first step in this process is to ensure that the IS department is situated within the overall organisational structure such that the IS function has sufficient authority to carry out its responsibility without undue hindrance. The person in charge of corporate information systems should be positioned at a strategic level within the organisation. This will enable the IS function to develop a corporate vision of the role of computer-based information systems in attaining the strategic objectives of the organisation (Wysocki and Young, 1990).

The alignment of the IS department within the organisational hierarchy has been shown elsewhere to be a critical issue (Brancheau and Wetherbe, 1987). Its importance has also been demonstrated in this research. The issue of alignment is not simply about where the IS department is placed in the organisational hierarchy. It is more about whether or not its placement will allow the department to have sufficient authority and influence over the development and execution of IS policies and strategies (finding 14). From the interviews (discussed in chapter 4) and the case studies, it has been shown that senior managers in Zimbabwean organisations are reluctant elevate IS to the most senior business management levels. This is because such managers continue to view IS as more of a technical function rather than a core business function. To change this situation, IS departments will need to convince business managers that their concern goes beyond purely technical issues. Business managers on the other hand will need to insist, through various mechanisms, that IS broaden its involvement to focus squarely on overall business requirements. The fact that Zesa is considering setting up the IT department as a separate business unit suggests that some managers are willing to contemplate new organisational arrangements when the appropriate level of competence has been demonstrated.

The exact placement of the IS department, although important, is not as critical when the department has good partnership relationship with the business units. In such a relationship the professional expertise of the IS department is complemented by the business expertise of client departments. In that situation staff in the IS department act as internal experts, comprising part of a multi-disciplinary team. Managers should ensure that the IS function does not become the exclusive property of any one of the line functions. The type of arrangement that has emerged at Zesa and is being instituted at The Cotton Company demonstrate that the building of effective partnerships can overcome some of the problems of alignment.

- **Recruitment and retention of IS personnel**

Because of the immediate demands for effective implementation of computer-based information systems, most companies are anxious to hire experienced IT people. They are less willing to take the time necessary to develop their own personnel. Depending on the market to provide the skills needed in the organisation is not only expensive, but risky. Even if people are experienced, there is no guarantee that they will fit into the culture of the organisation they are joining. Integrating new people into an organisation takes time and effort. Managers should be careful not to expect miracles within a few months of hiring new staff.

The contrasting experience of Zesa and those of The Cotton Company and Datlabs show that, in terms of developing internal capabilities, it is more essential to hire on the basis of potential than simply on that of experience. Zesa was willing to 'grow' its own IT personnel and as a consequence has retained most of them. While experience should be valued managers should not become blinded by it. Experience can introduce certain rigidities into an organisation that make it difficult to address new demands. Experienced people might be more willing to implement systems in the manner that they have done them in the past rather than being willing to entertain new and more novel ideas about systems and their implementation.

As finding 15 in chapter 8 pointed out, retaining IT personnel goes beyond providing competitive financial remuneration. Focus on the motivational content of the job itself is extremely important. If jobs are not satisfying, IT personnel are likely to leave them for more satisfying positions. IT personnel are motivated by challenging and interesting jobs which provide them with opportunities to develop new competencies. They also are more interested in jobs that will provide opportunities for career advancement, in much the same manner as the jobs of colleagues in other functions within the organisation. If such opportunities are not forthcoming, organisations will experience significant turnover. One way to address the issue of career advancement opportunities is to rethink the way jobs are rewarded. Rather that compensating and promoting staff according to hierarchical positions, companies should consider rewarding staff according to expertise. Since expertise, rather than the capacity to manage a group of people, is the key criteria for success in the IS field, organisations should create various expertise levels to which each staff member can aspire. In such a situation, one does not get a company car only by becoming IS manager or chief systems analyst. One could get the same privilege by reaching, for example, the level of senior systems engineer.

It is clear that IS jobs will not always remain interesting and challenging. There will almost inevitably be some turnover. Not all turnover is bad, however. Turnover can be beneficial to the organisation if it is carefully managed. Judicious turnover of personnel provides organisations with the opportunity for injecting new ideas and enthusiasm into the IS function. It is also a good way of transferring knowledge. New people, even recent graduates, can infuse the organisation with additional knowledge and skills that would take a long time to develop otherwise. Zesa could probably now benefit from a small amount of turnover. Too much turnover, on the other hand, can weaken a department and leave an organisation bereft of the capabilities needed deploy and exploit its computer-based information systems.

9.4.3 Integrating computer-based information systems within the business

Integrating computer-based information systems into the business is a very complex issue that has been addressed by a number of IS researchers (e.g. Johnson and Carrico,

1988; Cooper and Zmud, 1990; Henderson, 1990; Markus and Keil, 1994). Apart from effective commitment and involvement of top management, an element that was demonstrated as necessary in this research, there are three factors that are essential for successful IT integration. The first has to do with the locus of responsibility for IT implementation and the second with the complementary IT integration skills of the client business and those of the IT supplier. The third factor has to do with building confidence in and commitment to the IT systems.

One key finding (17) from the case studies shows that effective integration of computer-based information systems is promoted in a situation where business unit managers assume full ownership and responsibility for the deployment and exploitation of IT resources within their area of accountability. In many cases the implementation of computer-based information systems is often pushed from the top. This has been the case at Zesa and Datlabs and to some extent, The Cotton Company. The top down approach, while necessary at the initial stages, is not sustainable. The systems will be successfully deployed and exploited only as managers and operational staff of business units take full responsibility for their implementation and management. This situation is made possible where top managers insist that business unit managers fulfil their information management roles. Business managers will be able to fulfil these roles to the extent they have a proper understanding of the role computer-based information systems are to play in the conduct of their day-to-day business. IT implementation should not be viewed simply as a job for the 'IT people'. Business unit managers should understand the role of the IS function within the organisation to be that of supporting the information management needs of business units through the provision of appropriate computer-based information systems.

For business unit managers to take responsibility for IT implementation they must be given the necessary authority to make IT investment decisions within the broad framework of an overall IS strategy. They should decide on what systems get priority, what systems are procured and how the implementation process is effected and managed. Business unit managers will resist systems implementation efforts that they have no responsibility for or control over. IS departments can improve the chances of successfully implementing the corporate IS vision if they make every effort to build effective and

mutually beneficial partnerships with business units. As the experience at Zesa shows, these types of partnerships are effective to the extent that IS departments and business units jointly share and exchange knowledge, resources and competencies. This sharing and exchange can be effected through the creation of project planning, design and implementation teams, secondment of staff from the IS department to the business unit and vice-versa, and most importantly, through the development of personal friendships between personnel from each function.

The training of business unit managers to understand and manage IT systems is an essential factor in creating the basis for successful functional management of systems development and deployment. Managers in the case studies were more or less expected to take responsibility for orchestrating the integration of IT systems into their departments without having been properly exposed to the intricacies of managing such systems. Most business unit managers, particularly those in settings such as Zimbabwe, have only a limited understanding of the technical and organisational characteristics of computer-based information systems. Most are essentially illiterate as far as such systems are concerned. Organisational managers and business unit managers themselves must ensure that substantial training in understanding and managing computer-based systems is incorporated into any systems implementation effort. This is essential especially in the initiation stages.

The experiences of the companies studied show that successful integration of computer-based systems into the business is dependent, not only on the IT integration competencies of the client organisation but also on the complementary skills of the IT supplier (finding 18). Since organisations, by and large, will lack the specific technological knowledge associated with the IT product that they are implementing, they have to depend on the knowledge and skills of the IT supplier. In many developing country situations IT suppliers lack the extensive product knowledge that is needed to support the requirements of their clients. These organisations may sell products for which they cannot provide effective support. The experiences of Datlabs and The Cotton Company highlight the difficulties organisations face when the IT supplier cannot deliver as promised. In the Zesa case, Unitech also lacked full product knowledge. In fact, the company's project team members learned to use the software products they recommended at the same time as the Zesa IT

staff. The major difference between Zesa's case and the others was that both the client and the supplier had the internal capabilities to master the products and both were committed to develop and share the knowledge gained. The same results were not possible in the early stages at either Datlabs or The Cotton Company because both companies lacked the internal capacity to deal effectively with the IT supplier at the technological level.

During the interviews carried out in Zimbabwe, general managers and IS managers alike suggested that the persistent failures of computer-based information systems had created a crisis of confidence in these systems among business managers. IS managers have also been accused of promising more than they can effectively deliver. The case studies confirmed this does happen. Some IS managers try to carry off a big IS project in one impressive flourish. This can rarely be done. Under the former assistant general manager (MIS) the MIS department at The Cotton Company failed to deliver a concrete IT solution, although much time had been spent on extensive requirements analysis. Business managers became frustrated by the apparent lack of progress in delivering concrete systems. This frustration could probably have been avoided if the MIS department had successfully delivered at least one working system. This would have given the business unit managers a taste of what to expect in the future. Zesa proved this point by systematically delivering IT solutions to all business units in an incremental fashion. Although Zesa also went through a long gestation period between systems planning and implementation, its IT department was able to implement the solutions and deliver good results fairly quickly when the systems were deployed. The IT department did not have very anxious clients in the early stages, either. Business units like the finance department were being forced to implement the systems. In contrast, the finance department at The Cotton Company was driving the systems implementation process.

Successful projects evolve over time. The old axiom that success breeds success must be taken to heart by IS managers. The research has shown that business managers gain confidence in IT systems when successful implementation of such systems can be demonstrated. Lack of success decreases confidence in and commitment to the systems.

9.4.4 Managing IT-enabled change

Top managers in the three organisations studied have demonstrated that they understand the need for managing change in general. A number of change management initiatives have been undertaken in the companies with some measure of success. What is not clear is whether these managers understand the true nature of IT-induced organisational change and how this differs in scope from other change exercises. Implementing computer-based information systems in organisations represents more than a technological change. IT introduces fundamental functional and cultural changes into the organisation. Some of these are expected and others may be quite unexpected. Such far reaching changes will normally provoke resistance from a number of quarters. Managers must expect resistance and pro-actively plan to address the concerns of those affected by the changes being introduced. The success of any change management exercise is dependent on organisational personnel executing their roles effectively. Successful change is facilitated by visionary and strategic leadership from top management, effective process management by middle management, and substantive and constructive participation on the part of user personnel.

Top managers, especially in a developing country setting, must understand that IT-induced changes are particularly ominous to some organisational personnel, because they tend not only to have an impact upon operating procedures but they can also change the very nature of the jobs themselves. Some changes invariably mean the elimination of jobs. Fear of change or loss of jobs will probably lead to the greatest resistance. People also fear losing autonomy, expertise, status, and control. These fears can be effectively addressed as organisational managers develop ways of co-opting the support of personnel for the planned changes. They can do this by substantively involving personnel in designing and managing the change processes. They should also be prepared to provide affected employees, whose jobs will be eliminated or restructured by the change, with alternatives, through investing in their retraining, re-skilling and re-deployment.

9.4.5 Engaging in continuous organisational learning

The ability of the whole organisation to engage in continuous organisational learning is a crucial factor that underpins all the notions and proposals discussed so far.

Such learning is critical if organisations are to understand how best to deploy and exploit computer-based information systems to support their strategic and functional objectives. Only as organisations are able to learn from experience, specific search activities and basic research will they be able to develop and sustain the capabilities necessary to become proficient in implementing and using computer-based information systems. Such learning is not anticipated unless organisations are willing to commit both time and resources (financial, human, physical) in creating an environment in which learning is valued and pursued. The responsibility for articulating and creating a vision of the learning organisation rests with top management. They need to create the organisational mechanisms that will ensure that opportunities for learning can be exploited and barriers are removed. Organisational learning in developing country settings can be particularly problematic given the deficient infrastructure and support base and the volatility of the internal and external environments characterising the organisations. Developing country managers will need to create frameworks for organisational learning that can survive into the future despite the fortunes of any particular individual or group.

Creating a learning organisation involves a complex interaction of a number of processes that cannot be fully addressed here. A number of researchers and practitioners have written extensively on the subject (Senge, 1990: Argyris, 1993; Schein, 1993; Mayo and Lank, 1994). They attempt to give specific prescriptions on how organisations can create and sustain a learning environment. While the research on the concept of learning organisations and how these are created is still evolving, organisations seeking to build information systems capability, particularly those in developing countries, must address three learning challenges. These are (1) how to expand their IS-related learning horizons; (2) how to effectively embed new knowledge and lessons learned into organisational memory; and (3) how to avoid certain learning traps including the retention of dysfunctional behaviours and practices.

The research has shown that all the organisations studied have very limited access to new information about IS-related developments. Typically, IS departments depend on their IT suppliers to update them on new technological developments. This is an important mechanism for getting new information. However, information provided by IT suppliers

tends to reflect their own commercial interests. IT suppliers are more likely to promote the products they sell and support, and are most unlikely to present competitive alternatives. To prevent the type of circumscribed learning, business and IS managers must become more cognisant of the need to expand the learning horizons of their staff. They must be willing to invest in providing staff with access to independent sources of IS-related information, whether this means paying for subscriptions to local and international journals and magazines, sponsoring staff to attend international conferences and seminars, or seconding staff to work in other organisations where they can become involved in new learning experiences. Staff must be encouraged to explore new sources of information to broaden their knowledge base.

- **Embedding IS-related learning in the organisation**

Knowledge developed during the process of learning will be lost to the organisation if it is not systematically captured, stored and shared. The key to creating the potential for the devolution of organisational knowledge is to have such knowledge stored in way that will make it easily accessible to the those requiring and authorised to use the information. Knowledge repositories can take the form of information centres, libraries, databases, and archives. The type of information stored could include proposals, tenders, financial records, technical reports, performance reviews, contact reports, expertise database, among other types of information. None of the organisations studied had a systematic way or retaining and providing access to IS-related information. Even though it may be difficult to implement in the short term, organisations in countries such as Zimbabwe are encouraged to create IT information centres that will provide IS and business unit staff with access to up-to-date information. New technologies such as the World Wide Web will make it possible to implement this on-line.

The systematic sharing of information is one way of ensuring that the knowledge is diffused throughout the organisations. IS departments could develop newsletters (as Zesa is currently doing), hold periodic seminars, training sessions and briefings. Without this deliberate sharing, knowledge dissemination will be haphazard and lack the focus necessary to effectively contribute to organisational capability development.

- **Avoiding learning traps and dysfunctional learning**

The caveats expressed by Hedberg (1981), Senge (1990), and Levinthal and March (1993) should alert managers to the potential problems of organisational learning. Learning to do something really well can present a barrier to future learning. For example, IS departments that have mastered centralised IT systems might find it difficult moving to client/server systems. Their competencies developed in the past create built-in resistance to new ways of doing things. To break down the barriers organisations will need to unlearn the skills developed in the past. Unlearning requires IS personnel to surface and challenge preconceptions they might hold about how best to accomplish a given task. They need to adopt mechanisms that will encourage re-evaluation and rethinking of jealously guarded notions.

Organisational learning tends to focus almost exclusively on success or as Levinthal and March (1993) put it "any learning process tends to eliminate failures". The overemphasis on success can create significant barriers to effective organisational learning. Organisations often fail to learn from failures. This is because managers tend to be frustrated and embarrassed by failure and therefore want to spend as little time as possible contemplating it. They, however, need to spend time trying to understand why failure has occurred. Datlabs and The Cotton Company could benefit from a critical analysis of the failures that they experienced in their early attempts to deploy computer-based information systems. The findings of such analysis would be instructive to both organisations. For learning to be complete and capability to develop, managers must be willing to systematically examine and learn from both successful and unsuccessful IS deployment experiences.

9.5 Acquiring and deploying IS-related resources

IS-related resources provide the basis for the development of organisational information systems capability. It is through the deployment and application of IS-related

resources that organisations can achieve the performance objectives envisaged by the IS strategy. Six broad categories of resources have been discussed throughout this research. These are human resources, IS/IT infrastructure, IS/IT competencies, financial capacity, organisational culture/climate and organisational linkages.

9.5.1 Human resources

Although no one category of resources can be considered as sufficient for the development of information systems capability, having the right quantity and quality of IT personnel is absolutely essential. To emphasise that no capability building is possible without key IT personnel seems trivial, but given the penchant of companies to try to avoid making investment in developing IT personnel this fact is worth emphasising. The case studies demonstrated the importance of having sufficient numbers of high quality personnel to carry out the strategic objectives of the organisation. The experiences of Zesa and Datlabs contrasts with each other. Zesa has made a commitment to having sufficient IT staff in place to implement its IT strategy. Datlabs in contrast is reticent to increase the size of its MIS department because it fears over-staffing. While over-staffing is a valid concern, organisations must have sufficient in-house capacity to manage the systems acquisition and deployment process.

The need for an appropriately-educated and experienced IT/MIS manager is paramount to the effective development of IS capability. The experiences of the organisations in the case studies show that having a IS manager with well-developed business and technical management skills makes a significant difference in the success of IS implementation projects. Such a manager is able to articulate, within the context of the business, how the organisation can derive benefit from implementing computer-based systems. Prior to hiring their current MIS managers, senior managers at Datlabs and The Cotton Company felt that they could manage their respective IS implementation projects with the help of outside consultants. Undoubtedly both the finance director at Datlabs and the corporate services director at the Cotton Company have well-developed general and financial management skills. Both are very experienced chartered accountants who understand their business needs. What they both lacked was a well developed understanding

of the technical issues related to the implementation of computer-based information systems. On the surface it would appear that one could just buy in the technical side by using consultants. However, the very nature of computer-based systems makes it impossible to separate the technical issues from the business issues. Earl and Skyrme (1992, p. 172) assert that outside consultants lack one critical knowledge ingredient, organisation-specific knowledge. They highlighted the need for 'hybrid' managers who are able to 'enhance the integration of IT and the business'. They cite organisation-specific knowledge as an important, if often overlooked competence of hybrid managers. "Poor understanding of an organization's culture ('how we do things round here') and its internal processes seems likely to present insurmountable obstacles" to those not familiar with the particular organisational setting (Earl and Skyrme, 1992, p. 175). Table 9.1 highlights key roles that 'hybrid' IS managers should play.

Currently, most IS managers in Zimbabwe tend to be professional IT people rather than someone emanating from the 'business' side. This will probably change as more business managers become IT literate and IT knowledge becomes more widely diffused.

Table 9.1 Key roles of 'hybrid' IS managers[55]

Roles	Activities
Enhance business orientation of IT	• Increase IT specialists' awareness of business opportunities.
Enhancement of IT capabilities	• Increase awareness and responsiveness to different business needs. • Constant retooling of IT infrastructure. • Continual honing of IT skills and professionalism. • Appropriate selection and use of specialist skills.
Enhance organisation's understanding of IT	• Re-focus the organisation to understand IT. • Educate and consult on the strategic use of IT. • Reinforce IT's benefits and potential to business managers.
Build successful/IS business partnerships	• Develop shared vision of entire business. • Share responsibility for projects between IT and the business. • Help line managers make IT decisions.

[55] Earl, M. J. and Skyrme, D. J. (1992) "Hybrid Managers - what do we know about them?", **Journal of Information Systems**, no. 2., p.174.

An IS manager, however competent, cannot accomplish the implementation of computer-based information systems on his or her own. A complement of professionally trained IT staff is needed to carry out the activities of designing, acquiring, and implementing the selected IT systems. The number of staff needed is dependent on the scope of the IT strategy, the size of the organisation and the implementation strategy adopted by the organisation. It is quite evident that a project the size and scope of the one undertaken by Zesa could not have been implemented by an IT team comprising only a few people. Most of the applications were implemented using packaged software and much of the work was outsourced to Unitech. Yet, Zesa needed a sufficient number of IT people to ensure the systems were implemented and maintained. The use of packaged software does not negate the need for IT people. If packaged software is used organisations will either need to make some modifications to the package to suit their specific requirements or they will have to modify operating processes and procedures to suit the package. Either way, substantial changes will be required. This cannot be accomplished solely by users. They will need the assistance of IT staff who are able to understand and articulate both the business and technical requirements. In a number of instances both Datlabs and The Cotton Company had to resort to using experts from abroad to carry out software modifications.

With the increasing specialisation in the IT field many managers feel that it is not prudent or cost effective for any company to try to acquire in-house all the necessary IT skills. Outsourcing is seen as the best way to overcome the skills and staffing problem. There are two caveats to this presumption, however. This first is that it is very difficult, if not impossible, to outsource overall management of organisational information systems. This is because it is very difficult for an outside consultant to fully capture the intricate business IS requirements without essentially becoming a part of the organisation. The experience of both The Cotton Company and Datlabs demonstrated that dependence on outside consultants to conceptualise and manage the acquisition and deployment of computer-based information systems can lead to a severe mismatch of organisational requirements with proposed solutions. Effective outsourcing is only possible when there is sufficient internal IT management and technical IT skills present in the organisation. Such skills allow the organisation to understand how its IS needs can effectively be satisfied by

the available technology and the specialist skills of service providers operating in the local or international market.

9.5.2 Organisational IS/IT competencies

In chapter one we argued for an important distinction to be made between an organisation having highly qualified people and having high levels of organisational competence. This is necessary because organisational competencies extend beyond the mere aggregation of individual competencies. From the case studies, the IT department at Zesa has been shown to have a significant amount of organisational IS/IT competence. The effective deployment of computer-based systems is not dependent on any one person. Competence is diffused across the department and even among users. This contrasts with the situation at Datlabs where the MIS manager is the linchpin in the process of deploying IT resources. The small size and composition of the department makes it difficult for organisational IT competence to developed and be embedded.

Organisations need to develop a variety of competencies to serve as a basis of building IS capability. Table 9.2 presents a competence map as an aid for conceptualising the types of IS-related competencies that individuals, groups and organisations need to develop in order to build information systems capability. Three categories of competencies are suggested. These are managerial, technical and operational competencies. Managerial competencies are the skills, knowledge and aptitude needed to conceptualise, plan, manage and evaluate the design, acquisition, deployment and exploitation of computer-based information systems. Technical competencies are the skills and knowledge needed to design, acquire or develop and deploy the technical and operational systems. Operational competencies are those needed to efficiently operate and maintain the technical and non-technical systems and processes.

By and large, most technical competencies can be bought (through hiring or outsourcing arrangements) or developed internally. It is possible to buy in individual managerial and operational competencies as well. Group and organisational managerial and operational competencies, however, cannot be bought. They have to be built internally.

This is because of the heterogeneous nature of groups and organisations in terms of the contexts in which they exist, their resource endowments and their routines. The managerial and operational competencies of groups within organisations and the organisations themselves tend to be firm-specific and idiosyncratic in nature. They arise out of the unique relationships that develop within organisations in the process of executing organisational activities.

Table 9.2 IS/IT competence map

Competencies	Managerial	Technical	Operational
Organisational	Mission definition Environmental analysis Strategy development Strategy integration Financial planning Resource allocation Policy making Structuring the organisation Human resources planning Performance evaluation Managing inter-organisational links	Enterprise network management Enterprise database management Technology assessment Decision support & EIS Inter-organisational networking Standard setting Procurement Technical systems integration Research & development	Computer network operation Telecommunications network operation Database resource anagement Data warehousing Network and data security Information centre operation
Group	Task identification Task structuring Role assignment Group project management Conflict resolution Group problem solving Project assessment and evaluation Managing inter-group links and partnerships	Process and systems design Systems engineering Systems development Systems implementation Process re-engineering Work design	Scheduling Shared information handling Application sharing Procedure automation Conferencing Co-authoring Electronic meetings
Individual	Decision-making Communication Negotiation Personal networking Judgement/evaluation Delegation Project management Knowledge of the organisation Change management	Business & systems analysis Systems design Application programming Application testing Teaching & training Information searching Research Formal modelling	Information processing Application software usage Data entry Information presentation Personal communication Information storage and retrieval

Distinguishing between the different categories and levels of IS/IT competencies helps organisations address outsourcing issues. This distinction suggests that, depending on the particular situation, it is possible to buy-in certain competencies through outsourcing mechanisms. These would essentially be technical in nature for all three levels or individual competencies across all three types. Therefore, Zesa was able to hire Unitech to provide a

number of technical and project management services. The Cotton Company hired Alpha Systems to develop its producer accounts systems. Datlabs depended on the IT vendor to implement and support its IT systems. However, the overall responsibility for managing the planning and integration of the technical systems into the general operations of the organisation can never be outsourced. The management of Zesa's IT project, while supported by Unitech, could not have been left to the IT supplier. The Cotton Company came to realise that it could not outsource the overall management of the IT implementation project and get the type of integration necessary to make it a success. Organisational managers must understand that attempts to completely outsource all aspects of IS management and deployment will end in failure of the systems. Even if most of the technical aspects are outsourced, organisations must invest in developing both IT management and operational skills.

The potential success of outsourcing relationships is enhanced when the client organisation possesses a high level of IS/IT management competence and this is matched by high level of commitment and specialist competence on the part of the service provider. High levels of IT management competence makes it possible for organisations to engage in more outsourcing. Organisations with low levels of such competencies face tremendous risks in outsourcing arrangements. Such organisations should develop a substantive measure of IT management competence before embarking on risky outsourcing arrangements.

9.5.3 IT infrastructure

The appropriate IT infrastructure (IT hardware, communications, data management and software applications) are essential to the deployment and exploitation of computer-based information systems. The IT infrastructure provide the mechanism for deploying and exploiting the systems envisaged in the IS strategic plan. How often do organisations engage in extensive strategic planning efforts without giving sufficient thought to what it will take to accomplish the plan! Does the vision fit with the reality on the ground? Datlabs, for example, envisages an EDI system between itself, its customers and its suppliers. This vision of implementing EDI, however, will need to be translated into a

detailed implementation plan. The requirements of such a system might not easily be supported unless there are drastic improvements in the national data communications infrastructure. The Cotton Company had to postpone its plan to implement an on-line real-time client/server based system because the cost of putting in leased lines to its operating centres was prohibitive. They implemented a dial-up system instead. This change during the implementation phase could have been avoided if realistic IT infrastructure planning had been done in the first place.

The choice of hardware, software, and communications technology is among the most important decisions an organisation will have to make when considering the implementation of computer-based information systems. These choices create path dependent relationships, in that, once investment is made in hardware and software it is difficult to change to a completely new set-up. Zesa has invested a considerable amount of capital and human resources in implementing IT-systems based on the IBM AS400 platform. It is almost inconceivable that they could change from this set-up in the very near future. A change of platform would require such drastic managerial action that it is hard to contemplate it happening in the near future. It would take years for the organisation to build up the level of competence it has now achieved on a new platform. Datlabs would probably like to change both its IT platform and supplier, but cannot at the moment contemplate the technical and organisational upheaval this would bring. This is not to say that upgrades of hardware and software will not be made. They will be. Upgrading of software and hardware is a central feature of any IT implementation. The upgrades will, however, be path dependent. Zesa, for example is planning to upgrade to the new series of AS400 computers when it implements its new IT strategy. Even if a Sun Microsystems platform could be more efficient and cost effective, changing platforms at this time would be disastrous.

The rigidities introduced by the choices made in the past makes it doubly important for IT infrastructure decisions to be taken carefully. Decisions need to be made with a view to long term sustainability. Organisational managers need to give consideration to the nature of the technology they plan to implement. Is it proven technology? Are the requisite skills to deploy and maintain the technology locally available? (For example, taking on latest or

unfamiliar technology which will make the organisation dependent on expensive overseas consultants). What is the track record of the company marketing the technology? Is the manufacturer likely to survive into the future? Is the technology based on proprietary or open systems? These are only a few of the important questions that managers need to ask in the process of making decision about infrastructure. They are especially important given the rapidly changing and unstable nature of the IT industry, where even IBM was put into a defensive position by the dramatic changes that occurred recently.

Decisions about IT infrastructure should also reflect the realities of the local factor market for IT products and services. Organisations face substantial risks implementing the latest technology if these cannot be supported effectively by service providers in the local market. If organisations decide to implement technology that is not supported locally they must commit to developing their own capacity for deploying and sustaining it. If this is not done, they will become dependent on foreign support which can be very expensive and difficult.

Having a top quality IT infrastructure will be a waste of resources if it does not meet organisational user needs. A system that is unreliable and inefficient will be bypassed or left unused. The EIS system at Zesa is an example of a system that does not meet the expectations of the senior managers. It lacks the flexibility and accuracy that is needed in such a system. Ineffective IT systems create expectation failure among users. This could lead to frustration with the entire implementation.

9.5.4 Financial capacity

Investment in IT assets and services is impossible without at allocation of adequate finance. Investment in IT can be risky and can require huge capital outlay (Mata, et al., 1995). There is no guarantee that making investments in IT will give positive returns (Weill, 1992). Although IT has been shown to play a significant cost reduction or profit improvement role it is very difficult to know the exact part that IT plays. In most instances it is fairly easy to determine the costs of IT. It is very hard, however, to quantify the benefits derived from its application. How much of the improvement in organisational performance is due to the application of IT and how much to the organisational changes that

accompanied its use? This is the sort of question being asked at Zesa. IT implementation has clearly benefited the company but it is very difficult to quantify the extent of its contribution.

This lack of certainty as to the probable contribution IT will make to overall performance makes a majority of IT investments somewhat of a leap of faith. Managers take significant risks investing in the deployment of computer-based information systems although there is no clear proof that this investment will yield the promised benefits. IT investments cannot be justified only on a cost/benefit or input/output basis. This is because such justifications are at best contrived and at worse, misleading. Attempts to detail the benefits to be derived from IT investments represent, in my opinion, efforts to placate the accountants for whom such justification is important. A review of the cost/benefit justification provided by Price Waterhouse Consultants in Zesa's 1987 MIS strategy bears this point out. What is clear is that once the decision has been made to invest in computer-based information systems sufficient funds must be allocated to carry out the requirements of the plan.

The question of sustainability is intricately tied up with that of the organisation's ability to continue to fund the development and improvement of the IT assets and services. Operational and capital funding for IT must form part of the regular operating and capital budgets of the organisation. Depending on international aid or low interest loans from international financial institutions puts the organisation in a vulnerable position and restricts its ability to develop and expand its computer-based information systems.

9.5.5 Supportive IS climate and culture

An organisation's IS culture and climate represents a shared and enduring corporate understanding of the role of computer-based information systems in the organisations. They reflect the organisation's approach to managing, organising and executing the tasks and activities surrounding the acquisition, deployment and management of the systems. A supportive IS climate and culture is one in which the implementation of computer-based information systems is positively and pro-actively received. This does not mean the unquestioning acceptance of IT systems. What it means, however, is that organisational

personnel are predisposed to exploring the various options with which they are faced and do not resist the implementation of IT systems purely on the basis of narrow self-interest. Such a situation is difficult to arrive at and has certainly not been widely demonstrated in the cases.

In a supportive climate, top management are instrumental in creating the necessary environment for successful IT implementation. Here the appropriate resources are allocated, the relevant policies and procedures are enacted and the appropriate rewards and sanctions are provided. Strong top management support for IT implementation is demonstrated in all three cases. A supportive climate is one in which organisational participants are encouraged to experiment and learn from their mistakes. They are empowered to pursue business objectives by being provided with the needed resources. Such support for openness and experimentation bring significant challenges for traditional managers. In most organisational settings, especially in the IS area, mistakes are not tolerated and experimentation is not encouraged. Rigid adherence to standard operating procedures are the norm. To encourage the development of firm-specific IS knowledge managers will need to find ways of encouraging creativity without jeopardising the integrity of the systems deployed.

9.5.6 Internal and external organisational linkages

- **Internal Links:**

One key way of facilitating the effective integration of computer-based systems into the operations of the business is the building of mutually beneficial internal links between the IS function and the user departments. Henderson (1990) identified three preconditions for effective partnerships. These were mutual benefits, commitment and a favourable predisposition to the partnership, which includes trust and favourable management attitude. Partnerships were more effective when they shared knowledge and resources and had effective links that enabled the exchange of information and the building of personal relationships.

Effective internal links are built when the IS and functional departments work closely in identifying the business opportunities and challenges and jointly design and implement the solutions to exploit the opportunity or resolve the challenge. This joint effort is facilitated by project teams or working groups comprising both IT professionals and users. This was exemplified in the application teams and user groups instituted at Zesa. A similar situation is now taking shape at The Cotton Company. The essential ingredient to effective internal partnerships and linkages is good and trusting personal relationships between IT and user personnel.

- **External links**

External linkages provide organisations with a rich source of new knowledge, resources and personal contacts. Information systems departments need to develop close and meaningful links with external parties. These links, whether contractual or not, need be built on the same three principles of mutual benefit, commitment and trust. Contractual relationships are especially important. An effective relationship between a client IS department and a service provider is a crucial factor in the effective delivery of IT services to the organisation. When committed and trusting relationships exist between suppliers and clients, care will be taken to ensure that the best service is delivered. If the client IS department is viewed simply as a meal ticket then relations are bound to deteriorate. The relationship between Zesa and Unitech exemplified a relationship of mutual trust and commitment. The relationship between the two organisations went beyond the contractual obligations. Personal links between members of staff of both organisations developed over time.

Beyond contractual links organisations can forge beneficial technological links with other institutions similar to themselves, with IS and computer science departments of universities and colleges, with research institutes and with technical user groups. All of these can play an important role in developing the stock of locally held knowledge about computer-based information systems. It is especially important in the developing country setting that effective links are maintained with the local institutions of higher learning. Zimbabwean companies, through their IS departments, need to find ways of working with the IS and computer science departments of the local universities and colleges. The

resulting relationships will help to strengthen the programmes being offered in these institutions. It will also ensure that graduate are better prepared when they enter the workforce. Organisations engaging in similar IS deployment activities need to collaborate more closely on technical and infrastructural projects. The case studies have shown that most organisations in Zimbabwe operate as islands. There is little structured collaboration beyond the informal sharing of information that takes place at the personal level between friends working in different companies.

9.6 Understanding the environment

There is no disputing the impact of forces in the macro-environmental context on the processes and decisions of organisations. If organisations are to be successful, prescience in understanding the impact of the current and future macro-contextual environment on the capacity of the firm to deploy and exploit computer-based information systems is of great importance. The case studies presented in this thesis have highlighted the significant impact that macro-contextual factors had on the way organisations in Zimbabwe operated. Changes in the political environment during, UDI, immediate post independence and since the onset of the economic structural adjustment period in 1992 have affected organisational investment in computer-based systems in a number of ways. Table 4.5 demonstrated a loose causal connection between the political environment and the diffusion of IT in Zimbabwe. Closely intertwined with the political situation are the economic and the regulatory impacts. Political decisions had, and continue to have, a wide ranging impact on both the economic and regulatory climate.

Developments in the technological environment pose interesting and daunting opportunities and challenges for organisations. The IT field has witnessed dramatic changes in technology. IT continues to be instrumental in changing the bases of organising and competing. Dramatic developments in information and communications technology and the regulations guiding their deployment and use have broken down traditional protective barriers. Companies in Zimbabwe, for example, now face stiff international competition. At the same time, however, Zimbabwean companies have the opportunity to make their products and services available to the wider international market.

If the organisations in the case studies are to be used as a guide, most organisations in Zimbabwe lack the capacity to carry out rigorous and strategically significant environmental analysis. As far as information technology is concerned, most companies and organisations do not have the requisite capacity to carry out, locally, robust assessment of IT products and services. They are dependent of the information provided by suppliers, consultants and that gleaned from experience to help them in their decision-making about IT. Companies adopt an almost dependent mode where IT is concerned. They are inclined to accept the advice of IT suppliers and consultants without significant independent research. These companies need to break out of the dependency syndrome and adopt a more proactive stance when assessing new information technology. To do this they need to create a certain amount of slack in their organisations to allow staff to spend time exploring potentially useful developments in IT. IS managers at Zesa, Datlabs and The Cotton Company are very cognisant of the need to improve their technology assessment capabilities. Top managers will need to be convinced of the importance of this work if they are to permit the slack needed to make realisation of effective technology exploration possible.

The capacity to undertake local assessment of information technology is limited in Zimbabwe because there is almost no institutional research being consistently carried out in the field. Unlike the situation in many developed countries, there is very little capacity to conduct high level research in the IT field in Zimbabwe. Funding for this purpose is also not readily available at the moment either. There are plans to develop an IT research programme at the new Scientific and Industrial Research and Development Centre, being constructed near Harare. It is unclear, however, whether the research to be carried out will benefit business. An opportunity exists for the establishment of an independent IT research institute. Such an institute could be a free-standing entity or could be attached to one of the universities. It would carry out applied research geared towards helping organisations undertake technology assessment and development in the IT field. The institute could seek funding from local industry and from international bodies.

One key factor affecting the development of organisational information systems capability is the quality of the technological infrastructure on which such capability depends.

This relates to the general technological infrastructure as well as the IT-specific one. The technological infrastructure should be understood both in terms of physical and human resources. The deficiencies in the technological infrastructure in Zimbabwe have been described in both chapter 4 and the cases studies. Organisations implementing computer-based information systems must be realistic about what is possible given the technological environment in the country. Unless they are prepared to make significant contributions to developing the infrastructure there is no point in making grandiose IT deployment plans which cannot be supported by the prevailing infrastructure. At the same time, however, companies working together may be able to facilitate enhancements in the infrastructure through their collective effort. More co-operation between entities are needed. For example most public sector entities operate in the same locations around the country. They could pool together to build a common data network instead of developing their own separately.

9.7 Summary

In this chapter we have presented a framework for building information systems capability. The framework suggests that IS capability building revolves around three important processes: establishing of organisational IS-related routines, acquiring and deploying IS resources, and understanding the macro-environmental context. Organisations wishing to develop information systems capability must establish and enact routines that are supportive of the capability building process. They must also acquire and deploy the requisite IS resources that will provide the platform on which capability can be built. In embarking on the capability building process these organisations need substantial foresight in developing an understanding of the environmental contexts in which they operate in order to discover the opportunities and challenges they present. The integrative, dynamic and iterative nature of the IS capability building process was emphasised. We were careful to note that no starting point for the capability building process was being prescribed. This is in recognition that organisations were more than likely to be at one stage or another of the capability building process. It would be very rare that an organisation is starting from scratch. The processes cannot be separated into discrete activities. They occur together and in combination with each other. Information systems capability develops as these processes

are enacted and refined over time. Capability building advances more quickly when organisations expand their learning horizons and take concrete steps to embed organisational IS knowledge into the organisational memory.

The approach to understanding information systems capability adopted in this chapter and throughout the thesis has allowed us to take a more comprehensive view of the issues relating to the effective and successful deployment and exploitation of computer-based information system. While many of the issues raised have been addressed in other research on information systems, they have been dealt with more discretely without the benefit of a comprehensive framework. Attempts to develop a comprehensive view of information systems have been stymied by the inordinate focus placed on determining measurable outcomes of the implementation process (e.g. competitive advantage) rather than on the processes that lead to the outcomes. The approach we have taken is instructive and utilitarian, in that, it allows both researchers and practitioners to focus immediately on the key issues that need to be addressed when contemplating the deployment of computer-based information systems. It reminds us that successful and effective deployment of computer-based information systems does not result solely from the deployment of certain IT assets or the enactment of a single routine such as strategic IS planning. The success emanates from the unrelenting efforts organisations make to refine and enhance their routines, acquire, deploy and develop their resources, and to understand and correctly interpret their environments.

CHAPTER 10

Summary and Conclusions

10.1 Summary

In this thesis we have introduced the concept of information systems capability. It denotes an organisation's capacity to orchestrate corporate investment in acquiring, deploying, exploiting and sustaining computer-based information systems to gain maximum strategic and functional benefit. Information systems capability was portrayed as an organisational attribute. It extends beyond the capacity of any single individual or group within the organisation, such as the IT department. This is because the introduction of computer-based information systems pervades a multiplicity of organisational functions and processes. It requires the commitment, support and involvement of all organisational participants, including top management, functional management and users, for its effective deployment and exploitation.

The notion, information systems capability, derives specifically from the more general concept of organisational capabilities. In presenting and exploring the concept we adopted a combined evolutionary and resource-based perspective. This emergent perspective suggests that information systems capability develops in organisations in an evolutionary and cumulative manner. Rather than being a productive input that can be easily acquired in factor markets, IS capability represents a firm-specific, non-tradable asset that has been accumulated over time, through the enaction of organisation-specific routines in the process of deploying IS-related resources. Table 1.5 outlined some of the key characteristics of organisational information systems capability. These indicate that IS capability is a rather complex notion which makes it virtually impossible for it to be explained and understood by using traditional input/output rationalisations. Information systems capability is most effectively understood by adopting process-oriented analysis methods.

Organisations involved in the implementation of computer-based information systems must develop the capabilities necessary to orchestrate the effective design,

acquisition, deployment, exploitation and continuous development of such systems. To do this organisations must of necessity accumulate firm-specific knowledge about how best to effectuate these activities. The development of such knowledge occurs through a structured process of continuous organisational learning which is precipitated by prescient managerial action.

Drawing on existing research concerning organisational capabilities, we proposed three strategic dimensions of information systems capability: routines, resources and contexts (see figure 1.6). Routines reflect the management and non-management practices and activities of organisations that promote the successful deployment and exploitation of computer-based information systems. The effective performance of IS-related organisational routines substantiate the development of organisational IS capabilities. Routines effectively performed and refined over time become embedded in the memory and culture of an organisation creating idiosyncratic patterns of behaviour that are difficult to replicate in other settings.

Resources are the IS-related endowments of the organisation that provide the basis for IS capability development. An organisation's IS-related resources comprises its capacity to deploy and exploit computer-based information systems. They are the building blocks of IS capability. The context in which an organisation exists and operates influences its capacity to develop IS capabilities. IS capability building is promoted or constrained by forces in the macro-environmental context that influence IS-related investment decisions.

The research also provided an explanatory framework for understanding how organisations can develop information systems capability. The model presented in Figure 9.1 encapsulates the key components of the IS capability concept. The model illustrates an ontological relationship between organisational information systems capability and individual and group IS capabilities. However, IS capability at the organisational level is more than just the simple aggregation of individual and group capabilities. An organisation's IS capability includes, but surpasses the aggregate effect of group and individual capabilities.

The research emphasised the dynamic and iterative nature of the IS capability building process. Three important sub-processes, corresponding with the three strategic dimensions of organisational information systems capability were discussed. These included: establishing and enacting organisational routines for designing, acquiring, deploying and exploiting computer-based information systems; acquiring and deploying the necessary resources for supporting IT implementation; and developing a prescient understanding of the environmental contexts and their effects on organisations. These processes were considered to operate in concert. Each process dynamically interacts with the other processes in a mutually reinforcing manner. We do not prescribe a particular order for engaging in the capability building process. Rather, we propose a way for organisations to get a sense of where they are in the capability building process and outline the scope of the activities organisations need to engage in and refine in order to develop high levels of IS capability.

IS capability building in a developing country context was explored in the research. Specifically the focus was on capability building in Zimbabwean organisations. Building organisational information systems capability in a developing country context presents significant challenges for organisations. The background provided in chapters 2 and 4, along with the experiences outlined in the case studies provide ample evidence to suggest that capability building is specifically promoted or constrained by both environmental and organisational factors. IS capability building in a developing country is especially challenging given the high level of failure that occurs in the factor markets for information technology and related services. Developing country environments are characterised by political and economic instability, deficient infrastructure, and shortage of skilled and experienced personnel. This reduces the ability of organisations in those settings to make strategic investments without incurring significant risks.

The case studies presented in the thesis illustrate the heterogeneous nature of organisational experiences in deploying computer-based systems. In terms of the external environmental context we found that all the organisations faced similar

external forces and trends. Their response to these depended, to a large extent, on the nature of the organisation, its ownership and governance structure, its size, and the nature of its business, and the quality of its management and personnel.

10.2 Generalisations

♦ About IS capability

The developments in information technology coupled with the pressures for organisational transformation make the deployment of computer-based information systems an almost inevitable part of any process of organisational change and renewal. Organisations intent of deploying computer-based information systems must develop the requisite capabilities to organise and manage the processes surrounding the design, deployment and exploitation of such systems. Some may argue that organisations can acquire the necessary capabilities from the relevant factor markets. The heterogeneity of organisations and the path-dependent and cumulative nature of organisational IS capabilities suggest that such capabilities cannot be bought or acquired instantaneously. They take time to develop and must be patiently and consciously built. Organisations with highly developed IS capabilities will be in the best position to derive sustainable business value from deploying IT. They are better positioned to engage in and exploit a variety of beneficial outsourcing and inter-organisational relationships.

♦ About IS capability in the developing country context

Organisations in developing countries face substantial risks implementing computer-based information systems because of the deficiencies in relative factor markets for IS-related managerial and technical skills and associated services. The risks are heightened by the weak technical infrastructure and endemic economic and political instability characteristic of many developing countries. To obtain maximum value from investment in computer-based systems and to reduce the associated risks, organisations operating in developing country contexts must give priority to developing internal capabilities for deploying and exploiting such systems. Factor markets are not sufficiently developed in countries such as Zimbabwe for companies there to depend entirely on

outsourcing arrangements to satisfy their IS/IT requirements. Most aspects of managing and operating computer-based systems cannot be outsourced to beneficial effect for organisations.

♦ About managing IS in developing countries

The case studies show that some top managers in developing countries are giving more credence to the vital role of computer-based information systems in helping to transform organisations and make them more effective and competitive. However, IT systems are still managed at 'arm's length' by most top managers. Unlike production or finance, for example, IS continues to hold an aura of mystery for most top managers. Top managers therefore tend to defer to specialists IS managers, functions that would normally accrue to general business managers. With IS increasingly being considered a core business function, IS management must become the province of general business managers. Managers must begin to view IS management, not as a peripheral specialist activity to be tackled by specialist managers, but as a business-led function that demand significant involvement of general business managers. Business managers will have to commit to learning more about IT so that they more effectively can lead the development of computer-based solutions to business requirements. Corollary to this is the need for IS/IT managers to develop a deeper knowledge of the business in order to facilitate more effective business/IT integration.

♦ About the role of government policy in influencing IS/IT investment decisions

Government policies do influence the business and investment decisions of organisations as the case studies have shown. Such policies can promote or constrain the ability of organisations to make effective investment in computer-based systems. The anti-IT orientation of policies in many developing countries is predicated on the assumption that computer-based systems eliminate jobs thus creating unemployment. Governments need to be persuaded to view IT not as an enemy of jobs but as a necessary factor in the transformation of organisations. Policies, rather than being punitive, should be directed to

creating the environment in which the application of IT will lead to the creation of new and more fulfilling jobs.

♦ About IS/IT education and training

Having well-educated and trained IT personnel is a necessary element in the development of organisational IS capability. The case studies have demonstrated the fundamental difference that experienced and well-trained IT personnel can make to effective implementation of computer-based systems. The surveys and interviews done in Zimbabwe highlighted a number of problems with IS/IT education and training. University education tends to lack practical relevance while commercial IT training lacks coherence. There is no common understanding of what training is needed and how it should be delivered. To bring congruence between the education and training being delivered in Zimbabwe and the practical needs of organisations, educators and organisational managers need to work together to more effectively define and implement an IS/IT education and training curriculum that achieves the complementary goals of providing a sound IS/IT education along with practical IT skills that would benefit business organisations. The efforts of the Computer Society of Zimbabwe and the National Manpower Council (Namaco) in developing an IT skills requirement model and curriculum should be supported.

10.3 Contributions

This study has contributed to research in information systems with the introduction and articulation of the concept, information systems capability. In so doing it has augmented the small but growing body of research that is attempting to bring an evolutionary and resource-based perspective to explaining the strategic role of computer-based information systems in organisations. At the same time it allows us to move away from the narrow focus on IS competencies prevalent in recent IS research to a broader and more inclusive conception of IS capabilities. By adopting such perspectives it changes the focus from viewing computer-based information systems purely from a linear input/output standpoint. Effective IT systems acquisition, deployment and exploitation involves a dynamic set of cumulative and mutually reinforcing processes.

The research adopted a multi-strategy approach in order to bring richness to the data. To a large extent this richness was achieved. Through the questionnaires, we were able to get a general, if somewhat limited, sense of what was happening in the IT industry in Zimbabwe. The semi-structured interviews provided in-depth insight into the thinking of senior managers regarding a variety of issues surrounding the effective deployment and utilisation of IT within the country. The cases studies, conducted over a three year period, allowed the researcher to track developments in the organisations and in so doing offered opportunities to see the results of decisions and actions taken earlier in the research. The research outcomes underline the appropriateness of the case study method for research in information systems. The firm-specific nature of each implementation of computer-based information systems makes it difficult, if not impossible, for researchers to generalise about the impact of IT in organisations without the depth of analysis provided by case studies. Combining case studies with other methods was instrumental in enhancing the validity of both the construct and the content of the research. The use of a multi-strategy method is not without its difficulties, however. One of these is ensuring a tight integration between the different strategies when carrying out the analysis. This can most successfully be accomplished when the objectives of each strategy is clearly defined and understood at the outset of the research.

Research on the application of computer-based information systems in developing countries represent a growing area of emphasis within the IS field. This is because many researchers in developing countries, and those from developed countries doing work in developing countries, have highlighted special concerns and challenges faced by those implementing computer-based systems. We have contributed to this research base by providing additional case study evidence from which lessons can be drawn. We have gone further to provide a framework through which previous case studies can be analysed and future case studies can be conducted. The framework being epistemologically linked to concerns about technology transfer and technological capability is a suitable one for investigating IT implementation in a developing country setting.

The IS literature is dominated by research highlighting organisational experiences in a small number of developed countries, particularly the USA and the UK. This research adds to the very limited number of references to experiences with computer-based information systems in sub-Saharan Africa. The experiences from Zimbabwe described in this research give clear indications that organisations in Africa face many of the same organisational challenges as do organisations in other parts of the world. These challenges are however heightened by deficiencies in infrastructure, management and technical IT skills prevalent within the local context.

In contributing to practice, this research presents a explanatory framework for understanding and analysing IS capability in organisations. It highlights the key concerns and issues that should be addressed by organisations engaged in the process of acquiring and deploying computer-based information systems. The framework provides managers with a way of organising their approach to planning the implementation of computer-based systems. It immediately focuses attention on the key issues and concerns that must be dealt with by all involved in the deployment process.

10.4 Limitations

There are a number of limitations to this research that should be noted. The research presents one of the few attempts to apply evolutionary and resource-based analysis to the domain of information systems. The concepts incorporated in both the evolutionary and resource based perspectives of organisations are relatively new and are still being articulated. The application of the concepts to information systems is pioneering in many respects. Therefore the proposals made in this research must be treated as an initial attempt to identify the key dimensions of the construct, information systems capability.

Although the three case studies presented in this research provided interesting insights into the experiences of organisations involved in deploying computer-based information systems these case studies may not provide a sufficient basis on which to make substantive generalisations. The research would gain significantly from case studies done in other contexts.

Doing research in a developing country setting far away from one's research base poses significant problems for a researcher using a multi-strategy method. Overall, the findings of the research were limited by the inability of the researcher to interact more frequently with the organisations studied. Interactions were separated by long periods with limited contact. This was mainly due to the expense of carrying out research in a very distant country and the lack of viable alternative communication methods such as electronic mail. More frequent interactions would have increased the richness of the description of the cases and the findings emanating from them.

10.5 Further research

This study has highlighted the need to carry out additional research relating to improving general understanding of the construct, information systems capability. More empirical and theoretical investigations are needed to provide additional support for the strategic dimensions of information systems capability identified in this study. Future case studies would benefit from a more detailed categorisation of all the relevant issues that should be associated with each dimension. Further search of the extant literature may lead to the identification of issues relevant to one or more of the components.

The current research derived its empirical evidence to support the concept of information systems capability in a developing country setting. Many aspects of organisational experience are comparable to that found in other settings. However, comparable empirical work in an industrialised country would help to substantiate the concepts raised and help to determine whether there are any significant differences in approach to developing IS capability between the two settings.

Outsourcing of IT services has emerged as an important issue in discussions about information systems capability. In the research we inferred that an organisation's capacity to enter into and manage IT outsourcing relationships is heavily dependent on the quality and level of IT management capability present in the organisation. An organisation possessing high IT management capabilities will enjoy more success with its outsourcing endeavours. This notion needs to be investigated empirically. We also intimated that while it is possible to secure technical IT competencies through outsourcing relationships it

is virtually impossible to do the same for managerial and operational competencies. Further investigations specifically addressing this issue would yield evidence to support or deny this notion.

IS/IT education was shown as a key factor for establishing the basis for IS capability building. The experiences in the case studies show, however, that simply having well educated and trained people, while necessary, is not sufficient to develop IS capability. The links between IS education and training and IS capability building remain unclear. Further research specifically exploring those links would identify the practical issues to be addressed by policy makers, managers and educators, to establish congruence between the IS education and training provided and the needs of employers.

Developing and retaining quality IS/IT personnel emerged as an important factor in building organisational IS capability. With the acute shortage of highly trained and experienced IS personnel, organisations need to discover what factors and conditions IS employees consider to be important for them to remain committed to their jobs and the organisation. Some studies of IS career decisions have been undertaken in industrialised countries (eg. Igbaria and Siegel, 1993). Similar work, focusing on the situation in a developing country context would be particularly useful to managers and IS personnel operating in those settings.

The development of IS capability is predicated on organisations being able to engage in continuous IS-related organisational learning. Part of this learning process involves transferring new IS knowledge into organisational memory. What mechanisms are there for accomplishing this task? How do they differ between large and small organisations?

The notion of information systems capability presumes that it is possible to distinguish between levels of capability. Yet, the unique nature of each organisational setting and each information systems implementation makes it very difficult to envisage any standard way of measuring IS capability. How can we usefully distinguish between organisations that have high levels of IS capability and those that do not?

The development of information systems capability implies learning and unlearning the routinisation of successful behaviours. Learning from successful behaviours implicitly introduces rigidities into the capability building process. Something well learnt becomes difficult to unlearn. Given the dynamics of IT and the IT industry in general, organisations will need to be adept at unlearning outmoded concepts and approaches if they are to succeed in effectively deploying and managing IT. Such unlearning is particularly difficult if the environment in which learning takes place is not proactive and innovative. Further research can provide insights into how organisations can navigate the learning/unlearning dynamic and remain effective in deploying computer-based information systems.

APPENDIX A

INFORMATION SYSTEMS CAPABILITY

Information Systems Practitioner Questionnaire

This questionnaire seeks to gather data on the educational and training background, and work experience of computer/information systems (C/IS) personnel in selected countries of Africa. Please complete each item in the survey carefully and return the completed document in the self-addressed, stamped envelop supplied. Please be assured that the information is being requested purely for research purposes and is in no way connected with any commercial or governmental interests. All the information supplied on the forms will be treated in the strictest confidence.

Please indicate

1. The country in which you currently live and work _____
2. The location of residence/work (city/town) _____

Educational Background

Secondary Education:

3. State the number of years of secondary/high school completed (circle one) 1 2 3 4 5 6 7

4. Year of completion 19--

5. Type of secondary/high school (Circle one)
   - (a) Government/day
   - (b) government/boarding
   - (c) private/day
   - (d) private/boarding
   - (e) church or mission/day
   - (f) church/mission/ boarding

Higher Education:

6. **State qualifications beyond secondary/high school, starting with the highest.**

Date From	To	Institution	Location City/Country	Field of Specialisation	Qualifi-cation Received	Sponsor (eg. self)

7. **How would you rate the value of the post-secondary training programme to you in terms of the following items:**

		No basis for comment	Not Beneficial		Highly Beneficial
(a)	Professional status	0	1	2 3 4	5
(b)	Salary	0	1	2 3 4	5
(c)	Work responsibility	0	1	2 3 4	5
(d)	Respect and recognition	0	1	2 3 4	5
(e)	Job performance skills	0	1	2 3 4	5
(f)	Challenge of job	0	1	2 3 4	5
(g)	Advancement opportunities	0	1	2 3 4	5
(h)	Co-operation with colleagues	0	1	2 3 4	5
(i)	Relationship with superior	0	1	2 3 4	5
(j)	Creativity	0	1	2 3 4	5
(k)	Job security	0	1	2 3 4	5
(l)	Knowledge of local conditions related to work	0	1	2 3 4	5
(m)	Initiative	0	1	2 3 4	5

8. For the highest qualification in computer/information systems (C/IS) received, please indicate the level (Low to High) attained by the following aspects of the programme:

	No basis for comment	Low		High
(a) Variety and range of C/IS courses	0	1	2 3 4	5
(b) Quality of C/IS courses in terms of theoretical content	0	1	2 3 4	5
(c) Quality of C/IS courses in terms of practical application	0	1	2 3 4	5
(d) Quality of C/IS courses in terms of preparation for work responsibilities you might face	0	1	2 3 4	5
(e) Quality of instruction given	0	1	2 3 4	5
(f) Intellectual level of classroom instruction	0	1	2 3 4	5
(g) Participation in practical projects	0	1	2 3 4	5
(h) Access to laboratory facilities	0	1	2 3 4	5
(i) Adequacy of previous academic training	0	1	2 3 4	5
(j) Development of analytical skills	0	1	2 3 4	5
(k) Development of research skills	0	1	2 3 4	5
(l) Development of management and administration skills	0	1	2 3 4	5

9. How would you rate the above the adequacy of the training programme in preparing you for the following IS activities encountered upon completion of your training.

	No Basis for comment	Very deficient		Very Adequate
(a) Identification and definition of project needs	0	1	2 3 4	5
(b)Feasibility assessment	0	1	2 3 4	5
(c)Analysis - requirements solicitation	0	1	2 3 4	5
(d)Design and modeling	0	1	2 3 4	5
(e)Programming or software selection	0	1	2 3 4	5
(f)Testing and quality assurance	0	1	2 3 4	5
(g)Implementation	0	1	2 3 4	5
(h)Training system users	0	1	2 3 4	5
(i)Post-implementation evaluation	0	1	2 3 4	5
(j)Operations and system maintenance	0	1	2 3 4	5
(k)Database administration	0	1	2 3 4	5
(l)Network administration	0	1	2 3 4	5
(m)Managing systems development projects	0	1	2 3 4	5
(n)Developing and allocating budgets	0	1	2 3 4	5
(o)Organizing and scheduling the work of others	0	1	2 3 4	5
(p)Locating and acquiring system resources	0	1	2 3 4	5
(q)Assessing the financial impact of IS investment	0	1	2 3 4	5

Evaluation of Short-term Training

10. Please list short-term (less than one year) training in which you have been engaged.

Date From	To	Institution	Location City/Country	Field of Specialisation	Qualifi-cation Received	Sponsor (eg. self)

11. How would you rate the value of the training programme to you in terms of the following items:

		No basis for comment	Not Beneficial		Highly Beneficial
(a)	Professional status	0	1	2 3 4	5
(b)	Salary	0	1	2 3 4	5
(c)	Work responsibility	0	1	2 3 4	5
(d)	Respect and recognition	0	1	2 3 4	5
(e)	Job performance skills	0	1	2 3 4	5
(f)	Challenge of job	0	1	2 3 4	5
(g)	Advancement opportunities	0	1	2 3 4	5
(h)	Co-operation with colleagues	0	1	2 3 4	5
(i)	Relationship with superior	0	1	2 3 4	5
(j)	Creativity	0	1	2 3 4	5
(k)	Job security	0	1	2 3 4	5
(l)	Knowledge of local conditions related to work	0	1	2 3 4	5
(m)	Initiative	0	1	2 3 4	5

12. How significant was each of the following in promoting your professional development in the IS field.

		No basis for comment	Not Significant		Very Significant
(a)	Post-graduate university training	0	1	2 3 4	5
(b)	Undergraduate university training	0	1	2 3 4	5
(c)	Diploma, certificate training	0	1	2 3 4	5
(d)	Short courses and seminars	0	1	2 3 4	5
(e)	On-the-job training	0	1	2 3 4	5
(f)	Personal research, reading and experimentation	0	1	2 3 4	5
(g)	Attendance at conferences and seminars	0	1	2 3 4	5

Employment History

13. Please complete your employment history starting with your most current job.

Date From	To	Organization worked for (govt - local parastatal; private - local, foreign; other	Industrial sector (mining, manufacturing, commerce, banking, etc.	Location City/Country	Position title	Monthly Salary (optional)	Number of people managed by you	Reason for changing job *(see list below)

***Reason for changing job:**

(a) higher status
(b) more responsibility
(c) higher salary
(d) greater future advancement possibility
(e) new job more related to education
(f) better working environment
(g) more authority
(h) other _____

14. What is the total number of years of experience you have in the computer/information systems field _____.

Job Performance Outcomes

15. For your most recent job please evaluate the following IS activities according to the importance of success in your job, the percentage of your time allocated to it, your degree of preparedness from all post-secondary C/IS education that preceded it, and your evaluation of the effectiveness of your own performance.

	Type of work responsibility	Importance to success in your position No basis for Comment / Not Important / Very Important	Percentage of total work time spent on this responsibility	Preparedness from all previous post-secondary education No basis for Comment / Not Prepared / Highly Prepared	Your effectiveness in performance No basis for Comment / Not Effective / Highly Effective
(a)	Identification and definition of project needs	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(b)	Feasibility assessment	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(c)	Analysis - requirements solicitation	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(d)	Design and modeling	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(e)	Programming or software selection	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(f)	Testing and quality assurance	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(g)	Implementation	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(h)	Training system users	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(i)	Post-implementation evaluation	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(j)	Operations and system maintenance	0 1 2 3 4 5		0 1 2 3 4 5	
(k)	Database administration	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(l)	Network administration	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(m)	Managing systems development projects	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(n)	Developing and allocating budgets	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(o)	Organizing and scheduling the work of others	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(p)	Locating and acquiring system resources	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5
(q)	Assessing the financial impact of IS investment	0 1 2 3 4 5		0 1 2 3 4 5	0 1 2 3 4 5

16. **Please identify two significant C/IS projects that you have personally been involved with, indicating the specific tasks carried out by yourself, the outcomes (or performance) achieved, the contribution of the project outcomes to overall organizational performance and the contribution to the performance outcome made by a specific C/IS education or training programme.**

Project	Specific C/IS tasks	Outcomes or outputs that were achieved	Contribution to overall organizational performance	Specific training programme that was helpful in achieving outcome
eg. Order processing system	eg. Systems analysis and design User training Systems evaluation	eg. Significantly improved handling of customer orders	eg. Reduced customer complaints by 50%	eg. LSE, Analysis, Design and Management of Information Systems

General Opinion

17. How would you evaluate the following items:

	No Basis for comment	Low			High
(a) The level of computing ability among your peers	0	1	2	3 4	5
(b) Local ability to identify IS needs and solutions	0	1	2	3 4	5
(c) Capability to develop large, complex information systems	0	1	2	3 4	5
(d) Need for expatriate consultants on large C/IS projects	0	1	2	3 4	5
(e) Quality of C/IS training provided by local institutions	0	1	2	3 4	5
(f) Quality of locally trained C/IS graduates	0	1	2	3 4	5
(g) Quality of overseas trained C/IS graduates	0	1	2	3 4	5
(h) Quality of C/IS management in the country	0	1	2	3 4	5
(I) Level of local C/IS research	0	1	2	3 4	5
(j) Quality of local C/IS research	0	1	2	3 4	5
(k) Support by senior management in your organisation of the C/IS function	0	1	2	3 4	5
(l) Public support of the C/IS field in your country	0	1	2	3 4	5
(m) Job opportunities in the C/IS field in your country	0	1	2	3 4	5
(n) Effectiveness of the local computer society	0	1	2	3 4	5
(o) Tendency of C/IS personnel to seek jobs outside your country	0	1	2	3 4	5

Professional Development

18.How frequently do you

	Not at all				Very Frequently
(a) Participate in the activities of the local computer society	0	1	2	3 4	5
(b) Attend local C/IS conferences	0	1	2	3 4	5
(c) Attend foreign C/IS conferences	0	1	2	3 4	5
(d) Correspond with foreign persons in the C/IS field	0	1	2	3 4	5
(e) Read international C/IS journals and publications	0	1	2	3 4	5
(f) Read local C/IS journals and publications	0	1	2	3 4	5
(g) Contribute (papers, articles) to C/IS seminars and journals	0	1	2	3 4	5
(h) Conduct research in the C/IS field	0	1	2	3 4	5

Demographic Information (Circle where appropriate)

The information provided in this section will assist in the development of a profile of IS practitioners participating in the study. Your completion of this section is totally voluntary. If you do not care to respond to an item, please draw a single line through it.

19. Gender (a) male (b) female

20. Year of birth 19___

21. Ethnic classification (a) Black African (b) White (Caucasian) (c) Asian (d) Mixed race (coloured) (e) other

22. Nationality: Please state country _____

23. Please use the back of this sheet to comment on the level of information systems capability in your country and what you consider to be the contribution of information systems education and training to this process.

APPENDIX B

INFORMATION SYSTEMS CAPABILITY
Information Systems Personnel - Employers' Questionnaire

This questionnaire seeks to gather data on the education and training background, and work experience of computer/information systems (C/IS) personnel in selected countries of Africa. **It is directed to the senior manager responsible for information systems in the organization.** Please complete each item in the survey carefully and return the completed document in the self-addressed, stamped envelop supplied. Please be assured that the information is being requested purely for research purposes and is in no way connected with any commercial or governmental interests. All the information supplied on the forms will be treated in the strictest confidence.

General Information

Please indicate:

1. The country in which your organization is located _____

2. The city/town in which it is located _____

3. Type of organization
- (a) Government
- (b) Private-local
- (c) Private-foreign
- (d) Parastatal
- (e) Other _____

4. Area of business activity
- (a) Agriculture, Forestry
- (b) Mining, Engineering, technical services
- (c) Manufacturing, Commerce
- (d) Communications, transport, public utilities
- (e) Social services, health, medical
- (f) Education and training
- (g) Business services, consultancy

5. The total number of employees in the organization is _____

6. The total number of employees directly involved (more than 50% of their time) in computer/information systems work _____

7. How long have there been computers in use in your organization?
- (a) less than 2 years
- (b) 2-5 years
- (c) 5-10 years
- (d) over 10 years

8. How would you describe the importance of IT/IS to the profitability and success of your organization?
- (a) not essential
- (b) useful
- (c) valuable
- (d) essential
- (e) very vital

9. Which of the following best describes the way IS resources are organized in your company?
- (a) ad-hoc, unconnected systems
- (b) partially centralized systems covering a few applications.
- (c) highly centralized systems covering most applications.
- (d) decentralized systems with no central control
- (e) decentralized systems with central control
- (f) inter-organizational systems (eg. supplier customer links)

10. The number of employees in the C/IS area trained to a post-secondary level (degree, diploma, etc.) _____

11. Of the number indicated in 10 above, how many were
- (a) trained locally _____
- (b) trained overseas _____
- (c) trained both locally and overseas _____

12. Of the number indicated in 10 above, how many are
- (a) local nationals _____
- (b) other African country nationals_____
- (c) non-African country nationals_____

13. List job titles (in reporting order) in the computer/information systems department.

_____

_____

_____

_____

Information Systems Projects and Capabilities

14. What are the various types of information systems in use in your organization?

TYPE	PURPOSE	ACQUIRED /DEVELOPED	MAIN USERS

15. What major information systems projects do you plan for the next three years?

TYPE	PURPOSE	ACQUIRED /DEVELOPED	MAIN USERS

16. How would you rate the capability of your IS personnel to carry out the following aspects of the proposed information systems projects.

	No Basis for comment	Very deficient			Very Adequate
(a) Identification and definition of project needs	0	1	2	3 4	5
(b)Feasibility assessment	0	1	2	3 4	5
(c)Analysis - requirements solicitation	0	1	2	3 4	5
(d)Design and modelling	0	1	2	3 4	5
(e)Programming or software selection	0	1	2	3 4	5
(f)Testing and quality assurance	0	1	2	3 4	5
(g)Implementation	0	1	2	3 4	5
(h)Training system users	0	1	2	3 4	5
(i)Post-implementation evaluation	0	1	2	3 4	5
(j)Operations and system maintenance	0	1	2	3 4	5
(k)Database administration	0	1	2	3 4	5
(l)Network administration	0	1	2	3 4	5
(m)Managing systems development projects	0	1	2	3 4	5
(n)Developing and allocating budgets	0	1	2	3 4	5
(o)Organizing and scheduling the work of others	0	1	2	3 4	5
(p)Locating and acquiring system resources	0	1	2	3 4	5
(q)Assessing the financial impact of IS investment	0	1	2	3 4	5

17.Please comment on the steps to be taken to address the deficiencies noted above.

Importance and Effectiveness of Post-secondary Education

18.How important do you consider the following aspects in selecting employees who have post-secondary education?

	No Basis for comment	Not Important			Very Important
(a)Academic record	0	1	2	3 4	5
(b)Interview performance	0	1	2	3 4	5
(c)Selection test performance	0	1	2	3 4	5
(d)Letters ofrecommendation	0	1	2	3 4	5
(e)Past experience	0	1	2	3 4	5
(f)Physical appearance	0	1	2	3 4	5
(g)Overseas training	0	1	2	3 4	5
(h)Local training	0	1	2	3 4	5

19. How important is post-secondary education to the performance of the following C/IS activities?

	No Basis for comment	Not Important			Very Important
(a) Identification and definition of project needs	0	1	2	3 4	5
(b)Feasibility assessment	0	1	2	3 4	5
(c)Analysis - requirements solicitation	0	1	2	3 4	5
(d)Design and modelling	0	1	2	3 4	5
(e)Programming or software selection	0	1	2	3 4	5
(f)Testing and quality assurance	0	1	2	3 4	5
(g)Implementation	0	1	2	3 4	5
(h)Training system users	0	1	2	3 4	5
(i)Post-implementation evaluation	0	1	2	3 4	5
(j)Operations and system maintenance	0	1	2	3 4	5
(k)Database administration	0	1	2	3 4	5
(l)Network administration	0	1	2	3 4	5
(m)Managing systems development projects	0	1	2	3 4	5
(n)Developing and allocating budgets	0	1	2	3 4	5
(o)Organizing and scheduling the work of others	0	1	2	3 4	5
(p)Locating and acquiring system resources	0	1	2	3 4	5
(q)Assessing the financial impact of IS investment	0	1	2	3 4	5

20. How effective has been the performance of those with post-secondary education in the following C/IS activities when compared to those without post-secondary education?

	No Basis for comment	No post-secondary more Effective			Post-Secondary more Effective
(a) Identification and definition of project needs	0	1	2	3 4	5
(b)Feasibility assessment	0	1	2	3 4	5
(c)Analysis - requirements solicitation	0	1	2	3 4	5
(d)Design and modelling	0	1	2	3 4	5
(e)Programming or software selection	0	1	2	3 4	5
(f)Testing and quality assurance	0	1	2	3 4	5
(g)Implementation	0	1	2	3 4	5
(h)Training system users	0	1	2	3 4	5
(i)Post-implementation evaluation	0	1	2	3 4	5
(j)Operations and system maintenance	0	1	2	3 4	5
(k)Database administration	0	1	2	3 4	5
(l)Network administration	0	1	2	3 4	5
(m)Managing systems development projects	0	1	2	3 4	5
(n)Developing and allocating budgets	0	1	2	3 4	5
(o)Organizing and scheduling the work of others	0	1	2	3 4	5
(p)Locating and acquiring system resources	0	1	2	3 4	5
(q)Assessing the financial impact of IS investment	0	1	2	3 4	5

21. How important are the following for sending employees for additional training?

	No Basis for comment	Not Important			Very Important
(a)To get theoretical knowledge	0	1	2	3 4	5
(b)To learn additional skills	0	1	2	3 4	5
(c)To learn new techniques and methods	0	1	2	3 4	5
(d)To obtain a wider diversity of experience	0	1	2	3 4	5
(e)To increase professional contacts	0	1	2	3 4	5
(f)As a reward for past performance	0	1	2	3 4	5
(g)To prepare for a different position	0	1	2	3 4	5

Local training versus Overseas training

22.From your experience with post-secondary educated IS employees with the following IS activities, how would you rate capabilities of overseas trained employees versus locally trained.

	No Basis for comment	Overseas trained much better			Locally trained much better
(a) Identification and definition of project needs	0	1	2	3 4	5
(b)Feasibility assessment	0	1	2	3 4	5
(c)Analysis - requirements solicitation	0	1	2	3 4	5
(d)Design and modelling	0	1	2	3 4	5
(e)Programming or software selection	0	1	2	3 4	5
(f)Testing and quality assurance	0	1	2	3 4	5
(g)Implementation	0	1	2	3 4	5
(h)Training system users	0	1	2	3 4	5
(i)Post-implementation evaluation	0	1	2	3 4	5
(j)Operations and system maintenance	0	1	2	3 4	5
(k)Database administration	0	1	2	3 4	5
(l)Network administration	0	1	2	3 4	5
(m)Managing systems development projects	0	1	2	3 4	5
(n)Developing and allocating budgets	0	1	2	3 4	5
(o)Organizing and scheduling the work of others	0	1	2	3 4	5
(p)Locating and acquiring system resources	0	1	2	3 4	5
(q)Assessing the financial impact of IS investment	0	1	2	3 4	5

23.How would you rate overseas trained versus locally trained for the following characteristics of work?

	No Basis for comment	Overseas trained much better			Locally trained much better
(a)Professional status	0	1	2	3 4	5
(b)Salary	0	1	2	3 4	5
(c)Work responsibility	0	1	2	3 4	5
(d)Respect and recognition	0	1	2	3 4	5
(e)Job performance skills	0	1	2	3 4	5
(f)Challenge of job	0	1	2	3 4	5
(g)Advancement opportunities	0	1	2	3 4	5
(h)Co-operation with colleagues	0	1	2	3 4	5
(i)Relationship with superior	0	1	2	3 4	5
(j)Creativity	0	1	2	3 4	5
(k)Job security	0	1	2	3 4	5
(l)Knowledge of local conditions related to work	0	1	2	3 4	5
(m)Initiative	0	1	2	3 4	5

24.For the following IS activities, indicate (in the first column using appropriate letter) the type of training that would best provide the associated capabilities and whether this training is best acquired locally or overseas.

(a) Postgraduate university
(b) Undergraduate university
(c) Certificate, Diploma (eg. HNC, HND)
(d) Practical attachment
(e) Short, specialized courses
(f) On-the-job training

	Most suitable type of training	Overseas training much better			Local training much better
(a) Identification and definition of project needs	___	1	2	3 4	5
(b)Feasibility assessment	___	1	2	3 4	5
(c)Analysis - requirements solicitation	___	1	2	3 4	5
(d)Design and modelling	___	1	2	3 4	5
(e)Programming or software selection	___	1	2	3 4	5
(f)Testing and quality assurance	___	1	2	3 4	5
(g)Implementation	___	1	2	3 4	5
(h)Training system users	___	1	2	3 4	5
(i)Post-implementation evaluation	___	1	2	3 4	5
(j)Operations and system maintenance	___	1	2	3 4	5
(k)Database administration	___	1	2	3 4	5
(l)Network administration	___	1	2	3 4	5
(m)Managing systems development projects	___	1	2	3 4	5
(n)Developing and allocating budgets	___	1	2	3 4	5
(o)Organizing and scheduling the work of others	___	1	2	3 4	5
(p)Locating and acquiring system resources	___	1	2	3 4	5
(q)Assessing the financial impact of IS investment	___	1	2	3 4	5

25.Of the regions listed below, please indicate 3 regions to which your organization prefers to send employees for additional training (1 for the most preferred and 3 for the least preferred).

(a) Local ___
(b) South Africa ___
(c) Other African ___
(d) Asia (Pacific) ___
(e) Asia (Southern) ___
(f) Latin America ___
(g) Eastern Europe ___
(h) Middle East ___
(i) United Kingdom ___
(j) Western Europe ___
(k) North America ___

Please comment on the reason for your preference

General

26.How would you evaluate the following items:

	No Basis for comment	Low			High
(a)The level of general computing ability in your country	0	1	2	3 4	5
(b)Local ability to identify IS needs and solutions	0	1	2	3 4	5
(c)Local capability to develop large, complex information systems	0	1	2	3 4	5
(d)Need for expatriate consultants on large C/IS projects	0	1	2	3 4	5
(e)Quality of C/IS training provided by local institutions	0	1	2	3 4	5
(f)Quality of locally trained C/IS graduates	0	1	2	3 4	5
(g)Quality of overseas trained C/IS graduates	0	1	2	3 4	5
(h)Quality of C/IS management in the country	0	1	2	3 4	5
(i)Level of local C/IS research	0	1	2	3 4	5
(j)Quality of local C/IS research	0	1	2	3 4	5
(k)Support by senior management in your organisation of the C/IS function	0	1	2	3 4	5
(l)Public support of the C/IS field in your country	0	1	2	3 4	5
(m)Job opportunities in the C/IS field in your country	0	1	2	3 4	5
(n)Effectiveness of the local computer society	0	1	2	3 4	5
(o)Tendency of C/IS personnel to seek jobs outside your country	0	1	2	3 4	5

Demographic Information and Comments

The following information is being requested to give us a general profile of the participants in the survey. Please place a single line through any item you do not wish to complete.

27. Position title of person completing this survey _____

28. Position title of person to whom you report _____

29. Highest post-secondary qualification _____

30. Field of specialization _____

31. Post-secondary training received (a) locally (b) overseas

32. Gender (a) male (b) female

33. Ethnic classification (a) Black African (b) White (Caucasian) (c) Asian (d) Mixed race (coloured) (e) other

34. Nationality: Please state country _____

35. Please comment on the level of information systems capability in your country and what you consider to be the contribution of information systems education and training to this process.

APPENDIX C

List of people interviewed in Zimbabwe
(October 1993)

Consultants:

Erich Bloch
Economist/Management Consultant
Bulawayo

Sithole, Arthur
IT Field Consultant
Eastern and Southern Africa Management Institute (ESAMI)
Harare

Academics:

Borland, Dr Rob
Chairman, Computer Science Department
University of Zimbabwe

Mangena, S. Bayeza
Chairman, Computer Science Department
National University of Science and Technology, Zimbabwe

Sheppard, Professor John
Director, Computing Centre
University of Zimbabwe

Other academic contacts:

Peters, Dr Harold
Vice-Principal Academic Administration
Solusi College

Simpande, Ocean
Lecturer in Computer Science, Department of Business Administration
Solusi College

Finance Directors:

Darikwa, Albert
Financial Controller
Hunyani Paper and Packaging Ltd.
Bulawayo

DeBoer, Gary
Treasurer
General Conference of SDA
Eastern Africa Division, Harare

Moyo, Todd
Financial Director
DATLABS, Bulawayo

IS/DP Managers:

Benza, Joice
Data Processing Manager
BAT Zimbabwe Ltd
Harare

Brittan, Vernon
Group Data Processing Manager
National Foods Ltd.
Harare

Makumure, John
Data Processing Manager
Air Zimbabwe
Harare

McMaster, Gavin
Information Technology Manager
Standard Chartered Finance Zimbabwe
Harare

Moyo, Hazel
MIS Manager
Omega Informatics (Pvt) Ltd
Harare

Sanhowkwe, Evans
IT Manager
Zimbabwe Electricity Supply Authority (ZESA)
Harare

Taputaira, Givemore
MIS Projects Manager
Zimbabwe Sun Hotels
Harare

Tobaiwa, Sydney
Assistant General Managers (Management Information Systems)
Cotton Marketing Board
Harare

Whiley, Jean
Group Information Systems Executive
AMTEC (Pvt) Ltd
Bulawayo

Zinyengere, Daniel
Group Data Processing Manager
Caltex Oil
Harare

Other IS Managers:

Bradbury, Mike
Manager, Computer Projects
Central Africa Building Society (CABS)
Harare

Sithole, Pele
Divisional Manager, Systems Services and Education
NCR Zimbabwe (Pvt) Ltd
Harare

Young, David
Director - Training and Software Development
CF Tulley Associates (Pvt) Ltd.
Harare

General Managers/ Managing Directors

Dawson, John
Managing Director
Unitech Ltd
Harare

Fairall, Geoff
Managing Director
Fairall Associates
Harare

Gudza, Lawrence
Managing Director
Speciss Computers (Pvt) Ltd
(President, Computer Society of Zimbabwe)

Hyslop, Ron
Managing Director
Realtime Computers (Pvt) Ltd.
Harare

Matsena, John
General Manager
Zimbabwe United Passenger Company (Southern Division)
Bulawayo

Shumba, K. Daniel
Managing Director
Systems Technology (Pvt) Ltd
Harare

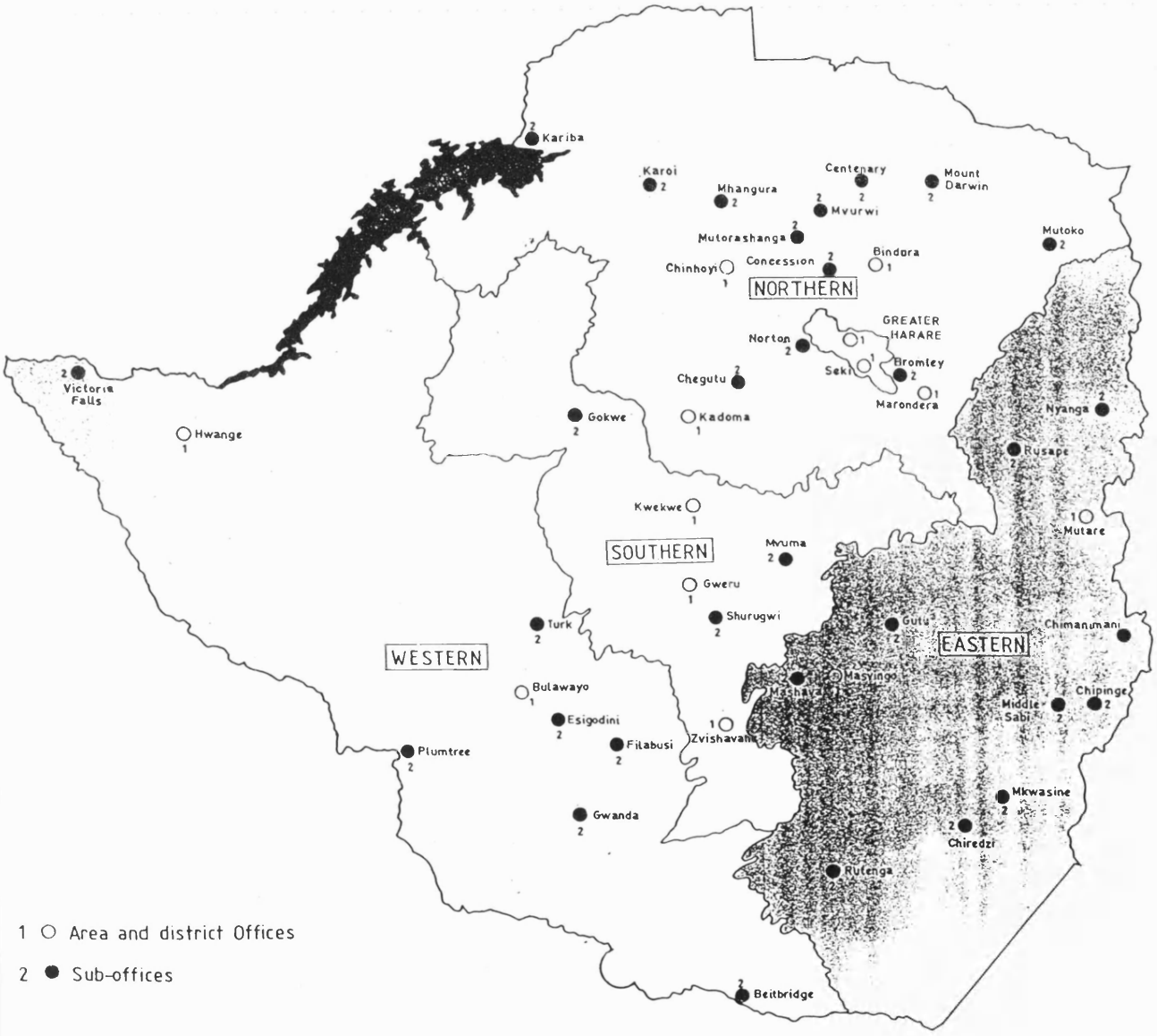
Zwangobani, Dr Elliot
Managing Director
Omega Informatics (Pvt) Ltd
Harare
(Chairman, Research Council of Zimbabwe)

Other:

Angus, Mark
Publisher and Editor
IT News
Harare

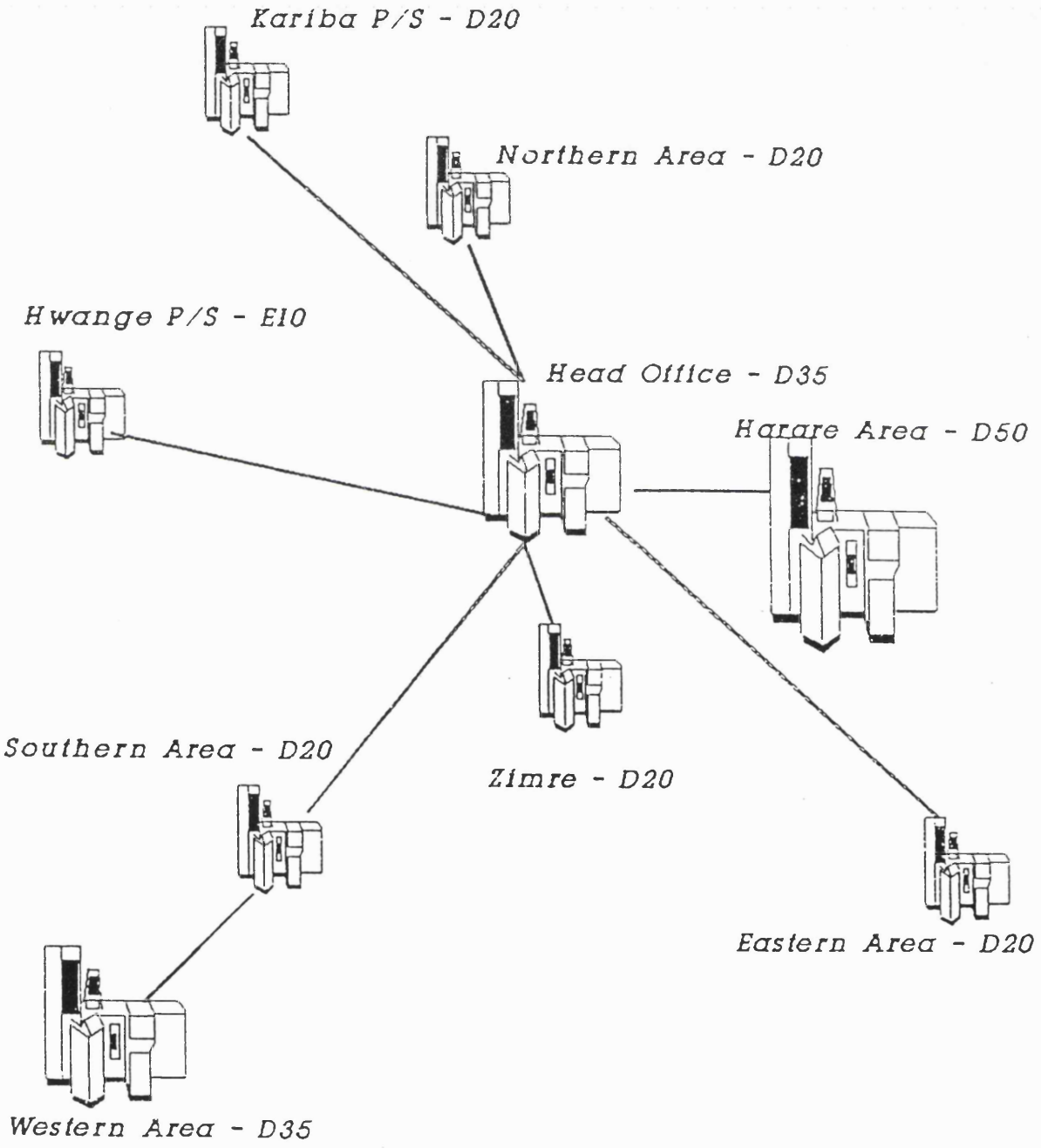
Appendix D

Map of Zimbabwe depicting Zesa's operations.



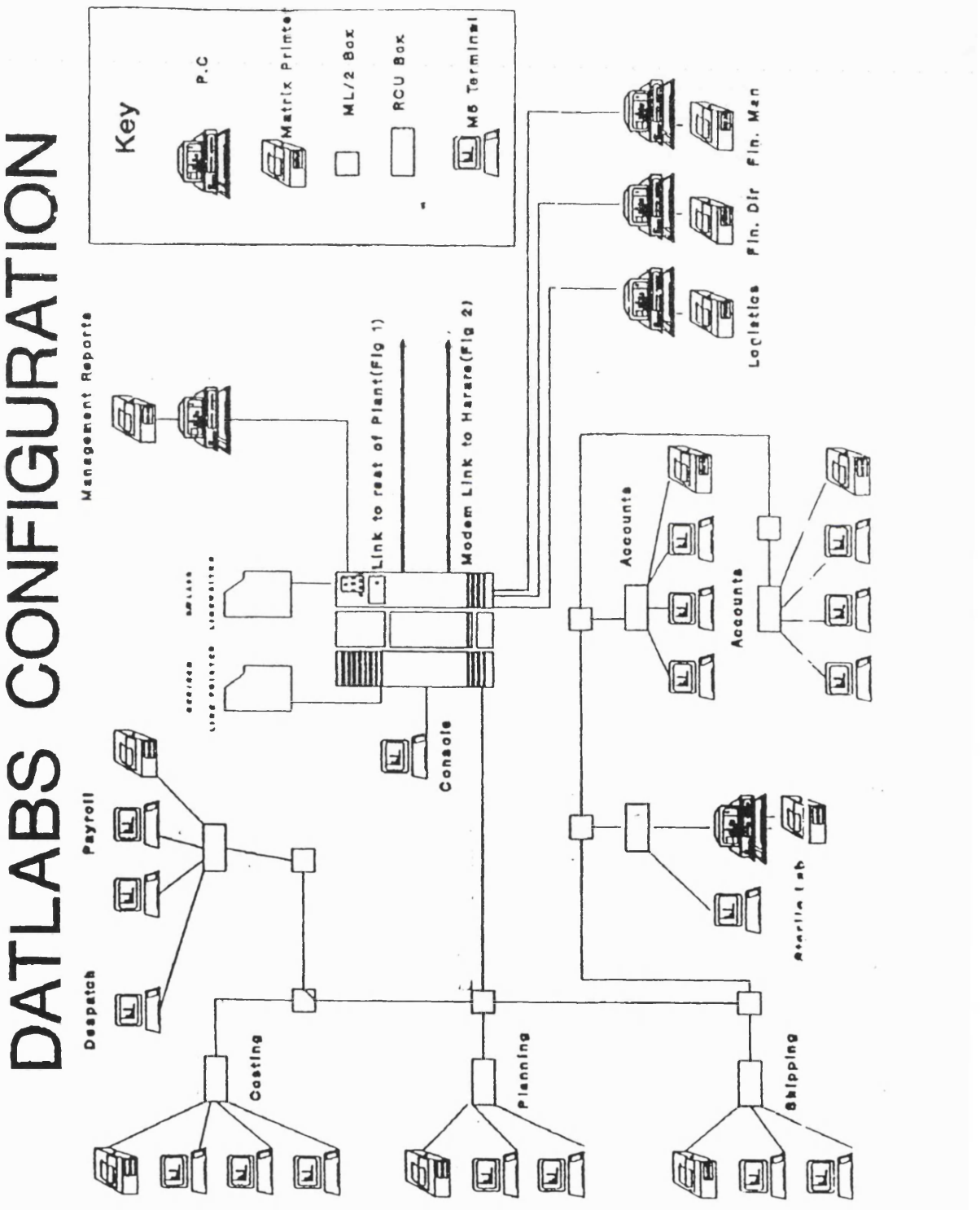
Appendix E

Zesa: IT Project Network - 1993

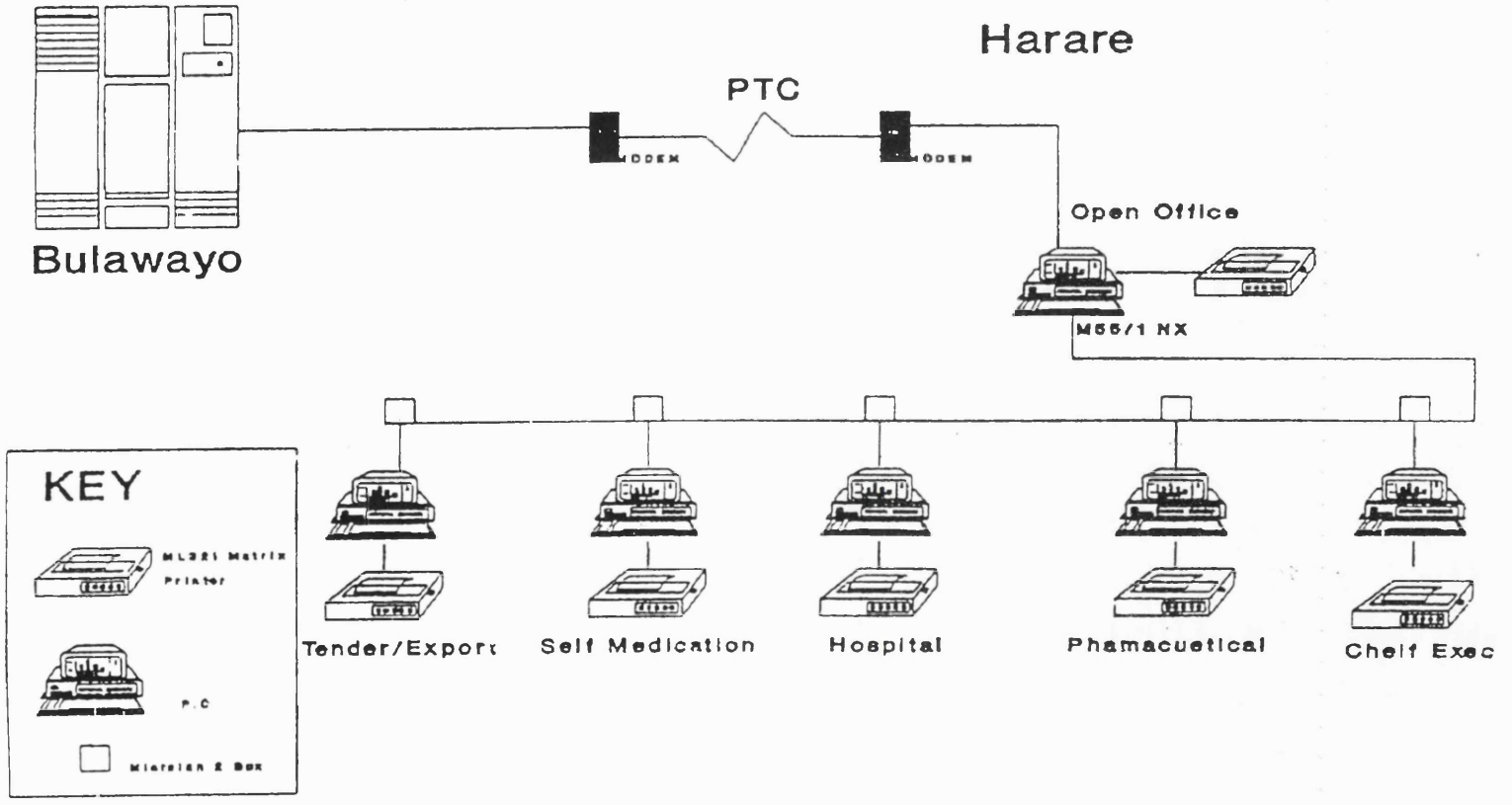


Appendix F

Datlabs: IT network configuration - 1993



DATLABS : LINK TO HARARE



Appendix G

Zimbabwe dollar : average exchange rates with the US dollar, 1991-1995

Year	Rate (Z$ to 1 US$)
1991	3.621
1992	5.098
1993	6.483
1994	8.152
1995	8.670

Source: Economist Intelligence Unit Limited. (1996) EIU Country Report: Zimbabwe. 1st quarter, p.3.

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