AN INVESTIGATION INTO THE EFFECT OF POWER DISTANCE AS A FACTOR THAT FACILITATES THE IMPLEMENTATION OF A COMPUTERIZED HOSPITAL INFORMATION SYSTEM

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By

DENISE LAKAY

A DISSERTATION PRESENTED TO THE HIGHER DEGREES COMMITTEE
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DECLARATION

The contents of this dissertation represent my own work, and the opinions contained therein are my own and not necessarily those of the Technikons. All references have been accurately reported.

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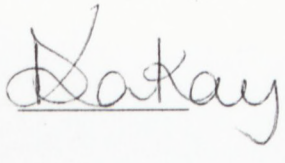
Signature: 

Date: February 2005

DEDICATION

This dissertation is dedicated to my husband, Anthony; my children Andrea and Jared; my mother, Margaret and mother-in-law Catherine; my family and friends and the many others who touched my life positively.

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First I wish to thank God for giving me the opportunity to embark on this dissertation and for the ability He gave me to complete it successfully. I knew that the dissertation carried his blessing. This assurance helped when I felt like quitting and when I struggled with the pressures of being a wife, mother, student and career woman. With the knowledge that He would adequately meet my every need, I was able to confront every challenge.

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This study was initiated to investigate whether power distance facilitates the successful implementation of a hospital information system. A comparative study was done to evaluate the effect of culture on the same information system (CLINICOM), implemented at the same time, but at different locations.

The overall objective of this study was to identify the importance of culture in the implementation of Information systems and how output influences the success of a system.

- The first objective was to assess the organizational culture in each hospital in terms of one of the dimensions of culture on Hofstede's checklist, namely power distance.

- The second objective was to determine whether the speed with which a HIS was implemented was a success at the two academic hospitals in the Western Cape using the reduction of the level of backlog (paper based patient registration records) as a measure of implementation progress.

The literature was reviewed on what determines the success of an information system. The effects of culture were studied and in particular power distance on the implementation of an information system and how this factor affected the backlog of information entries. Questionnaires were administered to the clerical staff at the hospitals, as they were the high users of the information system.

The study showed that both institutions had a high power distance score, but the one institution had a Power distance Index (PDI) that was considerable higher than the other. PDI relates to the concentration of authority. This finding suggests that the managers were more autocratic at the one hospital than at the other.

The study found that the higher the PDI, the faster the backlog was reduced at implementation. Thus the higher the PDI the greater the concentration of authority;

CHAPTER 1
INTRODUCTION

Awareness Of The Problem

A system has been described as a group of interrelated components that works together towards a goal, by accepting input and producing outputs (Whitten, et al., 2000). An Information System (IS) input can be defined as information that is entered into a system and produces outputs such as reports that are reviewed or used by the various users. An Information System is thus an example of a system satisfying this description. Whitten, et al. (2000) describe an information system as the arrangement of people, data processes, information presentation and information technology that interacts to support and improve day-to-day operations in a business as well as support the problem-solving and decision-making needs of management and users. As such, information systems then become critical in any business organization that operates in modern technological and competitive environments (Lau, Ang and Winley, 1999) and should be regarded as business assets (Yasin and Quigley, 1994). They benefit organizations by producing timely information leading to important decision-making and improving efficiency (Lowry, 1996) as well as monitoring and recording transactions. However, in many cases as a result of non-performance, IS have become liabilities rather than assets.

The manner in which information systems are implemented in organizations has necessarily changed to keep pace with technological change as well as improvements in the user's familiarity with technology. The result has been a change in the way that these systems are designed and implemented.

Systems are designed in accordance with the following steps:

1. The particular problem is analyzed;
2. A solution is outlined to the client, who approves or changes it as recommended;
3. The system is designed, stating the type of database, input and output layouts and any special requirements for the completed system;
4. The system is written in a specific programming language and database structure; and
5. The system is tested, training of staff is done and finally when accepted, implemented.

These steps make up what is known as the Systems Development Life Cycle (SDLC) (Whitten, et al., 2000). A system life cycle divides the life of an information system into two stages, namely systems development, and systems operation and support (Whitten, et al., 2000). A system is built, used, kept running, and supported. Eventually, when the cost of running the system becomes excessive and / or when the organization has changed sufficiently, the cycle starts again from operation and support to redevelopment. The above steps recur over and over again resulting in an expected improvement on each cycle to the previous versions of the information system. In some cases this is not necessarily true.

During each of these phases, there are different factors that are critical for the end product to be successful. Whilst the critical factors of the other SDLC phases, are not considered unimportant, for this project the implementation phase will be concentrated on. In the opinion of the researcher, this phase has the greater influence on the success of a system particularly in very large public sector organizations such as hospitals where decisions are made at higher levels. Considerable research has looked at the entire project, instead of focusing on individual phases. Doll (1985) relates management involvement as a critical factor, at all levels of the development of a system. Olson and Ives (1982) studied user involvement during the entire development of the system, which also looked at project management signoff. Factors relating to service management irrespective of the phase they fall in, are mentioned by Whyte and Bytheway (1996) and Doll and Torkzadeh (1988; 1991).

Information Technology (IT) practitioners use a systems approach to devise solutions to IS problems. System thinking helps these practitioners to understand the way the systems are organized and how they work. This way of thinking aids recognizing systems, subsystems, components of systems and systems interrelationships in a situation. Systems thinking will potentially assist practitioners to develop more successful systems, if applied correctly. Over the years many experts have written about new methods and ideas to implement systems. However, much of their implementation ideas have not taken cultural variations into consideration. The assumption has been

made that the same implementation technique will fit all cultures (Oram and Headon, 2002).

There are many definitions of culture. Pasa (2000:414) defines culture as: "a collective formed by the norms, roles, belief systems, laws and values that form meaningful wholes and that are interrelated in meaningful ways".

Considering that there are many descriptions of culture, organizational culture is also quite difficult to define. Bechtold (1997:4) states that "the concept of organizational culture has emerged relatively recently in the realm of organization theory". Organizational culture comes from leaders or founders, from organizational success, from new members. These individuals create a culture through the process of implementing their personal beliefs, values and assumptions about human nature, business strategy and the environment (Bechtold, 1997; Haupt, 2001).

Hofstede (2001) identifies the following dimensions of culture namely, power distance, individualism-collectivism, uncertainty avoidance and masculinity-femininity. Power distance can be described as " the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally" (Hofstede, 2001: 98). Therefore, the higher the score (index) the greater the gap between management and subordinates. Uncertainty avoidance can be described as "the level of stress that a society faces in an unknown future" (Hofstede, 2001: 29). Individualism-collectivism (Hofstede, 2001: 209) "stands for a preference for a tightly

knit social framework in which individuals can expect their relatives, clan, or other in-group to look after them, in exchange for unquestionable loyalty." Masculinity-femininity relates to the division of emotional roles between men and women (Hofstede, 2001: 29).

Power distance is the willingness of the less powerful members of a society to accept their lower status and authority rules due to inequalities that have occurred, where different societies put different weights on status. Inside organizations, inequality in power is inevitable and functional. This project will look at how this cultural factor affects implementation success of a Hospital Information System (HIS) with the level of usage of transactions used as a measure.

Successful systems have been defined as systems that have not failed. By this is meant that they were developed within the proposed budget and the scheduled time, while meeting the requirements of users and working effectively. Heeks (2002) categorizes three ways of evaluating a system; namely

- A total failure if the system was either never implemented or implemented and immediately abandoned;
- A partial failure if major goals were unattainable or where there were significant undesirable outcomes; or
- A success when most of the stakeholder groups attained their major goals while not experiencing significant undesirable outcomes.

Critical implementation factors are dependent on elements in preceding developmental stages of the information system (Petroni, 2002). Petroni (2002) identifies the following factors as important to successful implementation:

- Top management support;
- Formal project planning;
- Data accuracy;
- Organizational arrangement;
- Education and training;
- Formal planning /control policies and procedures;
- Software/hardware characteristics; and
- Employees individual characteristics.

Historically there have been more failed than successful information systems (Whyte and Bytheway, 1996; Heeks, 2002). There are many reasons for total or partial I.S. failures. These include a lack of:

- information satisfaction (Olson and Ives, 1982; Ives and Olson, 1984);
- user involvement (Olson and Ives, 1982);
- information for decision-making (Williams, 1997; Douglas, 1999);
- culture (Douglas, 1999);
- system quality (Ives and Olson, 1984);
- user satisfaction (Doll and Torkzadeh, 1988); and
- top management involvement (Doll, 1985).

An information system was recently implemented at two academic hospitals in the Western Cape. The same company, the same implementation team, and the same supervisory committee did the implementation. The two hospitals are situated at different locations in the Western Cape approximately 25 kilometers from each other. In the researchers opinion the employees from the one hospital come from a liberal English speaking culture as most employees speak English, whereas at the other workers come from a stricter Afrikaner background where Afrikaans is the predominant language.

The implementation process seemed to proceed much more smoothly at one hospital than at the other, judging from the differences in levels of patient registration backlog that arose during the first year. This project provides a unique opportunity to study the effect of cultural differences in the implementation process of an information system in a hospital.

The Statement Of The Problem

While hospital information systems are essential tools in academic hospitals, there are several critical factors that affect their successful implementation in order to achieve the objectives for which they were originally designed.

Theoretical Hypothesis

- H_1: The cultural factor, which Hofstede calls power distance, is related to the ease of implementing a Hospital Information System (HIS).

Operational Hypothesis

- H_{o1}: The cultural element referred to as power distance as measured by Hofstede's questionnaire, is negatively related to the level of backlog of patient registration generated as a measure of implementation progress.

Objectives

The overall objective of this study is to identify the importance of culture in the implementation of Information systems and how output influences the success of a system.

- The first objective is to assess the organizational culture in each hospital in terms of one of the dimensions of culture on Hofstede's checklist, namely power distance.
- The second objective is to determine whether the speed with which a HIS was implemented was a success at the two academic hospitals in the Western Cape using the reduction of the level of backlog (paper based patient registration records) as a measure of implementation progress.

Limitation

The research is confined to HIS users in the Western Cape because the province recently implemented a large academic HIS at two major hospitals in close proximity to each other.

Methodology

The research method that will be followed to achieve the objectives of the study will include both qualitative and quantitative methods. It will use an adapted form of Hofstede's checklist for assessing power distance.

The literature relevant to the research topic will be reviewed to identify those factors relating to culture that are critical to the success of H.I.S. implementation. Information will also be gathered by interviewing specific persons at the hospitals linked to the HIS. Structured questionnaires will be used in interviews to gather data that will be analyzed (Whyte and Bytheway, 1996, Olson and Ives, 1982).

The data collected will be statistically analyzed, using the Statistical Package for Social Scientists (SPSS), findings compared against the literature and conclusions drawn from this comparison.

Definition Of Key Concepts

- The Systems Development Life Cycle (SDLC)

  Is a systematic and orderly approach to solving system problems (Whitten, et al., 2000).
- Stakeholder

  Is any person who has an interest in an existing or new information system. Stakeholders can be technical or non-technical (Whitten, et al., 2000).
- System construction (systems development)

  Is the development, installation and testing of systems components (Whitten, et al., 2000).
- Systems implementation

  The stage of systems development in which hardware and software are acquired, developed and installed; the system is tested and documented; people are trained to operate and use the system and an organization converts to the use of a newly

developed system. It is the delivery of that system into production (meaning day-to-day operation) (O' Brien, 1999; Whitten, et al., 2000).

- Information Systems (IS)

  Arrangement of people, data processes, information presentation and information technology that interacts to support and improve day-to-day operations in a business as well as support the problem-solving and decision-making needs of management and users (Whitten, et al., 2000).

- Information technology

  Is a term that describes the combination of computer technology (hardware and software) with telecommunications technology (data, image and voice networks) (Whitten, et al., 2000).

- Power distance

  The extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally (Hofstede, 2001: 79).

- Hospital Information Systems (HIS)

  A hospital is itself a system, precisely a socio-technical system, in which human beings and machines carry out specific actions following established rules. A HIS is that socio-technical subsystem of a hospital which comprises all information processing actions as well as the associated human or technical actors in their respective information processing role (Winter et al., 2001).

Assumptions

The study is based on the assumption that participants will provide accurate and comprehensive information.

Structure Of The Dissertation

The introductory chapter outlines the research problem addressed by this study. It also sets out the objectives of the study and includes a brief description of the research methodology that is used.

The literature on the how power distance will effect the success criteria for evaluating an Information Systems will be reviewed in the chapter Literature Review.

The methodology used in the study is discussed in the chapter entitled Research Methodology. The analysis of the data is described in the chapter entitled Data Analysis. The research findings are discussed and compared with the findings of the literature in the chapter Conclusion.

This final chapter concludes the study, highlighting any recommendations.

Ethical Statement

To comply with internationally accepted ethical standards, no names of individuals will be recorded on research instruments. In this way anonymity will be assured. No compensation will be paid to any of the respondents for participation in the study. As with other studies, quality assurance will be done with respect to the following aspects:

- General conduct and competence of interviewers where interviews and surveys are conducted;
- Correctness and completeness of responses, especially where open ended questions are concerned;
- Quality of data capturing done by encoders; and

- Frequency distributions run to check that all variables contain only values in the accepted range and variable labels.

CHAPTER 2
LITERATURE REVIEW

Introduction

The literature reviewed in this chapter provides a panorama of what is meant by successful Information system implementation and factors particularly cultural factors that are related to implementation success.

Implementation

The implementation phase in the development life cycle of an information system (IS) brings the proposed information system to life. During this phase the programs that are written in a specific software package are tailored, tested and any new hardware to run the system are installed.

The key tasks prior to implementation thus involve:

- Programming the proposed system using a software language;
- Acquisition of the new hardware and installation thereof, which may include the upgrading of any existing hardware; and
- Installation of local area network (LAN) (Haag, et al., 2002; Post and Anderson, 2000).

Once installation is complete, the entire system is rigorously tested to ensure that it works perfectly. After testing and debugging, the IS training starts for all staff that will be using it.

Arguably the best training method will be used to ensure that everyone that has to use the system knows how to use it correctly. After these steps have been completed, the new system will be introduced to replace the old system – a process referred to as conversion. Conversion involves converting the old system to the newly developed system. Part of this process involves uploading the data from the old system to the new system. There are a number of conversion approaches according to Whitten, et al. (2000) to achieve this as shown in table 2.1.

Table 2.1. Types of conversion approaches

Conversion Plan	Explanation
Abrupt cut-over	On a specific date (usually a date that coincides with an official business period such as a month, quarter or fiscal year), the old system is terminated and the new system is placed into operation.
Parallel Conversion	Under this approach, both the old and new systems are operated for some time periods. This type of conversion method ensures that all major problems in the new system have been solved before the old system is discarded. The final cutover may be either abrupt (usually at the end of one business period) or gradual, as portions of the new system are deemed adequate.
Location conversion	When the same system will be used in numerous geographical locations, it is usually converted at one location first (using either abrupt or parallel conversion). As soon as that site has approved the system, it can be farmed to other sites. Often other sites can be cut off abruptly because major errors have been fixed.
Staged conversion	Like location conversion, staged conversion is a variation on the abrupt and parallel conversions. A staged conversion is based on the version concept. Each successive version of the new system is converted as it is developed. Each version may be converted using the abrupt, parallel or location strategies.

The best method of conversion has to be selected to ensure that the least amount of disruption occurs within the organization. These converted systems follow the same route as that of writing and introducing a new system from scratch.

In many organizations, off the shelf packages are acquired. Very seldom do these packages fit "as is" in the organization, necessitating adjustments to accommodate the new environment (McLeod and Smith, 1996).

Implementing a new information system is therefore a complex procedure in any organization that needs to be checked against certain critical factors to ensure successful implementation.

Studies on the success rates of IT projects suggest a rather low percentage of success. According to Heeks (2002) and Hugos (2003) the success rate could be as low as 30%. Since HIS cost in the order of millions of rands it is of the utmost important to understand the factors associated with success. Evidently technological excellence does not of itself lead to successful information systems in organizations and society (Walters, Broady and Hartley, 1994). The present study will pose the question "Why?", hoping to contribute to a methodology that could be effective when implementing an information system. System quality and implementation methods have been much researched using various criteria for 'success'.

The concept of 'success'

According to the Oxford dictionary (1986), success is defined as "the achievement of something desired, planned or attempted". Peacock (1995) defined success from a management perspective, namely in financial terms, in terms of positive customers reactions, smooth running of the business, according to the relationship with their staff

and other related issues. According to Whyte and Bytheway (1996) success according to project managers is determined by the completion of a project in the face of inevitable difficulties. Failure on the other hand according to Ewusi-Mensah and Przasnyski (1991) is described as consequence of falling or dwindling expectations of the implemented system.

Failure of information systems can occur at various levels. According to Goulielmos (2003) and Beynon-Davis and Lloyd-Williams (1999) these may be:

- Failure to meet design objectives;
- Failure to produce within time or budget;
- User perceived failure;
- Expectation failure; or
- Completion in excess of budget.

A complex system functions because there are stakeholders with varying interests who form a mutually supportive coalition. A system fails when this coalition breaks down and support diminishes to a standstill, bringing about terminal failure. Agreed dissolution often referred to as "mutual agreement to discontinue" is another form of failure. Hardy (2000) mentions that health organizations should plan the dissolution carefully, as physicians need to continue with practices. Termination of a system means the stoppage of all development, maintenance, and operation leading to complete failure.

Incomplete failure may be a strategy to scale down and avoid complete failure. Abandonment of a system or a project is an aspect of information systems failure. Ewusi-Mensah and Przasnyski (1991) examines abandonment while a system is under construction and of existing systems. They refer to three types of abandonment namely:

- Total abandonment where all the activities on the project prior to full implementation are completely stopped;
- Substantial abandonment where a major part or part of the project is simplified to make it radically different from the original specification prior to the full implementation; and
- Partial abandonment where the original scope of the project is reduced without making major or significant changes to the project's original specification, prior to full implementation. Failure or inability to use 100% of the functionality built into the system will also fall into the area of partial failure.

A survey done by Ewusi-Mesah and Przasnyski (1991) suggest that the largest number of project were abandoned at the implementation phase of the systems development life cycle. These results are shown in Table 2.2.

A number of models are used as frameworks for measuring IS success. Heeks (2002) examined the design and reality gaps to determine the likelihood of system project failure. He identified seven dimensions of the design-reality gap according to the ITPOSMO model. This acronym stands for Information, Technology, Processes, Objectives and values, Staffing and skills, Management and structures, and Other resources. Using the above dimension he identified three design-reality gaps that are the common sources of IS failure: namely rationality-reality gaps, private-public gaps and country context gaps. This success and failure depends on the size of the gap that exists between "current realities" and design conceptions of the information system.

Table 2.2. Stages of Project Abandonment

Life Cycle State	Frequency	Distribution
Planning	1	4.3%
Analysis	5	21.7%
Design	2	8.7%
Development	7	30.4%
Implementation	8	34.8%

Source: Ewusi-Mesah and Przasnyski (1991)

Delone and McLean (1992) devised a model in terms of which they divided success into six success dimensions. This model was based on reviewing 180 articles based on theoretical and empirical information systems research. Citation analysis suggests this model to be the most popular in the literature (Delone and McLean, 2003).

Their Model referred to as the D and M model, assesses failure along six dimensions, namely

1. System quality that can be measured in terms of ease of use and functionality;
2. Information quality that can be assessed by accuracy of reports and transactions accuracy;
3. Usage that can be gauged by actual use;
4. User satisfaction which can be surveyed;
5. Individual impact which can be assessed by improvements in job performance of the user, quality of work and better decision making; and
6. Organizational impact that can be assessed by the overall effect on the organization at the more macro level and methods include cost benefit analysis.

This model is a multi-dimensional and interdependent construct. Therefore it is important to look at the interrelationships among these dimensions. This study will examine user satisfaction namely, dimensions 3 and 4 of the D and M model, using a

knowledge, attitude and perception (KAP) survey relative to the CLINICOM system from data entry to report generation (i.e. data retrieval) and usage.

Factors influencing IS success

Al-Mashari and Zairi (1999) identified and analyzed important success and failure factors that potentially influence the implementation process. The list of factors raises concerns relating to information technology, as the effective observance thereof could become a key component to success.

Technical factors such as design, network capabilities and ease of use will influence success and implementation success. An information system, however, is a system that is required to function in a human organizational setting. Since human beings are cultural organisms, culture is an important set of factors influencing their behavior. Culture is therefore expected to be an important set of factors in the implementation of an information system. This has unfortunately been overlooked (Oram and Headon, 2002).

Culture

Several researchers have attempted to define culture. For example, Smith and Peterson (1988) define culture as "agreed ways of interpreting signs, symbols, artifacts and actions". Therefore, culture is a complex system of meaning and behavior that defines the way of life for a given group. Characteristic of culture is that it is shared

philosophies, values learned, taken for granted, symbolic and variable over time and place e.g. childhood discipline tactics or beliefs about issues (Deal and Kennedy, 1982; Schein, 1992).

Hofstede (2001, 4) calls culture the 'software' or 'collective programming' of the mind, which distinguishes the members of one group or society from those of another. Culture can thus be said to be the shared values of a group of people. From a study of 116, 000 cases covering IBM branches in 40 countries Hofstede (2001) derived five dimensions by which cultures differ and can be measured. These are:

- Power distance, which refers to the extent to which less powerful parties accept the existing distribution of power and the degree to which adherence to formal channels is maintained. Power distance index (PDI) relates to the concentration of authority (Hofstede, 2001:102). Thus the higher the PDI the greater the concentration of authority;
- Uncertainty avoidance, which is related to the degree to which employees are threatened by ambiguity, and the relative importance to employees of rules, long term employment and steady progression through well defined career ladders;
- Individualism and collectivism, which is related to the level at which behavior is appropriately regulated;
- Masculinity and femininity, which is related to the division of the emotional roles between men and women; and
- Long-term and short-term orientation, which is related to the time frame used e.g. short-term (involving more inclination towards consumption, saving face by keeping up whereas long-term (involving preserving status-based relationships, thrift, deferred gratifications).

Culture as a factor in IS implementation

Often the Information Systems as well as the implementation strategy are designed in the 'North'. Odedra et al. (1993) defines the "north" as being the developed countries. Odedra et al. (1993) questioned whether systems analysis developed in the "north" is transferable since there appears to have been very little impact but rather increased dependency on the North. This is because the less developed countries lack education and training to develop the skills of the people (e.g. systems analysis, programming, maintenance and consulting skills). There have been several studies of cultural issues as factors that may potentially influence the installation of an IS (Kedia and Bhagat, 1988; Odedra et al., 1993).

The work of Coombs, Doherty and Loan-Clarke, (1999); Chau and Hu, (2002); Maull, Transfield and Maull, (2003); Poksinska, Dahlgaard and Eklund, (2003); Al-Mashari and Zairi, (1999); and Nemati and Barko, (2003) may be included in this list. These have been summarized and tabulated in Table 2.3.

Table 2.3 suggests that there are three areas that are referred too most frequently, namely training, commitment and cultural change.

Training is a cultural issue that affects the change process required to implement any new system in an organization (Deal and Kennedy, 1982) that is what implementation is all about. Training includes education (Al-Mashari and Zaire, 1999),

support (Coombs, Doherty and Loan-Clarke, 1999), external orientation and learning (Al-Mashari and Zaire, 1999) and the level of end-user expertise (Nemati and Barko, 2003).

Table 2.3. Cultural issues impacting successful IS implementation.

Characteristics	Coombs, Doherty and Loan-Clarke (1999)	Chau and Hu (2002)	Maull, Transfield and Maull (2003)	Poksinska, Dahlgaard and Eklund (2003)	Al-Mashari and Zaire (1999)	Nemati and Barko (2003)
Perceptions		✓				
Attitudes		✓				
Behavioral Intention in accepting the technology		✓				
Service improvement	✓		✓			
Cultural Change	✓	✓	✓		✓	
Training	✓			✓	✓	✓
Commitment	✓			✓	✓	
Implementation of corrective action				✓		
Revision of Motivations and rewards systems					✓	
Effective Communication			✓		✓	
Improved overall job performance	✓					
Satisfaction	✓					

Commitment is another culturally determined factor that influences the working environment. Yukl (1998) describes commitment as the outcome in which the target person internally agrees with a decision or request from the agent and makes a concerted effort to carry out the request or implement the decision effectively. Gbadamosi (2003) discusses organizational commitment in terms of three components namely a strong belief in and acceptance of organization goals and values (IDENTIFICATION), a willingness to exert considerable effort on behalf of the organization (INVOLVEMENT)

and a strong desire to maintain membership in the organization (LOYALTY). The commitment of top management (Poksinska, Dahlgaard and Eklund, 2003), senior management (Coombs, Doherty and Loan-Clarke, 1999), middle management and workers (Poksinska, Dahlgaard and Eklund, 2003) have major influences on the success of any system or project. Strong leadership, effective teams and empowerment (Al-Mashari and Zaire, 1999) assist the implementation process by demonstrating complete commitment to the system. Commitment may originate from the top (the high Power Distance Index) or be solicited and developed from the ground (in low PDI society). Pasa (2000) investigated the influences of leadership on behavior in a high power distance culture and found that leadership influences one or more subordinates in an organization. This influence could vary considerably as a result of the cultural context in which it was exercised. Therefore, leadership qualities have the ability to influence, motivate and enable others to contribute towards the effectiveness and success of an organization.

Effective communication between superiors and subordinates influences the implementation process that would include the reporting structure within an organization (Maull, Transfield and Maull, 2003). Communication is required not only between the supervisor and subordinates, but also between the implementation team and the users. Preferably this communication should transcend organizational and cultural barriers (Kakabadse and Korac-Kakabadse, 2000).

Within any organization, when developing or implementing information systems a team is formed. This team would be multi-functional or multidisciplinary. The team members would each be skilled in areas that will be developed relating to the project. It is possible that several team members may be skilled in more than one of these areas. According to McLeod and Smith (1996) multidisciplinary teams perform well on tasks that are non-routine and provide significant challenges. Failure to work in a team can either lead to a system succeeding or failing.

Implementing an information system normally requires fundamental organizational change in terms of organizational structure, culture and management process (Al-Mashari and Zaire, 1999). Cultural change refers to changes relative to technological advances or having an influence on behavior (Cray and Mallory, 1998). Cultural change includes human involvement (Al-Mashari and Zaire, 1999), user involvement (Coombs, Doherty and Loan-Clarke, 1999), peer influence (Chau and Hu, 2002) and an adequate job integration approach (Al-Mashari and Zaire, 1999).

Other issues that might potentially affect implementation include perceptions, service and communication. Chau and Hu (2002) considered the perceptions of users when using the technology. The usefulness and the ease of use of the technology impact the attitudes of workers towards accepting the newly introduced system. Service improvement that is the external communication of the system includes the most efficient way in direct patient care (Coombs, Doherty and Loan-Clarke, 1999).

From Table 2.3, it is evident that while culturally related issues were identified, they were not all examined relative to success factors in Information Technology implementation or usage. Organizational aspects that include culture need to be considered, since technology alone cannot lead to adequate solutions (Slay, 2003). According to Schein (1983: 13)

> "... An organizational culture depends for its existence on a definable organization, in the sense of a number of people interacting with each other for the purpose of accomplishing some goal in their defined environment ..."

Culture is a term used in the workplace regularly (Willcoxson and Millet, 2000) and according to Schein (1983) all organizations have their own individual culture. How would one define culture? Culture due to its complexity, is difficult to define because the analysts have a variety of ways of looking at the concept (Pheng and Yuquan, 2002; Schein, 1992). Some facets that influence culture are represented in Figure 2-1 below. It is necessary to point out that relationships between various elements of culture are multidimensional.

A key element of culture is language, as it determines a tribe or ethnic group (Deal and Kennedy, 1982). Language is defined as a set of symbols and rules that provides a complex communication system and is important because it is a reflection of culture. Language is an important part of establishing and maintaining relationships in organizations (Cray and Malloy, 1998).

In South Africa Afrikaner nationalism is based on the interaction of language, religion and race. The Afrikaans language identified the group as a separate entity

distinct from the English-speaking group. Calvinism provided an ideology that sanctioned the belief that Afrikaners were born to rule (Simons and Simons, 1983).

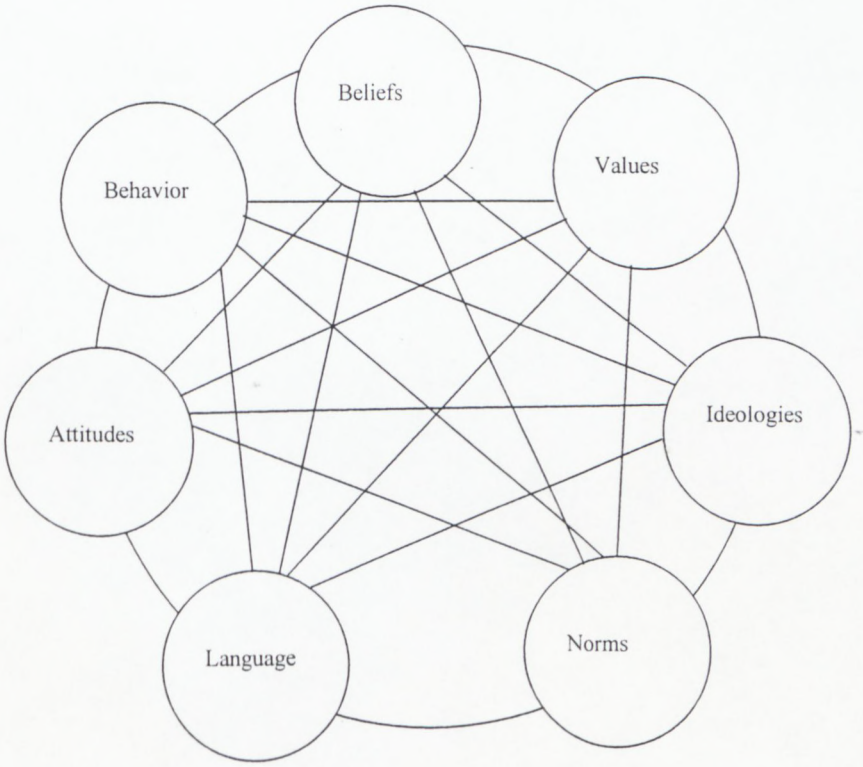

Figure 2-1. The multi-facets of culture. (Adpated from Pettinger, 2000)

Norms are another important element of culture, as they indicate the values held by the majority (Hofstede, 2001). A norm is defined as implicit and explicit cultural expectations that govern behavior in situations and is important because it is a form of social control, even in absence of formal laws.

Belief is defined as a meaning system around which culture is organized and is important because it is a source of integration and conflict within and across societies.

Beliefs motivate behavior of individuals as well as their values Pettinger (2000). Hayek (1982) describes liberalism as an openness to new ideas, freedom of thought, of speech and of the press and a belief in individual freedom of action on some sort of equality of all men. This belief system influences the culture around the individual. Calvinism on the other hand is based on the all-comprehensive system of thought that embraces "the absolute sovereignty of God in the natural and moral spheres" (Meeter, 1939). Calvinist Afrikaners believe that they were elected by God, and those that were not elected could not enter into the company.

According to Pettinger (2000) values are defined as abstract standards in a society that defines ideal principles and is important as a form of social control and a source of integration and conflict. To people within an organization a clear set of values, give them a sense of identity.

There may be more than one culture within a group. The dominant culture in that group is defined as the culture of the most powerful subgroup. The dominant culture will have over arching influence on education, media, public policy and other related issues. South Africa is a multicultural society.

Subcultures are defined as groups for whom values and norms of behavior differ from those of the dominant culture. Hospitals by nature are hierarchical establishments made up of subcultures, with strong inter-department barriers, staffed by professionals who have previously worked with their own traditional autonomy remaining divided

from management (Ennis and Harrington, 1999). Zabada et al. (1998) also refers to the subcultures that exist within a hospital. He refers particularly to physicians' subculture. These professionals form what can be called occupational subcultures, in the sense that they share in common a distinctive ideology and identifiable cultural forms and practices that are inherent in their occupation.

Countercultures are defined as groups that develop as a reaction against the values of the dominant culture. This is important, as it is a signifier of a society's present values and benchmark of social change and unrest.

Organizational Culture

All organizations have a type of culture. A hospital culture informs the way that they treat and heal people.

According to Bate (1995:15) organizations can be characterized by particular cultural perspectives when focusing on the 'humanness' of organizations, regarding them as social rather than physical entities, made up of people talking, acting, interacting and transacting with each other. Hence the idea that culture exists not so much 'inside' or 'outside' people as 'between' people. This conception suggests that a cultural effort (which may include an HIS implementation) must be seen as a form of social intervention aimed at altering the quality of this 'betweenness' in some way or other.

Organizations such as businesses and hospitals may have distinct cultures (Ennis and Harrington, 1999). Smith and Peterson (1988), define organizational culture by looking at the relationship between manager and the subordinate. Pettinger (2000) defines organizational culture as "the ways in which things are done here".

Schein (1983: 14) for example writes that

> "... Organizational culture is the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration. ..."

A culture within an organization is formed from the collection of traditions, values, policies, beliefs and attitudes that prevail throughout the organization (Pettinger, 2000). Organizational culture thus refers to its underlying values, beliefs and principles that serve as a foundation for an organization's management system as well as the set of management practices and behaviors that both exemplify and reinforce those basic principles. It is therefore, defined by the employees who work within in the organization. To identify the culture of an organization, the rites and ceremonies, language, legends and stories, physical setting and symbols and artifacts need to be examined. An institution like a hospital has a culture of its own, as well as the aggregation individuals' culture that is employed within the organization (McDermott and O'Dell, 2001). An organization's culture is thus the sum of the way its people think.

According to Hofstede (2001) organizational culture is bound by the culture of the nation. Thus he developed the notion of power distance. Therefore, demographic details such as age, education, language and gender play a role in organizational culture.

Power distance describes the distribution of power among individuals and groups in a society. It explains that in a particular society there is a willingness to accept a certain inequality in power, which allows for there being some who lead and others who follow. Low power distance means "absolute democracy" to "absolute dictatorship" with all the power concentrated to a few people. It is important to realize that in Table 2.4 listed below, the descriptions are of two extreme environments and the characteristics of most organizations would lie somewhere in the middle.

South Africa was one of 40 countries that participated in the first study on cultural dimensions done by Hofstede (2001, 44). The power distance for South Africa is 49, suggesting that it has a power distance rating that is neither low nor high.

Hofstede (2001: 86) computed the power distance index (PDI) on the basis of the country mean scores or the three questions:

- Non-managerial employees' perception that employees are afraid to disagree with their managers;
- Subordinates perception that their boss tends to take decisions in an autocratic (1) or persuasive/paternal way (2);.
- Subordinates preference for anything but a consultative (3) style of decision-making in their boss: that is for an autocratic (1), a persuasive/paternalistic (2), or a democratic style (4).

Table 2.4. Key Differences between Low and High PDI factors

In the work organization	
Low Power Distance Index (~0-50)[1]	High Power Distance Index (~51-100)
Decentralized decision structures; less concentration of authority.	Centralized decision structures; more concentration of authority.
Flat organization pyramids.	Tall organization pyramids.
Small proportion of supervisory personnel.	Large proportion of supervisory personnel.
Hierarchy in organizations means an inequality of roles, established for convenience.	Hierarchy in organizations reflect the existential inequality between higher-ups and lower-downs.
The ideal boss is a powerful democrat; sees self as practical, orderly, and relying on support.	The ideal boss is a well-meaning autocrat or good father; sees self as benevolent decision maker.
Managers rely on personal experience and on subordinates.	Manager rely on formal rules.
Subordinates expect to be consulted.	Subordinates expect to be told.
Consultative leadership leads to satisfaction, performance and productivity.	Authoritative leadership and close supervision lead to satisfaction, performance and productivity.
Subordinate-superior relations pragmatic (down-to-earth)	Subordinate-superior relations polarized (division), often emotional.
Institutionalized grievance channels in case of power abuse by superior.	No defense against power abuse by superior.
Subordinates influence by bargaining and reasoning.	Subordinates influenced by formal authority and sanctions.
Managers (increasingly) satisfied with career.	Managers dissatisfied with career.
Openness with information, also to non-superiors.	Information constrained by hierarchy.

Adapted from Hofstede (2001)

Chapter Summary

This chapter has indicated that most information systems that have been implemented have not been successful. Reasons were listed for success as well as failure and looked at how culture influences the implementation process. Culture and organizational was defined. Power distance, a cultural dimension, was analyzed.

[1] It is possible for scores to be above 100 and below zero

In the next chapter, the research methodology is described to achieve the stated research objectives.

CHAPTER 3
RESEARCH METHODOLOGY

Introduction

The research method that will be followed to achieve the objectives of the study will include both qualitative and quantitative methods. Both qualitative and quantitative research can be effectively combined in the same research project (Strauss and Corbin, 1990; Kaplan and Duchon, 1988).

Quantitative Research

The quantitative research approach looks at investigating things that can be observed and measured in some way. According to Brewerton and Millward (2001) quantitative approaches to studying culture emphasize their quantifiable nature. In the area of culture quantitative approaches are also concerned with identifying the predictive power of cultures. For example the relationship between organizational culture and performance can be examined by measuring distinct elements or dimensions of culture in as objective a way as possible.

Surveys are usually quantitative in nature and aim to provide a broad overview of a representative sample of a large population. The mode of observation comes from face-to-face interviews, structured questionnaires and telephone interviews.

The strengths of this design are that it can assess attitudes, is relatively inexpensive and has the ability to document social change. The limitations include the social pressure in interview settings, lack of depth and data that are sometimes very sample and context specific (Mouton, 2001).

Studies that systematically look for relations and test hypotheses in life situations like communities, organizations, factories are called field studies. According to Mouton (2001) field studies are usually quantitative in nature and aim to provide broad overviews of representative samples of large populations. The sources of information come from questionnaire, interviews and structured observations. The strength of this method is that the natural setting increases generalisability of the results.

Other methods of quantitative research include experimental designs, secondary data analysis and evaluation research relating to experimental and quasi-experimental outcome studies.

Qualitative research

The qualitative approach is concerned with developing explanations of social phenomena. This research method attempts to increase understanding of a situation from the researcher point of view. Strauss and Corbin (1990) claim that qualitative methods can be used to better understand any phenomenon about which little is known. According to Brewerton and Millward (2001) qualitative approaches to culture, by contrast, seek to characterize the rich, emergent, constructed and multi-dimensional

nature of culture using methods such as ethnographic approaches, often requiring 'psychological immersion' in an organization.

The ethnographic approach aims to provide an in-depth description of a group of people and cultures. Ethnography in the health care setting helps health care professionals to develop cultural awareness and sensitivity and enhances the provision and quality of care for people from all cultures (Hancock, 1998). The sources of data come from participative observation, non-participative observation and field studies. The strengths of observational studies are that they are in a "real world" setting, can focus on subcultures and give in-depth insights to situations. The weaknesses or limitations of this type of research are that it lacks generalisability of the results, non-standardization of measurement and the data collection and analysis can be very time consuming. Generalisability refers to the ability to extend the results of an investigation to other persons, settings, or times (Brewerton and Millward, 2001).

Cases in research are usually the same as a unit of analysis or the unit on which variables are measured. The unit can be a person, an organization or an institution. Qualitative researchers use "case-oriented approach", meaning that they examine a wide variety of aspects of one or more cases (Neuman, 2000). Case study claims to offer a richness and depth of information not usually offered by other methods (Hancock, 1998).

Sarantakos (1998) suggest the following characteristics that demonstrate that it is different from other forms of investigations:

- It studies whole units and not aspects of these units;
- It employs several methods to avoid or prevent error and distortions;
- Often studies are single units;
- It allows the respondents to be an expert and not just a source of data; and
- It studies a typical case.

Case studies can investigate a large variety of research objects, ranging from behaviour and interrelations, to persons and groups, to organizations and whole cultures (Sarantakos, 1998). The primary focus of case-study comparative research is to compare particular societies or cultural units, not to make broad generalizations (Neuman, 2000).

Other methods of qualitative research include grounded theory and phenomenology.

Sample selection

The difference between sampling methods in quantitative and qualitative sampling is that in quantitative methods large samples are required, selected randomly, whereas in qualitative methods the focus is on in-depth, small samples.

Reasons for sampling according to Sarantakos (1998) include:

- In many cases, the entire population cannot be covered;
- Sampling provides a better option since it addresses the survey population in a short period of time and produces comparable and equally valid results;
- It is more economical i.e. it requires less printing and in general cost less;
- Samples require less time and quick answers;
- Demands less labour, since a smaller group is targeted;
- Offer more detail and high degree of accuracy.

Table 3.1. Sampling methods and descriptions

No.	Type of Sampling	Description
A	Random probability Sampling	The sample size is a function of the population size and the desired confidence level.
1	Simple random sample	Gives all units of the target population an equal chance of being selected.
2	Stratified random and cluster samples	The population is divided into areas and a sample if drawn from each area.
B	Purposeful Sampling	Selects information-rich cases for in-depth study. The sample size depends on the purpose of the study.
1	Intensity sampling	This focuses on cases that manifest the phenomenon of intense interest (not extreme).
2	Snowball or chain Sampling	Identifies cases of interest from people who know people who know people who know what cases are information rich, i.e. good examples for study and good interview subjects.
3	Criterion Sampling	Picking all the cases that meet a certain criteria

Adapted from Patton (1990)

Other methods of sampling are extreme or deviant case sampling; maximum variation sampling; convenience sampling; purposeful random sampling; homogeneous samples; combination or mixed purposeful sampling; opportunistic sampling; typical case sampling; stratified purposeful sampling; theory-based or operational construct sampling; confirming and disconfirming cases; sampling politically important cases and critical case sampling (Patton, 1990).

This study investigates the organizational culture at two hospitals to determine if this was a factor in the speed of Hospital Information System implementation. The H. I. S. under study is essentially an administration system. The sampling frame will therefore

be administrative clerks, receptionists and their supervisors. The aim is to survey the views of all the personnel at work on these levels at both hospitals.

Reliability and Validity

It is important for the reliability of parts of the questionnaire to be assessed. The term reliability according to Bouma (2000) and Melville and Goddard (1996) refer to determining whether the measurements are consistent. This means that if the same experiment is performed under the same conditions, the same measurements will be obtained. Reliability is concerned with the accurate reporting of the research findings. The more accurate the finding, the more reliable the research process is (Bouma, 2000). Consequently the design of the reliable instrument for measuring people's attitudes requires careful planning.

Melville and Goddard (1996) suggests 3 reliability check approaches namely:

- Test-retest method is where the researcher administers the same instrument at a later time and check if the same results are obtained. Many respondents (people answering the questions) are not happy having to answer the same questions twice, however, and the time lag needed between test and retest can also cause responses to change and respondents to be 'lost'. Memory might also interfere with responses.

- Equivalent-form method is where each question on the original test / interview / questionnaire is rephrased so that there are two different tests that 'look different' but effectively ask the same questions. If there is a high correlation between people's responses to the original questions and to the rephrased questions, then there is an indication that the test is reliable (and that people aren't just 'answering at random').

- Split-half method is a modification of the equivalent form approach where the two tests (original and equivalent form) are combined into one. The fact that for example question 14 and question 87 are differently worded versions of the same

question will escape most respondents notice, and thus make it possible for the test to be given at a single sitting rather that at two.

Compared to reliability, validity is defined as the degree to which an instrument actually represents what it claims to represent (Brewerton and Millward, 2001). Validity is thus the extent to which instrument measures what it is intended. It reflects the extent to which a research effect can be trusted. The issue of validity revolves around the questions of whether the variable adequately reflects the researchers understanding of the concept.

There are several validity techniques namely:

- Criterion-related validity, which measures whether an instrument accurately predicts some particular variable.
- Content validity, which requires the researcher to find a technique that will provide some information on all the components of the research topic. If no instrument exists, expert opinion on each question on the instrument is required to determine whether or not each question actually tests what it is suppose to be. This opinion must determine whether the question constitutes a valid and representative test of the variable being measured.
- Construct validity uses an existing instrument with a known theory in the area the researcher wants to measure, comparing the result with the new instrument, and checking if there is a correlation. (Melville and Goddard, 1996)
- Face validity investigates the way the instrument appears to the participant, whether it is too difficult or too easy to complete (Bless and Higson-Smith, 1995). This type of validity relies on the subjective judgment of the researcher when it relates to the instrument used for measurement or the sample of measurement (Leedy, 1997).

Data Collection

Data collection methods include observation (Mouton, 2001), modeling and simulation (Melville and Goddard, 1996) and interviewing (Frazer and Lawley, 2000).

To conduct an observation means to "watch what happens". Mouton (2001) describes 3 types of observations namely: experimental (controlled) recordings; systematic field observations; and participant observations. To gather data collection in any of these ways, requires that the measurement of the variable has to be decided before the data collection commences. Bouma (2000) suggests that if the observation is not directed by the hypothesis or the research question, the researcher is likely to become distracted or overwhelmed with information and gather irrelevant data.

According to Melville and Goddard (1996), a model is a simplified representation of a system. A simulation on the other hand is a process of model creation and usage. Modeling is often used as a research tool as it is inexpensive. A model can either use mathematical analysis to solve a problem or a computer simulation. Simulations need to mimic the exact problem it is trying to solve, as when the input data is not truly representative, the simulation is useless.

An interview is a one-on-one verbal interaction between the researcher and the respondent (Melville and Goddard, 1996), whereas a questionnaire is a printed list of questions which respondents are asked to respond to.

Types of interviews

- Structured interviews where the interviewer asks each respondent the same question in the same way.
- Semi structured interviews where the interviewer asks open-ended questions to the respondent. Cues and prompts are used to encourage the respondent to elaborate to the answers.
- Unstructured interviews have very little structure. The interviewer has no plan or structure on how to approach the topic, and therefore questions are asked, relating to the earlier responses given (Hancock, 1998).

Types of questionnaires

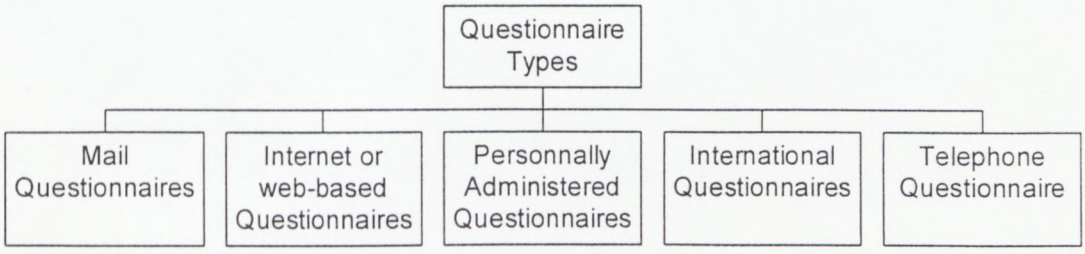

Figure 3-1. Adapted from Frazer and Lawley (2000)

Personally administered questionnaires are one-on-one interactions (interviews) Frazer and Lawley (2000). To ensure that the data is objectively analyzed, requires effective planning beforehand (Melville and Goddard, 1996). The questions that are drawn up beforehand are related to the method used to collect the data.

The advantages of questionnaires are that they are:

- Easy for people to understand;
- Very useful if there are a large number of respondents;
- Quick to complete; and
- Allow respondents to answer the questionnaire at a time convenient to them (Leedy, 1997).

Other methods of data collection include testing (Mouton, 2001), selecting and analyzing texts (Mouton, 2001), laboratory work (Melville and Goddard, 1996), and focus groups (Hancock, 1998).

This research project seeks data relative to information system success and implementation, culture relating to power distance, and system usage. Open as well as closed questions were used to gain insight into how the respondents felt about the CLINICOM Hospital Information System. Questionnaires have been used in studies of culture (Hofstede, 2001; Olson and Ives, 1982 and 1984). The latter authors studied system success from the user involvement point of view.

Questionnaires

There are different types of questionnaire namely mail questionnaires, personally administered, telephone or internet and web-based questionnaires, that will affect the final design of the questionnaire. Mail questionnaires are self administered by the respondent. Therefore clear instructions must be given and the questions must be clear. With face-to-face (personally) interviews more complex questions and explanations can be used because of the greater interaction possible between the interviewer (researcher) and the respondent. Telephone interviews need to be kept short and simple as respondent might find them intrusive. Questionnaires that use the internet, should be similar to mail questionnaires, as well as easy responses, e.g. clicking buttons for choices.

Questionnaires, interviews and official statistics will be used to obtain the relevant information (Karltun, Axelsson and Eklund, 1998). Frazer and Lawley (2000, 4) define a questionnaire as a set of questions used to obtain information from respondents. There are three types of response formats in a questionnaire namely: open-ended, close-ended and scaled-response questions. Open-ended questions allow respondents to give their own opinions. The primary disadvantage of these questions is that they are difficult to analyze and time-consuming to answer. Close-ended questions allow for a set of answers, determined by the researcher, to be presented to the respondents. There are three forms namely, single, dichotomous or multichotomous. Single responses are where the respondents only have to give one answer. Dichotomous are where two response items are provided. Multichotomous are where multiple alternatives are listed. Scaled-responses use a scaling method to determine the respondent choice. The method allows respondents to express their degree of agreement or disagreement on a particular scale. Likert scales as types of scaled response are used to measure attitudes (Naoum, 1998:79).

Question Design

After completing a literature search on power distance, the design of the questionnaire was informed by the study of Hofstede (2001) after obtaining permission to use parts of his questionnaire (see appendix A). The information systems success coincides with the success factors identified in literature. The final survey instrument consists of 5 sections, namely:

- Demographic details where respondents provide information about themselves e.g. their job title and highest qualification;

- Management style where the respondents compare their view of the ideal manager with their own type of supervisor;
- Employment environment where respondents provide data about their relationship with their supervisor and the kind of information gathered on the hospital information system;
- Staff attitudes towards the CLINICOM IT system; and
- Frequency of their use of the information system.

The following two questions are representative of the open-ended questions used in the study namely:

- Provide reason for your answers.
- Name the types of reports received.

Both questions were probing questions providing respondents with the opportunity to elaborate on their answers to close-ended questions.

To determine the attitudes of staff towards the CLINICOM IT system, a 5-point Likert scale of agreement was used. For example, on a scale of 1 – 5 where (1 = Strongly agree; 2 = Agree; 3 = Undecided; 4 = Disagree; 5 = Strongly disagree), how do you feel about each of the following statements?

Reasons for using scales as identified by Sarantakos (1998) include:

- High coverage of all significant aspects of the concept;
- Scales allow a high degree of precision and reliability;
- Scales permits comparison between sets of data; and
- Simplicity with regards to the collection and analysis of data.

The questionnaire is attached (see appendix B).

Questionnaire administration

Clerical staff are the most frequent users of the information system at both hospitals. Since they were also involved in the implementation of the new system, they were best placed to respond to the questions asked. Staff members that worked in medical records were excluded from the sample, as their only function was to look after the patient folders. At both hospitals, the total staff complement consisted of 400 staff members who were actively involved with the system on a daily basis i.e. 210 staff members at TBH and 190 staff members GSH. A staff member at each of the specified hospitals was approached to distribute the questionnaires to staff at the weekly meeting. To ensure confidentially, the researcher did not want supervisors to collect the completed questionnaires. Rather respondents had to return their questionnaires via the internal mail to someone not directly related to them.

The questionnaires were given to the supervisors at their weekly meeting, to distribute among the staff. A due date was stipulated on the questionnaire, namely one week to complete after receiving it. By the end of the week, only a few responses were returned. The researcher with the contact person walked through the hospital, to physically collect the questionnaires. At Groote Schuur many people had forgotten, others handed it to their supervisors, others left it at home and some claimed not to have received it. At Tygerberg Hospital, people had similar excuses, but some added that it was not part of their jobs description while others thought it was a joke. Groote Schuur staff members were more eager to participate and some indicated that they would like to

know the results, whereas TBH was very resistant. Their superior indicated that he could not force them to complete the form. By the time that the analysis was done, GSH had a higher return rate than TBH.

Confidentiality

The respondent's anonymity was guaranteed by not including any details on the questionnaire that might be directly linked to any response. A copy of the questionnaire is included as Appendix B.

Response rate

There are three types of responses to the questionnaire namely nonresponse, refusal and response (Neuman, 2000). The refusal rate is the percentage of contacted respondents who refused to participate in the study. The response rate is the number of eligible respondents who actually responded divided by the total number of eligible respondents approached (Frazer and Lawley, 2000, 74).

If the response rate is less than 75%, the researcher can compute the following kinds of "nonresponses":

- Being unable to locate the repondent;
- Located the respondent but could not get hold of them;
- Located the respondent, but the person refused to participate;

- Located and contacted the respondent who agreed to participate, but the respondent failed to answer most questions on the questionnaire (Neuman, 2000).

An acceptable response rate varies depending on the type of data collection. Neuman suggests that there is a 90% response rate when using face-to-face interviews, a 80% response rate when using telephone interviews. For self-administered questionnaires the response rate can vary depending on the how much influence the researcher has on the respondents. At GSH 190 questionnaires were handed to the supervisors and 90 were returned i.e. a 47% response rate. At TBH 210 questionnaires were handed to the supervisors and 34 was returned. Of the 34 that were returned 1 was not completed resulting in an overall response rate of 16%.

Since follow-up techniques help increase the overall response rate, procedures were followed that included physically walking through the hospital, reminding staff of the need to participate and periodic phone calls to the supervisors.

Data analysis

The collected data was captured and encoded using Statistical Program for Social Sciences (SPSS). This package will also be used to statistically analyze the data.

Hofstede's global method to calculate the Power Distance Index (PDI) will be used to characterize the respective hospitals and compare against the South African value obtained by Hofstede in his study (2001). The PDI formula uses the following variables

from the study namely, the preferred type of manager, the actual manager, and whether the employee disagrees with the employer. It must be noted that this produces a single overall value for the respective hospital and no variability (measures of dispersion) is relevant.

The actual formula used is:

PDI = 135 – (% answer 3 in A54) + (% answer 1 or 2 in A55) – 25 X (mean score B46)

A HIS implementation progress will be used to measure the success of the system, namely using the usefulness of the information as a variable.

Means and standard deviations for each hospital will be computed and these means will be compared for significance using the independent sample t-test as well as comparing the means of 2 samples from SPSS. Attitude to the HIS will be compared by selecting the following questions rated on a scale 1 (strongly agree) to 5 (strongly disagree) i.e. questions 35 to 51. Question 49 and 51 were the reverse of questions 48 and 50. This strategy was used to double check whether the respondents were consistent with their answers.

Chapter summary

In this chapter, the methods used to gather the data from the hospitals, the questionnaire design and the sample selection were discussed. As the researcher had a low response rate, the follow up procedures were also mentioned.

In the next chapter, the findings after the analyses of data are presented and analyzed.

CHAPTER 4
DATA ANALYSIS

To draw conclusions from the empirical data collected, statistical evidence is necessary to establish the existence and strength of relationships between the variables represented by the data. The SPSS (Statistical Program for Social Sciences) computer software was used to analyze the data from the survey instruments. The findings of the questionnaire and the analysis of these findings are presented in this chapter.

Questionnaire Analysis

This questionnaire was designed to determine the management style of the supervisor at each hospital, as this is required in calculating the power distance index. It was also designed to determine the staff attitudes towards the CLINICOM hospital information system. The success of an information system is dependents on the users attitudes towards the system and how they view the information that is produced. A cross tabulation will be done on questions per hospital.

Questionnaires were returned by 123 respondents, namely 90 questionnaires from GSH i.e. a response rate of 47% and 33 from TBH i.e. a response rate of 16%.

Profile of respondents at GSH

Most respondents (70.1%) were female and the predominant home language was English (52.3%). The mean period of employment of respondents was 16.07 years, with periods of employment ranging from 0.5 years to 32.58 years. Employees held their current positions of employment for a mean period of 11.72 years with these periods ranging from 0.5 years to 32.58 years. The mean age of respondents was 39.44 years ranging from 20 years to 64 years. With respect to the years of formal education completed, respondents reported a mean of 11.53 years of schooling ranging from 9 to 17 years. Most respondents matriculated (52.8%) according to Table 4.1. Of the respondents 8.9% were managers. A further, 77.2% of respondents were not managers but worked most of the time in an office. Of these 100% carried out work for which normally no higher-level professional training was required. Additionally, 13.9% of respondents were not managers and did not work most of the time in an office. Of these 90.9% carried out work for which normally no vocational training other than on-the-job training was required.

Profile of respondents at TBH

Most respondents (66.71%) were female and the predominant home language was Afrikaans (68.8%). The mean period of employment of respondents was 14.18 years, with periods of employment ranging from 0.58 years to 26 years. Employees held their current positions of employment for a mean period of 11.10 years with these periods ranging from 0.58 years to 25.58 years. The mean age of respondents was 39.53 years ranging from 25 years to 59 years. With respect to the years of formal education completed, respondents reported a mean of 11.96 years of schooling

ranging from 10 to 16 years. Most respondents matriculated (48.5%) according to Table 4.1. Of the respondents none were manager. A further, 90% were not managers and worked most of the time in an office. Of these 96.3% carried out work for which normally no higher-level professional training was required. Additionally, 10% of respondents were not managers and did not work most of the time in an office. Of these 100% carried out work for which normally no vocational training other than on-the-job training was required.

Table 4.1. Highest Qualification

		GSH		TBH	
No.	Question	N	Percentage	N	Percentage
10.	Lower than Grade 10 (Std 8)	4	4.5	0	0
	Grade 10 (Std 8)	15	16.9	4	12.1
	Grade 11 (Std 9)	14	15.7	4	12.1
	Grade 12 (Std 10 / Matric)	47	52.8	16	48.5
	Technical College	1	1.1	4	12.1
	Technikon Diploma	6	6.7	2	6.1
	University Degree	1	1.1	1	3.0
	Other	1	1.1	2	6.1
	Total	89	100	33	100

Respondents indicated their level of agreement using a 5-point Likert scale of agreement with six statements presented to them about their employment environment. The ranking of the means of the responses to these statements is shown in Table 4.2.

Respondents of both hospitals were in most agreement (GSH mean = 1.79 and TBH mean = 1.57) with IT staff taking the lead in introducing new system functions to users. The next statement that they were most in agreement (GSH mean = 2.36 and TBH = 2.37) with was that an organization's rule should not be broken – even when the employee thought it was in the organization's best interest. They were in least

agreement (GSH mean=3.30 and TBH = 3.60) with the statement that users generally did not understand computers.

This finding suggests that according to the respondents the working environment of both the institutions are similar.

Table 4.2. Employment environment

Rank	Statement	Hosp	SA	A	U	S	SD	Mean[2]	Std. Dev.
1.	IT staff must take the lead in introducing new system functions to users.	GSH	56.1	24.4	9.8	3.7	6.1	1.79	1.15
1		TBH	60.6	27.3	6.1	6.1	0	1.57	0.87
2.	An organization's rule should not be broken – even when the employee thinks it is in the organization's best interest.	GSH	25.1	33.3	25.0	13.1	3.6	2.36	1.11
2		TBH	40.6	15.6	12.5	27.1	3.1	2.37	1.36
3.	A large corporation is generally a more desirable place to work for than a small company.	GSH	21.4	33.3	17.9	17.9	9.5	2.60	1.27
3		TBH	25.0	37.5	15.6	18.8	3.1	2.37	1.16
4.	Quite a few employees have a natural dislike of work and will avoid it if they can.	GSH	16.7	29.8	27.4	17.9	8.3	2.71	1.19
4		TBH	28.1	31.3	9.4	18.8	12.5	2.56	1.41
5.	Most people I work with can be trusted.	GSH	17.6	31.4	23.3	18.6	9.3	2.71	1.22
5		TBH	18.2	27.3	12.1	27.3	15.2	2.93	1.39
6.	Users generally do not understand computers.	GSH	4.8	17.9	29.8	38.1	9.5	3.30	1.03
6		TBH	3.0	21.2	6.1	51.5	18.2	3.60	1.12

In Table 4.3 the respondents were asked to indicate on a 5-point Likert scale of agreement their responses to the ten statements presented to them concerning the information they worked with and their attitude towards the HIS.

[2] On the 5-point Likert scale of agreement, the smaller the mean the greater the level of agreement

Respondents of GSH were in most agreement (mean = 1.56) with the effective use of information increases our hospital's chances of success. The next statement that they were most in agreement (GSH mean = 2.36) with was that the hospital success depended on good quality information. Respondents of TBH were in most agreement (mean = 1.30) with success depending on good quality information and next the use of the information to increase the hospitals chances of success (mean = 1.34). Respondents of GSH were in least agreement (mean = 2.73) with the statement that reports that are printed are correct and accurate whereas TBH were in least agreement (mean = 2.93) with the statement that "Our current information meets all or most of our hospital's needs".

Table 4.3. Attitudes towards information

Rank	Question	Hosp	SA	A	U	D	SD	Mean[3]	Std. Dev.
1.	The effective use of information increases our hospital's chances of success.	GSH	58.1	33.7	3.5	3.5	1.2	1.56	0.82
2		TBH	71.9	21.9	6.3	0	0	1.34	0.60
2.	Our hospital's success depends a good on the quality of our information.	GSH	51.7	39.1	4.6	3.4	1.1	1.63	0.82
1		TBH	69.7	30.3	0	0	0	1.30	0.47
3.	As an institution, we could not get along without our hospital information system.	GSH	32.6	40.7	12.8	9.3	4.7	2.13	1.11
3		TBH	30.3	57.6	3.0	6.1	3.0	1.93	0.93
4.	Our information is useful for assessing the quality of care we provide.	GSH	26.2	44.0	20.2	7.1	2.4	2.15	0.97
5		TBH	12.5	53.1	12.5	9.4	12.5	2.56	1.21

[3] On the 5-point Likert scale of agreement, the smaller the mean the greater the level of agreement with the statement

Table 4.3. cont'd Attitudes towards information

Rank	Question	Hosp	SA	A	U	D	SD	Mean[4]	Std. Dev.
5.	The reports are relevant for you to complete your job.	GSH	19.7	44.7	18.4	13.2	3.9	2.36	1.06
4		TBH	15.6	59.4	18.8	6.3	0	2.15	0.77
6.	Our information has kept pace with the hospital's internal information needs.	GSH	15.5	45.2	21.4	11.9	6.0	2.48	1.08
6		TBH	9.7	45.2	19.4	19.4	6.5	2.68	1.11
7.	Our current information meets all or most of our hospital's needs.	GSH	16.3	43.0	20.9	14.0	5.8	2.50	1.10
10.		TBH	9.1	33.3	24.2	21.2	12.1	2.93	1.20
8.	Our information regularly "flags/highlights" problem areas.	GSH	14.1	40.0	27.1	12.9	5.9	2.56	1.07
7		TBH	6.3	40.6	34.4	12.5	6.3	2.72	0.99
9.	Our information easily adapts to changes in demands from external sources.	GSH	8.5	43.9	30.5	13.4	3.7	2.60	0.95
8		TBH	6.7	36.7	30.0	16.7	10	2.87	1.11
10	The reports that printed are correct and accurate.	GSH	12.2	36.5	27.0	14.9	9.5	2.73	1.15
9		TBH	3.3	50.0	20.0	10.0	16.7	2.87	1.20

This finding suggests that there were attitudes towards information at each of the hospitals on which there was agreement and others where differences of opinion.

The respondents were asked to indicate on a 5-point Likert scale of agreement their responses four statements presented to them about the current information system as well as the old information system. The ranking of the means of the responses to these statements is shown in Table 4.4.

[4] On the 5-point Likert scale of agreement, the smaller the mean the greater the level of agreement with the statement

Respondents of both hospitals were in most agreement (GSH mean = 1.91 and TBH mean = 1.55) with the new system being useful. The next statement that they were most in agreement (GSH mean = 2.07 and TBH = 1.71) with was that they considered the new system to be good. They were in least agreement (GSH mean=3.56 and TBH = 4.07) with the statement that they considered the old system to be more useful than the new system.

Table 4.4. Feeling concerning the new system

Rank	Question	Hosp	SA	A	U	D	SD	Mean	Std. Dev.
1.	I consider the new system to be useful.	GSH	26.2	61.9	7.1	3.6	1.2	1.91	0.76
1		TBH	44.8	55.2	0	0	0	1.55	0.51
2.	I consider the new system to be good.	GSH	33.0	42.0	12.5	9.1	3.4	2.07	1.06
2		TBH	46.9	43.8	3.1	3.1	3.1	1.71	0.92
3.	I consider the old system to be better than the new system.	GSH	6.2	11.1	32.1	37.0	13.6	3.40	1.05
3		TBH	10.7	7.1	10.7	39.3	32.1	3.75	1.29
4.	I consider the old system to be more useful than the new system.	GSH	4.9	8.5	28.0	42.7	15.9	3.56	1.02
4		TBH	3.7	7.4	7.4	40.7	40.7	4.07	1.07

This finding suggests that the workers at each of the hospitals felt the same way about the new CLINICON system.

The respondents were asked to indicate on a 5-point Likert scale of importance their responses to nine statements presented to them about their ideal working environment. The ranking of the means of the responses to these statements is shown in Table 4.5.

The clerical staff was asked what their ideal employment environment was. Their responses are ranked in order of importance as shown in table 4.5. It is evident that they considered job security as very important (GSH mean = 1.49 and TBH = 1.42). The next important statement to GSH (mean =1.50) was "Do you make a real contribution to success of your institution?" whereas to TBH (mean = 1.57) it was to "Have a good working relationship with your direct superior?" Both hospitals agreed that it was of least importance (GSH = 2.06 and TBH = 2.50) to them whether they were consulted by their direct superiors in any decisions that their superiors made.

This finding suggests that respondents at each of the hospitals disagreed with most of the statements about their ideal employment environment providing some indication that they had divergent view about what such an environment should be.

Table 4.5. Ideal employment environment

Rank	Question	Hosp	UI	VI	MI	LI	NI	Mean	Std. Dev.
1.	Have security of employment?	GSH	67.4	24.4	3.5	1.2	3.5	1.49	0.90
1		TBH	74.2	16.1	6.5	0	3.2	1.42	0.89
2.	Do you make a real contribution to success of your institution?	GSH	61.0	27.9	3.5	3.5	1.2	1.50	0.82
3		TBH	50.0	43.8	3.1	3.1	0	1.59	0.71
3.	Work with people who cooperate well with one another?	GSH	55.8	37.2	2.3	2.3	2.3	1.58	0.84
6		TBH	48.5	33.3	12.1	3.0	3.0	1.79	0.99
4.	Work in a well-defined job situation where the requirements are clear?	GSH	59.5	31.0	4.8	1.2	3.6	1.58	0.92
4		TBH	50.0	31.3	15.6	0	3.1	1.75	0.95
5.	Have an opportunity for higher earnings?	GSH	56.3	25.0	18.8	0	0	1.62	0.79
7		TBH	54.8	22.6	12.9	9.7	0	1.87	1.26
6.	Have a good working relationship with your direct superior?	GSH	57.0	27.9	11.6	1.2	2.3	1.63	0.91
2		TBH	60.6	24.2	12.1	3.0	0	1.57	0.83

Table 4.5. cont'd Ideal employment environment

Rank	Question	Hosp	UI	VI	MI	LI	NI	Mean	Std. Dev.
7.	Have an opportunity for advancement to higher level jobs?	GSH	60.0	22.5	15.0	0	2.5	1.63	0.92
5		TBH	54.8	25.8	12.9	0	6.5	1.77	1.12
8.	Work in a prestigious, successful organization?	GSH	42.2	43.4	8.4	2.4	3.6	1.81	0.95
8		TBH	42.4	30.3	12.1	9.1	6.1	2.06	1.22
9.	Are you consulted by your direct superiors in any decisions they make?	GSH	29.6	46.9	14.8	4.9	3.7	2.06	0.99
9		TBH	18.8	43.8	15.6	12.5	9.4	2.50	1.22

In response to how frequent subordinates were afraid to express disagreement with their superiors on a 5-point Likert scale of frequency, the mean of the responses at GSH = 2.86 and TBH = 2.73. This finding suggests that respondents at TBH were more frequently afraid to disagree with their superiors than their counterparts at GSH. This finding is shown in Table 4.6.

Table 4.6. Disagreement with superiors

Hosp	Always	Often	Sometimes	Seldom	Never	Mean	Std. Dev.
GSH	14.1	17.6	38.8	27.1	2.4	2.86	1.05
TBH	18.2	42.2	30.3	21.2	6.1	2.73	1.18

In response to whether their immediate manager was concerned about helping them get ahead on a 5-point Likert scale of frequency, the mean of the responses at GSH = 3.13 and TBH = 3.25 indicates that workers at TBH reported that their immediate managers were more seldomly concerned about them making progress than their counterparts at GSH. This finding is shown in Table 4.7.

Table 4.7. Managers concern about their subordinates

Hosp	Always	Usually	Sometimes	Seldom	Never	Mean	Std. Dev.
GSH	20.7	17.1	18.3	15.9	28.0	3.13	1.51
TBH	12.5	25.0	21.9	60.3	34.4	3.25	1.48

The respondents were presented with descriptions of four types of managers and requested to indicate which they would prefer to work under. Most respondents at each of the institutions preferred manager type 4 i.e. a manager who would usually call a meeting of their subordinates when there is an important decision to be made, put the problem before them, invite discussion and accept the majority viewpoint as the decision. The next preferred manager type was type 2 i.e. a manager who usually makes decisions promptly, but before going ahead, tries to explain the decisions fully to subordinates giving reasons for the decisions taken and responding to any question that the subordinates may have. This finding is shown in Table 4.8.

Table 4.8. Preferred Manager

	GSH		TBH	
Mean	3.29		3.25	
Median	4.00		4.00	
Question	n	Percentage	n	Percentage
Type 1 Manager	5	4.3	3	9.4
Type 2 Manager	20	17.4	6	18.8
Type 3 Manager	27	23.5	3	9.4
Type 4 Manager	63	54.8	20	62.5
Total (N)	115	100	32	100

The respondents were asked to indicate which type of manager their own superior most closely corresponded with. At GSH most respondents (26.0%) indicated that their superior most closely corresponded to manager type 2. At TBH most respondents (33.3%) indicated that their superior most closely corresponded to manager type 1 i.e. a manager who usually makes their decisions promptly communicates them to their subordinates clearly and firmly, expecting them to carry

out these decisions loyally and without raising difficulties. These results are shown in Table 4.9.

Table 4.9. Perceptions of actual manager

	GSH		TBH	
Mean	2.72		2.42	
Median	3.00		2.00	
Question	n	Percentage	n	Percentage
Type 1 Manager	25	21.6	11	33.3
Type 2 Manager	32	27.6	7	21.2
Type 3 Manager	22	19.0	7	21.2
Type 4 Manager	25	21.6	6	18.2
None of the above corresponding to my manager.	12	10.3	2	6.1
Total (N)	116	100	33	100

In order to calculate a manager index from the responses the following formula was used: Manager index = $(n_1X_1 + n_2X_2 + n_3X_3 + n_4X_4 + \ldots n_yX_y) / N$ where

manager type 1 = 1 (X_1)

manager type 2 = 2 (X_2)

manager type 3 = 3 (X_3)

manager type 4 = 4 (X_4)

n = frequency (number of responses)

N = total frequency – number of responses

For the purposes of the computation of a manager index responses were excluded where no selection of manager type was given.

Table 4.10. Manager indices

	GSH	TBH
Preferred Manager	((5 * 1) + (20 * 2) + (27 * 3) + (63 * 4)) / 104 (5 + 40 + 91 + 252) / 115 388 / 115 = 3.37	((3 * 1) + (6 * 2) + (3 * 3) + (20 * 4)) / 31 (3 + 12 + 9 + 80) / 32 104 / 32 = 3.25
Actual Manager	((25 * 1) + (32 * 2) + (22 * 3) + (25 * 4)) / 104 (25 + 64 + 66 + 100) / 104 255 / 104 = 2.45	((11 * 1) + (7 * 2) + (7 * 3) + (6 * 4)) / 31 (11 + 14 + 21 + 24) / 31 70 / 31 = 2.26

The respondents were asked to indicate which of 5 statements presented to them best described themselves in their work environment. Table 4.11 indicates that staff are not stressed in the work environment. At GSH 43.9% reported that they were neither never nervous nor tense or seldom nervous or tense (31.7%). On the other hand respondents at TBH 42.4% reported that they were never nervous or tense nor seldom nervous or tense (30.3%). This finding suggests very little difference relative to their environments.

Table 4.11. Description of the working environment

	GSH		TBH	
Question	n	Percentage	n	Percentage
I am always nervous or tense	0	0	0	0
I am usually nervous or tense	4	3.3	2	6.1
I am sometimes nervous or tense	25	20.3	7	21.2
I am seldom nervous or tense	39	31.7	10	30.3
I am never nervous or tense	54	43.9	14	42.4
Total	122	100	33	100

Respondents of both hospitals were asked to indicate the number of reports received during implementation (GSH mean = 1.91 and TBH mean = 1.72). Almost two thirds (65.2%) of the respondents at GSH did not receive any reports, while 68.2% of TBH staff received none. The reports received were mainly: Inpatient Lists;

admission, discharge and ward lists of patients; information relating to CLINICOM namely problems, upgrades, downtime or changes; Night reports and ward round reports; picking lists, unknown lists and transaction log report; statistics of patients namely clinic attendance and bed occupation; and unattended dates. The respondents were asked what reports they needed. Most did not respond to the question, but those that did named the following workload reports; statistical reports; ward movement list reports; information about CLINICOM e.g. when the system would be down and how long, levels of performance of the system; revenue income made for departments on a monthly basis; and institutional consumption to enable informed decisions.

This finding suggests that most of the workers at each of the hospitals were not interested in receiving reports and those that wanted reports listed very useful reports that would assist them in their tasks as well as their decision-making.

Implementation speed

The CLINICOM HIS generates approximately 120 reports. These reports range from detailed information, summary information and exception information i.e. patient, ward, management as well as statistical reports (Whitten, et al., 2000). Depending on the report type, they are printed daily, weekly, monthly, quarterly, yearly or on demand. Accurate reporting is essential to let those not directly involved in the day-to-day activities of the implementation process of the project to obtain a clear picture of the progress of the development: what is being delivered and what problems are being encountered (McLeod and Smith, 1996).

From the exception reports (refer to appendix C) printed on the 1st of February 2002, 10,826 documents were still in paper form and not yet entered on the system at GSH. By the 28th of February 2002, this had increased to 20,349, whereas TBH had a backlog of 4,199 documents and by the end of the month, it was reduced to 3,222.

PDI classification of the two hospitals

In order to calculate the power distance index (PDI) for each of the hospitals the following formula was computed based on Hofstede's (2001) approach to calculating PDI. This formula is

PDI = 135 - 25* (mean score employees afraid (Q30)) + (% manager 1 and 2 (Q13)) – (% manager 3 (Q12))

By substituting in this formula for each of the hospitals the PDIs are computed as follows:

For GSH PDI = 135 – (25 * 2.86) + (16.9 + 30.1) – (28.9)
= 135 - (71.5) + 47 – 28.9
= 81.6

For TBH PDI = 135 – (25 * 2.72) + (33.3 +21.2) – (9.4)
= 135 - (68) + 54.5 – 9.4
= 112.1

According to Hofstede (2001) there is a strong correlation among occupations for the 3 PDI questions used. The lower-education, lower-status occupations tended to produce high PDI values namely 49 through to 94 whereas the higher –education, higher-status occupations tended to produce low PDI values namely range from 11

through to 40. All respondents in unskilled jobs (regardless of country) are high (Hofstede, 2001). These results give GSH a PDI in the order of clerks in India (81) and TBH an index in the order of clerks in Mexico (97). In India and Mexico the power distance were large for everyone regardless of the individuals prestige, wealth or power.

Table 4.12. Variance tests

	Which hospital was visited?	N	Mean	Std. Deviation	Std. Error Mean	t-test
Select the ONE, which you would prefer to work under (mark ONE number only)	Groote Schuur	83	3.3012	.83717	.09189	0.78
	Tygerberg	32	3.2500	1.07763	.19050	
To which ONE of the 4 types of managers would you say your own superior mostly closely corresponds?	Groote Schuur	83	2.8313	1.29558	.14221	0.13
	Tygerberg	33	2.4242	1.29977	.22626	
How frequently, in your work environment, are subordinates afraid to express disagreement with their superiors?	Groote Schuur	85	2.8588	1.04827	.11370	0.55
	Tygerberg	33	2.7273	1.17985	.20539	

Continuous variables were compared using the two-sample t-test with or without equal variance. The purpose of using this technique is to test for significant differences between two group means of data that has been gathered (Kerr et al., 2002). This information is provided using Levene's test for equality of variance. Levene's test is a one-way analysis of variance on the absolute deviation scores of the

groups where the group mean is subtracted from each individual score within the group.

If this test is significant i.e. the Levines test has a probability of 0.05 or less, then the t-test for unequal variance was used (SPSS). If the variances are equal in table 4.12, the pooled variance estimates is used (Bryman and Cramer, 2001). Categorical data was compared using the χ^2 test (SPSS).

Chapter Summary

The responses to the Users questionnaire were analysed. The findings suggest that are no significant difference between the profiles of the employers of both the hospitals. The respondents had similar views concerning the employment environment and their attitude concerning the new system. From the analysis it is evident that the respondents views differed in the area of their attitude towards information and their ideal employment environment. The analysis also showed that in the ideal situation, they would select manager type 4, but their perceived managers differed. Manager type 2 was the perceived manager at GSH, whereas TBH choose manager type 1. These responses were important in the calculation of the PDI score. Even though the PDI score for both institutions were high, there was a considerable difference.

In the next chapter, the study is concluded and includes suggestions for further research.

CHAPTER 5
CONCLUSION

Introduction

The purpose of this study, as stated in the chapter entitled Introduction, was to examine the factors that affect the successful implementation of a hospital information system to achieve the objectives for which they were originally designed. The primary objectives of the study were

- To assess the organizational culture in each hospital in terms of one of the dimensions of culture on Hofstede's checklist, namely power distance; and
- To determine whether the speed with which a HIS was implemented was a success at the two academic hospitals in the Western Cape using the reduction of the level of backlog (paper based patient registration records) as a measure of implementation progress.

The study was designed to test the following hypotheses:

Theoretical Hypothesis

- H_1: The cultural factor, which Hofstede calls power distance, is related to the ease of implementing a Hospital Information System (HIS).

Operational Hypothesis

- H_{o1}: The cultural element referred to as power distance as measured by Hofstede's questionnaire, is negatively related to the level of backlog of patient registration generated as a measure of implementation progress.

The available literature was reviewed relative to the area of research to achieve the objectives of the study. A questionnaire was designed using several of the questions used in the Hofstede (2001) study. To determine power distance, the collected data was encoded and analyzed using SPSS. This chapter provides a summary of the key findings of the study relative to the study objectives, and concludes the study with recommendations for further research.

Assessment of organizational culture

Management involvement has been established in the literature to be a critical factor at all levels of an organization (Doll, 1985). Therefore the relationship between managers and subordinates or workers impacts organizational culture and system and worker performance. It was established in the literature that effective communication between superiors and subordinates influences the implementation process that includes the reporting structure within an organization (Maull, Transfield and Maull, 2003). The communication flow is more horizontally oriented and more formal within a high power distance environment.

At TBH, the perceived manager type 1 was the most dominant where managers themselves made decisions before presenting them to their subordinates. These decisions were communicated clearly and firmly without providing the opportunity for subordinates to give input to inform the decisions of management before finalization thereof. Subordinates were and expected to execute the decisions without question (i.e. autocratic decision-making).

On the other hand at GSH the perceived manager type 2 was the most dominant where managers formulated preliminary decisions, presented them to their subordinates, explained the decisions to them and allowed them to discuss the decisions made and ask questions for further clarification.

This finding suggests that the prevailing organizational culture of the hospitals impacted on the implementation of the HIS.

According to Pheng and Yuquan (2002: 10), Hofstede's definition of power distance is "the power distance between a boss B and a subordinate S in a hierarchy is the difference between the extent to which B can determine the behavior of S and to which S can determine the behavior of B". Power distance has been established in the literature to be the willingness of the less powerful members of a society to accept their lower status and authority rules due to inequalities that have occurred, where different societies put different weights on status. Inside organizations, inequality in power is inevitable and functional. According to table 2-4 low power distance means "absolute democracy" to "absolute dictatorship" with all the power concentrated to a few people. With high PDI ratings of > 80 there tends to be more downward authority, i.e. top-down management style.

Language is an important mediator of culture (Schermerhorn and Bond, 1997). The findings of the study indicated that most employees at TBH were Afrikaans speaking

while at GSH they were English speaking. Afrikaans was the language used by the Dutch that migrated from the Cape to the interior of South Africa (Louw and Kendall, 1986). They became known as Afrikaaners, who held deeply rooted religious beliefs heavily influenced by Calvinism. Consequently, they held ultra-conservative views characterized by obstinate, individualistic and autocratic dealings with others (Ross, 1999). These characteristics typify cultures with high power distance (Hofstede, 2001).

The results of the study suggest that at TBH these characteristics had a positive impact on implementation of the HIS at that site.

Implementation speed and backlog

The implementation speed of entering information on the system is evidence of usage which is one of the elements of success identified by Delone and McLean (2003). The exception report is a printout that lists information that requires the attention of management and are often printed whenever required. The exception report designed by the Provincial Administration of Western Cape lists the monthly accumulative level of the backlog of counts of patients who attended clinics but whose details had not yet been captured on the HIS (see appendix C). The February/March 2002 report suggested *prima facie* that the implementation of the HIS proceeded more smoothly at TBH than at GSH. The report confirms that the backlog at TBH decreased while it increased at GSH.

The speed of entering information suggests that the HIS was being used at TBH more effectively to capture patient data than at GSH.

Effective use of Reports

It has been established in literature that information technology supports and improves day-to-day operations in a business as well as support the problem-solving and decision-making needs of management and users (Whitten, et al., (2000)). Thus information systems have become critical in business organizations that operate in modern technological and competitive environments (Lau, Ang and Winley, 1999) such as hospitals and should consequently be regarded as business assets (Yasin and Quigley, 1994). They benefit organizations by producing timely information facilitating easier important decision-making and improving efficiency (Lowry, 1996) as well as monitoring and recording transactions.

According to most respondents at GSH the effective use of information increases the hospital's chances of success. They also suggested that this success was dependent on good quality information. On the other hand, most respondents at TBH reported that good quality information impacted the success of the hospital.

The availability and relevance of the information are important for the effective management of any organization. Hospital information systems are required to provide high quality information and data about patients, diseases, hospital performance and cost (Winter et al., 2001; Nemati and Barko, 2003). This study revealed that most of the staff at both of the hospitals did not receive any reports. Of the 120 reports listed on the HIS, staff mainly received reports about patient admissions, discharges and ward lists. These reports by their nature are not necessarily useful to improve the overall management of

hospitals. By useful is meant that the reports add advantage and value to the hospital environment. In the case of both hospitals the reports generated by the HIS were not being effectively used suggesting that the hospital information system was not being optimally utilized.

Hypothesis Testing

H_1: The cultural factor, which Hofstede calls power distance, is related to the ease of implementing a Hospital Information System (HIS).

The study revealed that at TBH where the power distance score was higher than at GSH , the implementation was easier resulting in more effective data capturing and a reduced backlog.

The hypothesis that power distance is related to the ease of implementing a HIS is therefore not rejected.

H_{o1}: The cultural element referred to as power distance as measured by Hofstede's questionnaire, is negatively related to the level of backlog of patient registration generated as a measure of implementation progress.

The study revealed that the higher the power distance score as in the case of TBH, the lower the backlog of generated information as indicated in the exception report relative to TBH.

The hypothesis that power distance negatively relates to the level of backlog of patient registration as a measure of implementation is not rejected.

Conclusion

Culture can either be a liability or an asset. The PDI scores at both hospitals were high. However the PDI at TBH was higher than that of GSH. These findings are consistent with a culture where there is an acceptance of inequalities with relatively more autocratic leadership or centralization of authority. Considering that the managers at TBH rely more on leadership styles that are authoritarian accompanied with close supervision, there is a resultant greater degree of satisfaction, performance and productivity in the implementation of the CLINICOM system.

Further since both hospitals are government institutions, they would typically be characterized by top-down organizational structures that impair the flow of information. At TBH this was more evident. Managers did not need to explain the value of the information in the various reports they required. Consequently workers had no appreciation for the content of the reports relative to their usefulness. Against this autocratic background, they failed to recognize the value of the information relative to the needs of the hospital.

On the other hand managers at GSH reportedly took time to explain the value of the information that the reports produced. Even though the workers had been empowered with this information, they regarded the reports as incorrect and inaccurate implying that the reports generated by the HIS were flawed and therefore of minimal value in managing the hospital.

The study suggested that there were different aspects of success relative to the implementation of the information system and is also related on the prevalent culture of the particular hospital. Therefore it is imperative that when looking at the implementation of an information system the organizational culture of the hospital has to be considered in order to not only achieve successful implementation but also a system that is optimally utilized by the maximum number of users producing reports that enhance the management of the hospitals.

Recommendation

When information systems are developed, the culture of the information systems users are not necessarily taken into consideration. The recommendation is that when information systems are designed, developed, implemented and eventually running, that the systems analyst be aware that the cultural factor within the organization could impact the smooth implementation of the system.

Further research

This research investigated albeit superficially the impact of a cultural factor such as power distance on the successful implementation of a HIS. The measure of the use of information was used as a measure of success. However, further research is necessary to determine whether power distance was the most predominant factor on HIS implementation success.

Further research needs to look at how power distance is affected by the organizational structure i.e. a flat versus a tall organizational pyramid. This research did not look at proportion of supervisory staff to the subordinates (clerical staff). Further research is necessary to determine how this relationship affects the power distance index.

APPENDIX A
PERMISSION TO USE INFORMATION

Dear Denise,

We don't have a problem with using some of the questions used by G. Hofstede. Only in the case that you want to use the whole Values Survey Module (see also our website http://www.uvt.nl/iric) it will be a problem because the VSM 94 is under a strict copyright.

Best regards,

Rianne Mutsaers
Office Manager IRIC

-----Original Message-----
From: DENISE DARNELL LAKAY [mailto:LAKAYD@pentech.ac.za]
Sent: dinsdag 9 september 2003 11:24
To: iric@uvt.nl
Subject: Permission to use information

To: Whom it may concern

RE: Permission to do use information

I am current working on my master's project. I am looking specifically at how culture affects the implementation of an Information system. I would like to use some of the questions used by G Hofstede. I am looking at the power distance in a teaching hospital.

Dr. Sedick Isaacs, HOD of Medical Informatics at Groote Schuur Hospital is my supervisor. He can be e-mailed on seisaaacs@pawc.wcape.gov.za.

I will be happy to provide any additional information you may require.

Thanking you

Mrs Denise Lakay
Department of Information Technology
Peninsula Technikon
Bellville
South Africa
7935

APPENDIX B

QUESTIONNAIRE FOR INFORMATION TECHNOLOGY USERS AT ACADEMIC HOSPITALS IN THE WESTERN CAPE

Please complete the questionnaire and return it via internal mail to Tessa Strauss, M51 OMB at Groote Schuur Hospital and Mr. Chetty, Room 11, Data Avenue, Information Management Unit at Tygerberg Hospital.
Return by: 8th November 2004

Purpose of the questionnaire

A new Hospital Information System was installed at the your hospitals. The questionnaire seeks to determine the use of the systems and the reports generated.

Please note the following:

- Only administrative personnel who work on the CLINICOM IT system should complete this questionnaire.
- There is no right or wrong answer; answer as accurately as possible.
- Note scales used in questions where they are used.
- Note that different scales are used for different questions.
- Mark with an X the response that is the most correct in your opinion or best describes how you feel about the issue raised by the question.
- All responses will be treated confidentially.

DEMOGRAPHIC DETAILS

1. Hospital

Groote Schuur	
Tygerberg	

2. How long have you worked at this hospital? _____years _____months

3. Which **ONE** of the following best describes the basis of your employment?

Permanent	
Part Time	
Full Time	
Temporary	
Contract	
Casual	

4. Job Title / position: _____

5. How long have you held this position? _____years _____months

6. Are you?

Male	
Female	

7. What language do you speak at home? _____

8. How old are you? _____

9. How many years of formal school education have you completed?

_____

10. What is your highest qualification?

Lower than Grade 10 (Std 8)	
Grade 10 (Std 8)	
Grade 11 (Std 9)	
Grade 12 (Std 10 / Matric)	
Technical College	
Technikon Diploma	
University Degree	
Other	

11. If other, please explain _____

MANAGEMENT STYLE

The descriptions below apply to FOUR different types of managers. Please read through these descriptions before attempting to answer the questions that follow:

Type 1 Managers
Usually make their decisions promptly and communicate them to their subordinates clearly and firmly. Expect them to carry out the decisions loyally and without raising difficulties.
Type 2 Managers
Usually makes their decisions promptly, but before going ahead, try to explain them fully to their subordinates. Give them the reasons for the decisions and answers whatever questions they may have.
Type 3 Managers
Usually consult with their subordinates before they reach their decisions. Listen to their advice, consider it, and then announce their decision. They then expect all to work loyally to implement it whether or not it is in accordance with the advice they gave.
Type 4 Managers
Usually call a meeting of their subordinates when there is an important decision with the advice they gave. Put the problem before the group and invite discussion. Accept the majority viewpoint as the decision.

12. For the above types, select the **ONE**, which you would ***prefer*** to work under (mark **ONE** number only):

Type 1 Manager	
Type 2 Manager	
Type 3 Manager	
Type 4 Manager	

13. To which **ONE** of the above types of managers would you say your own superior most closely corresponds?

Type 1 Manager	
Type 2 Manager	
Type 3 Manager	
Type 4 Manager	
None of the above corresponds to my manager	

EMPLOYMENT ENVIRONMENT

Please think of your **ideal** employment environment. On a scale of 1 – 5 answer the questions below. (1 = of utmost importance to me; 2 = Very important; 3 = Of moderate importance; 4 = Of little importance; 5 = Of very little or no importance), HOW IMPORTANT WOULD IT BE TO YOU TO **(please mark ONE answer in each line across):**

No		1	2	3	4	5
14.	Have a good working relationship with your direct superior?					
15.	Have security of employment?					
16.	Work with people who cooperate well with one					

	another?					
17.	Are you consulted by your direct superiors in any decisions they make?					
18.	Do you make a real contribution to success of your institution?					
19.	Have an opportunity for higher earnings?					
20.	Have an opportunity for advancement to higher level jobs?					
21.	Work in a prestigious, successful organization?					
22.	Work in a well-defined job situation where the requirements are clear?					

23. Which **ONE** of the following best describes you when you are in your work environment?

I am always nervous or tense	
I am usually nervous or tense	
I am sometimes nervous or tense	
I am seldom nervous or tense	
I am never nervous or tense	

On a scale of 1 – 5 (1 = Strongly agree; 2 = Agree; 3 = Undecided; 4 = Disagree; 5 = Strongly disagree), how do you feel about each of the following statements? **(Please mark ONE answer in each line across)**

		1	2	3	4	5
24.	An organization's rule should not be broken – even when the employee thinks it is in the organization's best interest.					
25.	Most people I work with can be trusted.					
26.	Quite a few employees have a natural dislike of work and will avoid it if they can.					
27.	A large corporation is generally a more desirable place to work for than a small company.					
28.	Users generally do not understand computers					
29.	IT staff must take the lead in introducing new system functions to users					

30. How frequently, in your work environment, are subordinates afraid to express disagreement with their superiors?

Always	Often	Sometimes	Seldom	Never

31. Which of the following best describes how long you will continue working for this hospital?

Two years at the most	
From two to five years	
More than five years (but I probably will leave before I retire)	
Until I retire	

32. Provide reasons for your answer.

_____

_____

_____

33. Is your immediate manager concerned about helping you get ahead (e.g. promotion)?

Always	Usually	Sometimes	Seldom	Never

34. Which of the following best describes the kind of work you do?

a.	I am a manager (that is, I supervise at least 1 person) – **go to f**	
b.	I am not a manager and I work most of the time in an office – **go to e**.	
c.	I am not a manager and I do not work most of the time in an office – **go to d**.	

If you selected **c** complete the following:

d.	If you are not a manager and you do not work most of an office, what do you do:	
d.1	Work for which normally no vocational training, other than on-the-job training is required (unskilled or semi-skilled work)	
d.2	Work for which normally up to four years of vocational training is required (skilled worker, technician, non-graduate engineer, nurse, etc.)	
d.3	Work for which normally a higher-level professional training is required (graduate engineer, doctor, architect, etc).	

If you selected **b** complete the following:

e.	If you are not a manager and you work most of the time in an office, what do you do:	
e.4	Work for which normally no higher-level professional training is required (clerk, typist, secretary, non-graduate accountant)	
e.5	Work for which normally a higher-level professional training is required (graduate accountant, lawyer, etc.).	

If you selected **a** complete the following:

f.	If you are a manager, are you:	
f.6	A manager of people who are not managers themselves (that is, a first line manager)	
f.7	A manager of other managers.	

On a scale of 1 – 5 (1 = Strongly agree; 2 = Agree; 3 = Undecided; 4 = Disagree; 5 = Strongly disagree), to what extent do you agree or disagree with the following statements. **(Please mark ONE answer in each line across)**

		1	2	3	4	5
35.	The effective use of information increases our hospital's chances of success.					
36.	Our hospital's success depends a good on the quality of our information.					
37.	Our current information meets all or most of our hospital's needs.					
38.	Our information has kept pace with the hospital's internal information needs.					
39.	Our information easily adapts to changes in demands from external sources.					
40.	Our information is useful for assessing the quality of care we provide.					
41.	Our information regularly "flags/highlights" problem areas.					
42.	As an institution, we could not get along without our hospital information system.					
43.	The reports are relevant for you to complete your job.					
44	The reports that printed are correct and accurate.					

45. Number of reports you receive on a weekly basis during implementation of the HIS.

0	1	2	3	>3

46. Name the types of reports received.

_____

_____

_____

47. What reports do you need?

_____

_____

ATTITUDES TOWARDS THE CLINICOM IT SYSTEM

On a scale of 1 – 5 (1 = Strongly agree; 2 = Agree; 3 = Undecided; 4 = Disagree; 5 = Strongly disagree, Indicate your feelings concerning the new system.

No.		1	2	3	4	5
48.	I consider the new system to be good.					
49.	I consider the old system to be better than the new system.					
50.	I consider the new system to be useful.					
51.	I consider the old system to be more useful than the new system.					

SYSTEM USE

The following questions are about your current level of usage on the new system.

52. How often do you use the system?

Daily	Weekly	Monthly	When Required

Thank you for your prompt assistance in the completion of the questionnaire.

APPENDIX C
OUTPATIENT STATISTICS

Groote Schuur OPD Stats: February 2002							
	Appts	Atts	DNA	Walk-In	Cancelled	GAP	Accummulative
2/1/2002	975	557	46	28	4	340	10826
2/2/2002	117	117	0	20	0	-20	10806
2/3/2002	94	92	0	2	0	0	10806
2/4/2002	1407	554	54	4	11	784	11590
2/5/2002	1368	728	69	22	7	542	12132
2/6/2002	1406	784	51	12	4	555	12687
2/7/2002	1315	744	50	9	4	508	13195
2/8/2002	968	569	30	24	6	339	13534
2/9/2002	118	116	2	2	0	-2	13532
2/10/2002	98	96	0	12	0	-10	13522
2/11/2002	1518	731	60	15	12	700	14222
2/12/2002	1520	779	60	17	1	663	14885
2/13/2002	1529	837	70	27	6	589	15474
2/14/2002	1313	735	65	41	3	469	15943
2/15/2002	979	698	26	33	2	220	16163
2/16/2002	129	117	0	3	2	7	16170
2/17/2002	99	99	0	2	0	-2	16168
2/18/2002	1402	739	70	17	6	570	16738
2/19/2002	1393	845	73	47	8	420	17158
2/20/2002	1331	705	71	21	5	529	17687
2/21/2002	1350	742	68	31	5	504	18191
2/22/2002	1006	651	138	87	4	126	18317
2/23/2002	186	170	0	65	0	-49	18268
2/24/2002	148	117	1	17	0	13	18281
2/25/2002	1625	904	92	30	10	589	18870
2/26/2002	1440	715	83	11	4	627	19497
2/27/2002	1390	808	70	33	5	474	19971
2/28/2002	1195	717	65	27	8	378	20349

Groote Schuur OPD Stats: March 2002							
	Appts	Atts	DNA	Walk-In	Cancelled	GAP	Accummulative
3/1/2002	981	638	125	29	6	183	20532
3/2/2002	129	115	0	8	1	5	20537
3/3/2002	143	139	0	48	1	-45	20492
3/4/2002	1489	746	96	20	14	613	21105
3/5/2002	1472	793	99	23	5	552	21657
3/6/2002	1446	791	74	14	8	559	22216
3/7/2002	1239	806	58	19	7	349	22565
3/8/2002	959	626	48	30	8	247	22812
3/9/2002	117	103	0	17	1	-4	22808
3/10/2002	169	121	0	15	1	32	22840
3/11/2002	1861	786	75	13	10	977	23817
3/12/2002	1839	895	67	20	6	851	24668
3/13/2002	1850	925	61	45	7	812	25480
3/14/2002	1576	701	47	38	8	782	26262
3/15/2002	1228	650	38	39	5	496	26758
3/16/2002	176	109	0	21	0	46	26804
3/17/2002	180	129	0	12	0	39	26843
3/18/2002	1931	809	54	92	14	962	27805
3/19/2002	1799	867	94	77	8	753	28558
3/20/2002	1741	842	91	32	4	772	29330
3/21/2002	203	126	0	32	2	43	29373
3/22/2002	1203	702	43	39	4	415	29788
3/23/2002	217	125	0	23	0	69	29857
3/24/2002	1763	908	68	35	6	746	30603
3/25/2002	1820	772	56	28	4	960	31563
3/26/2002	1763	908	68	35	6	746	32309
3/27/2002	1640	784	56	112	5	683	32992
3/28/2002	1614	617	75	36	3	883	33875
3/29/2002	210	90	0	7	0	113	33988
3/30/2002	161	127	0	9	0	25	34013
3/31/2002	155	149	0	16	0	-10	34003

Tygerberg OPD Stats: February 2002							
	Appts	Atts	DNA	Walk-In	Cancelled	GAP	Accummulative
2/1/2002	872	584	35	144	4	105	4199
2/2/2002	166	158	0	145	1	-138	4061
2/3/2002	209	196	0	182	1	-170	3891
2/4/2002	1844	1230	121	168	20	305	4196
2/5/2002	1732	1240	101	292	18	81	4277
2/6/2002	1703	1143	122	196	15	227	4504
2/7/2002	1693	1133	141	221	23	175	4679
2/8/2002	1013	833	56	236	17	-129	4550
2/9/2002	221	215	0	201	0	-195	4355
2/10/2002	223	210	0	201	1	-189	4166
2/11/2002	1860	1349	183	285	20	23	4189
2/12/2002	1657	1203	168	242	30	14	4203
2/13/2002	1788	1302	184	323	34	-55	4148
2/14/2002	1737	1262	183	290	25	-23	4125
2/15/2002	1040	733	74	224	14	-5	4120
2/16/2002	230	190	0	166	0	-126	3994
2/17/2002	251	228	0	205	2	-184	3810
2/18/2002	1965	1444	174	275	34	38	3848
2/19/2002	1859	1348	161	278	36	36	3884
2/20/2002	1782	1325	163	255	17	22	3906
2/21/2002	1776	1292	157	230	24	73	3979
2/22/2002	1026	757	60	252	15	-58	3921
2/23/2002	205	193	0	189	0	-177	3744
2/24/2002	225	202	1	201	1	-180	3564
2/25/2002	1957	1441	217	309	30	-40	3524
2/26/2002	1816	1407	151	351	19	-112	3412
2/27/2002	1790	1408	160	313	15	-106	3306
2/28/2002	1836	1389	188	327	16	-84	3222

Tygerberg OPD Stats: March 2002							
	Appts	Atts	DNA	Walk-In	Cancelled	GAP	Accummulative
3/1/2002	1003	746	96	238	7	-84	3222
3/2/2002	222	211	0	208	1	-198	3024
3/3/2002	223	211	0	208	0	-196	2828
3/4/2002	2116	1522	254	317	33	-10	2818
3/5/2002	2024	1554	229	341	35	-135	2683
3/6/2002	1786	1390	219	285	30	-138	2545
3/7/2002	2042	1566	164	287	17	8	2553
3/8/2002	1056	858	98	242	12	-154	2399
3/9/2002	206	189	0	161	0	-144	2255
3/10/2002	233	220	0	163	0	-150	2105
3/11/2002	2112	1638	240	359	19	-144	1961
3/12/2002	1898	1434	193	280	15	-24	1937
3/13/2002	1865	1476	168	323	24	-126	1811
3/14/2002	1880	1334	174	278	32	62	1873
3/15/2002	1039	747	62	216	13	1	1874
3/16/2002	214	204	0	179	2	-171	1703
3/17/2002	192	184	0	175	2	-169	1534
3/18/2002	2205	1571	227	375	34	-2	1532
3/19/2002	1957	1389	130	334	24	80	1612
3/20/2002	1954	1446	170	282	16	40	1652
3/21/2002	124	121	0	117	0	-114	1538
3/22/2002	1005	728	92	161	22	2	1540
3/23/2002	183	113	0	104	0	-34	1506
3/24/2002	174	164	0	148	0	-138	1368
3/25/2002	2009	1582	210	421	24	-228	1140
3/26/2002	1766	1333	143	356	21	-87	1053
3/27/2002	1810	1263	176	278	21	72	1125
3/28/2002	1979	1201	175	314	41	248	1373
3/29/2002	243	202	1	200	0	-160	1213
3/30/2002	306	295	1	288	1	-279	934
3/31/2002	7	0	0	0	0	7	941

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Denise Darnell Lakay was born on May 26, 1964. She completed the National Diploma in Electronic Data Processing at Peninsula Technikon, Bellville. In 1989, she completed the National Higher Diploma in Computer Systems at Cape Technikon in Cape Town. While working at Groote Schuur Hospital, her interest grew in research and co-presented a paper with Dr S. Isaacs at the Helina Conference in 1996 i.e. "User attitudes to a Heritage Hospital Information System. In 1997, she presented a paper at the HISA 97 Congress called "User Participation in Systems Selection / Development:

In 1996, she entered the Educational Stream as a Lecturer in the Peninsula Technikons Engineering Faculty. In the Department of Information Technology she lectures subjects ranging from program logic and design to programming and systems analysis and design. In an attempt to keep subject matter relevant and students interested, Denise has incorporated integrated projects and real life scenarios (case studies) into her subject matter.

Denise's research interest include hospital information systems, success factors relating to the people-technology relationship in information technology and teaching methods.