Factors Influencing the choice of Information System Changeover Approaches used by Information and Communication Technology Consulting Firms in Kenya

By

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DECLARATION

This research project is my original work and has not been presented for a degree programme in any other University.

Signed: _____ **Date:** 13th January 2005

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This project paper has been submitted for examination with my approval as a University Supervisor.

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DEDICATION

This work is dedicated to my loving and dear parents, Thomas Ngure Kagiri and Faith Wambui Ngure, who have seen me through the thick and thin during the study programme.

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ABSTRACT

This study examined the factors considered in selection of changeover approaches and the challenges encountered in information systems changeover. The study is timely as many corporations had to change from traditional manual systems to adapt computer based information systems as a tool of competitive advantage. Background information on changeover approaches and the factors considered in choice is given in details. Also the challenges encountered in the conversion process are discussed.

The study objectives were to determine the extent to which various information system conversion approaches are used by Information Systems consultants in Kenya, establish the challenges encountered by IS consultants during the information system conversion process and determine the relative importance of factors that affect the choice of information system conversion approaches.

Descriptive methodology was mainly used and data was collected using questionnaires on a drop and pick later basis. Data was analyzed using factor analysis and tabulation techniques. The findings on the demographic factors show that most firms are largely locally owned and most had at most two branches. Most respondents were programmers and IS managers who had the required knowledge on system changeover. Gender and age of the respondents was analyzed with the aim of finding out the proportion of men to women involved in the system changeover process, and it was found out that majority of the respondents were men aged between 20-35 years.

Findings of this study also show that majority of the firms in Kenya use the parallel approach in the conversion process. Phased conversion approach is the second most used followed by the pilot approach and the least used approach is the direct approach.

The challenges that greatly affected the conversion process were lack of management support, end users resistance, intended users ignoring the operational system and doing the job the old way, diversion of resources for conversion process, inadequate budget and insufficient conversion time. However, poor coordination of the conversion process, inadequate documentation for the conversion process and impatience of end users with

initial disappointing results produced by the system moderately influenced the conversion process.

The factors considered most important in the choice of an approach are size of the system, top management support to the approach, cost benefit justification, conversion risk, ability to enhance user motivation, amenability of approach to facilitate interaction between users and system development, volume of data to handled, flexibility of approach and complexity of system being handled.

Other factors that were considered but did not greatly influence the conversion process were organizational culture, value of the old system to be implemented and client's recommendation.

Unfortunately, during the study some limitations like lack of enough study literature on the area, lack of enough time and lack of enough money were encountered.

In conclusion management support was the major factor considered in the choice of an approach and the lack of management support was also the greatest challenge encountered during the system conversion. Therefore recommendations sensitizing top management to provide resources are included in this report.

CHAPTER 1

1.0: INTRODUCTION

1.1 Background of the study

Information system implementation issues have been given much attention for the last two decades due to its low implementation success. Nearly 90% of application systems implementations are late or over budget and the success rate of application systems implementation is about 33%. In Kenya, the success rate of application systems implementation is extremely much lower than that in West countries (IDC Group, 1998). Consequently, many people have puzzled over the reasons for the successes and failures experienced with these implementations and especially so more in the conversion stage (Lucas, 1994).

System conversion, which is part of system implementation, involves the practical work of transferring the systems design suite of programs and databases into a working system. It starts with the new system coming in and ends with the old system closing down. This stage involves tasks like project management, staff training and education, file conversion, security check, documentation check and deciding on the method of system conversion (Burch, 1986).

Conversion of a system is a very important stage because a successful implementation can lead to organizational strengths and efficiencies. However, systems could fail even if they have all the specified functionality at the conversion stage (Laudon, 2000). Therefore the project team should plan the conversion stage very carefully to avoid problems that could lead to the failure of the whole project. Four basic approaches to conversion can be used and these are, direct approach, phased approach, pilot approach and parallel approach.

Direct approach involves changing from the old to the new at once or overnight whereby the operations of the old system are stopped and the use of the new system starts. This is sometimes called "cold turkey" approach. This conversion approach is

meaningful when the system is not replacing any other system, when the old system is judged absolutely without value. The approach is also applicable when the new system is either very small or simple, when the design of the new system is drastically different from that of the old system and comparison between systems would be meaningless (Burch, 1986).

Parallel approach method involves the old and the new systems running simultaneously until sufficient confidence is gained in the new system or until everyone is assured that the new system functions correctly and then the old is dropped. This method can only be used if there exist an "old" system in place (Laudon, 2000)

Phased approach involves the new system being introduced in incremental stages, which are divided by function; organizational units served hardware on which the new system will reside, or some other factor. This involves segmenting the system itself rather than the organization. For example, the new data collection activities are implemented and an interface mechanism with the old system is developed. This interface allows the old system to operate with the new input data. Later the new database access, storage and retrieval activities are implemented. Once again an interface mechanism with the new system is developed. Another segment of the new system is installed until the entire system is implemented (O'Brien, 2000).

Pilot conversion method relies on introducing a part of the system into one carefully designated organizational area. When the pilot version is complete and working smoothly it is installed throughout the rest of the organization either simultaneously or in stages. For example, an order entry system could be installed in one sales region and, if proved successful, installed in a second sales region, and so on (Janson and Woo, 1992)

1.2 Factors considered in the choice of an approach.

Over the years many factors have been seen to affect organizational choice of one approach over the other. However,, there is no general consensus as to which sets of

factors are the keys to success in information system implementation. These factors can be internal to the organization or external to the organization.

Factors internal to the firm that may affect the conversion process include the firm's past experience with system conversion, the firm's characteristics, and the firm's pursued strategy. A firm's past experience with system conversion in terms of exposure and organizational learning ultimately affects its future choices in adopting a conversion strategy (Burch, 1986).

A firm's characteristics include size; the conversion of certain information systems may appear more appropriate for larger firms. This is because of the generally large capital investments required and the skilled human resources involved in the implementation and operation of such systems, However,, the availability of financial resources (which is associated with size) can be a major stumbling block to the conversion process (Flores, 1980).

Structural characteristics can be demonstrated by indicators such as the degree of centralization in the firm, the degree of formalization of the different activities in the firm, and the degree of technocratization, which measures the percentage of technical employees in the firm. All these characteristics have been shown to be associated with the conversion of information systems.

The firm's pursued strategy in both strategic orientation and technological policy. A firm's strategy reflects its actions vis-à-vis markets and technology, which ultimately modify its experience and consequently its overall characteristics and capabilities. The need for a strong technology–strategy connection (or fit) has been advocated by a number of authors (for example, Powell 1992), and investments in IT should therefore be closely aligned with overall corporate strategy.

External factors are conditions that exist in a firm's external environment and may affect its system conversion process, these factors can be found at the industry level, in the macroeconomic environment, or in national policies. At the industry level, characteristics such as the degree of diffusion of certain technologies, the availability

of external know-how (for example, technology suppliers), and the degree of innovativeness of the industry are considered. The requirements imposed by major customers and external markets, and overall levels of competition and technological sophistication in the industry will all affect the conversion process (Janson and Woo, 1992).

Regarding the macroeconomic environment, the concern is more with the availability of certain conditions such as capital and qualified human resources, as well as issues related to the general characteristics of the work force and the type and quality of industrial relations (Janson and Woo, 1992).

When considering national policies, we must look for actions that may ultimately affect system conversion in a nation. These actions may come as a result of national policies implemented by the host nations for example, tax policies, such as investment tax credits aimed at making adoption easier or more accessible to certain groups of firms or trade agreements between nations.

1.3 Challenges of system conversion

Evidently despite the careful selection of factors Managers continually face challenges of implementing information systems. This according to O'Brien (2000) can occur at various stages of system implementation and may differ from one organization to another. These include:

Risk and uncertainty, any significant change will present participants with uncertainty of the outcome, and particularly risk of failure. System conversion involves very high risk. Risk and uncertainty can be managed by involving users at all levels, and by building the appropriate (cooperative versus adversarial) relationships with the users (Burch, 1986).

The pressure of time, particularly in private sector organizations, where spending the money before the end of the financial year can result in too little attention to project definition and control.

Failure to invest in planning of the conversion process within the organization, lack of proper user training, education and training are frequently underestimated and are given less time due to schedule pressures, and less understanding of cross-functional business processes.

1.4 Studies on system implementation

A lot of research has gone in the process of system implementation (Schulmeyer, 1992). In Uganda a study by CISCO Systems on the successful system conversion concluded that challenges like lack of enough money and time. Lack of system and user documentation, inadequate provisions for system maintenance and the lack of performance standards all contribute to the failure of the implementation process (Kuilboer and Ashrafi, 2000).

Studies on the Kenyan environment have concentrated on information technology in general without specifically addressing system conversion changeover approaches. Such studies included (Wachira, 2001) found out that ergonomic factors are considered important by information systems consultants but their implementation faces several constraints such as financial resources.

Kinyanjui (2001) came up with the findings that work values are important determinant of the use of information systems in organizations and that these values should be considered during the process of implementing computer systems. Again this did not take conversion approaches into account

Nyandiere (2002) study was on investigation of challenges facing enterprise resource planning systems (ERPs). His area of further research is on challenges facing a particular module of the ERP, which could be accounting module. He found ten important challenges as follows: high costs incurred, problems with data integration, complexity of systems, poor user training, major organizational results and layoffs, compromise on the system security, vendor unreliability, poor vendor support and under utilization of systems.

Kipngetich (1991) concluded that computer users relied heavily on the services of the computer suppliers, rather than taking the initiative to have their own policy guidelines. This would thus prove that conversion of systems is totally left to the suppliers rather than being the users initiative.

However, all the above studies do not address system conversion and changeover approaches used. Furthermore, documentation on system conversion approaches in Kenya and the challenges involved is quite scarce.

1.5 Statement of the problem

With the advent of globalization and liberalization of the Kenya economy many foreign firms have entered the local market. These new entrants have created intense competition as they have taken up the majority market of the existing firms. Information technology (IT) within many organizations has been identified as a tool for building competitive edge in the market as it has substantial effects on many organizations operations, including production, packaging, delivery, marketing, customer and general management of resources.

Realization of the benefits of Information and communication technology together with the recognition of the needs for firms to embrace ICT has led many firms to incorporate computer-based system thus leading to over dependence of computer software (Prahalad and Krishnana, 1999).

As computer based systems grow in popularity in the Kenyan situation, ICT firms must work in order to successfully implement information systems, as there exist low rate of successful systems conversion. It is therefore very important for organizations to enhance success by ensuring the factors considered in choice of an approach and the challenges encountered during conversion are well considered (Beggs, 2000). The consideration of these factors is very important because it is probably a combination of factors that are important in explaining success rather than single elements (Laudon, 2000).

The process of information systems conversion, involving the successful development and introduction of new information systems in the organization, presents an ongoing challenge for managers. This is because the exact combination of factors varies over time from one organization to another and should be decided regarding a given specific set of company circumstances. Also, this is a very important stage that requires careful planning and consideration because it is at this stage that the system is actually transferred from the developers to the users of the system.

Limited study has been conducted in hardware, software, data files and procedures conversion, with most research consisting of case studies in individual organizations. Pressman, (2000) in 1998, conducted a survey on Hoechst Celanese Corporation of Somerville New Jersey. It was found out that though the conversion process was a well planned for activity in most organizations that undertook large system projects, most systems ended up failing at conversion stages due to unforeseen factors. However, documentation is not readily available about such factors in Kenya. Moreover, studies in information systems do not cover information system conversion process.
Consequently, this research primarily focuses on system conversion process in the Kenya. It raises three questions:

a) What conversion approaches are used?
b) What challenges are encountered in the conversion process in the Kenyan business environment?
c) What factors are considered in the choice of an approach?

1.6 Objectives of the study

1. Determine the extent to which various information system conversion approaches are used by Information Systems (IS) consultants in Kenya;

2. Establish the challenges encountered by IS consultants during the information system conversion process; and

3. Determine the relative importance of factors that affect the choice of information system conversion approaches by IS consultants.

1.7 Importance of the study

The findings of this study would be of interest to a number of people. Firstly, the top management in user organizations will know the extent to which various conversion approaches are utilized and the relative importance attached to each conversion approach. They will also draw on the findings the most important factors as they select an approach and finally will understand the challenges encountered in the conversion process and solutions offered to overcome the challenges.

To the Government of Kenya, Kenya Computer Society and other bodies involved in ensuring successful information system conversion. They will draw upon the findings of the study to come up with guidelines of enhancing successful system conversion process.

Finally, the findings might be of importance to the academics or researchers. The findings may form a foundation on which more in-depth studies could be done with respect to information system conversion process.

CHAPTER 2

2.0: LITERATURE REVIEW

2.1 Introduction

Literature in this chapter highlights the various conversion approaches used by many ICT firms. It also identifies the various factors considered important in the choice of an approach as well as highlighting the various challenges encountered in the conversion process and finally it also gives the negative effects of software failure and disasters.

2.2 Information system conversion approaches

The conversion of an information system, which is part of system implementation, is the process of preparing people in an organization for a new system and introducing the new system into the organization. This is an ongoing process that should start early during system development lifecycle (or even precede the actual development) and result in the intended use of the new system and its continuing modification to meet new requirements (Avison, 1995).

Information system conversion involves hardware, software, data files and procedures. This process is complete only when the new system has become a routine, ongoing part of the organization (Burch, 1986) Four basic approaches or strategies toward accomplishing the conversion of a new system exist and these are:

Direct approach.

The direct approach is also known as straight changeover, it involves the complete replacement of the old by the new at one go. It will usually take place during a slack time for example a weekend or holiday, typically closing down the old on Friday and evening and opening a new one on Monday morning (Burch, 1986). This is normally used when users have previous experience of computerization and is confident and well trained. It is also used when the old system is not comparable with the new

system and has no value to the users. When the time scale is tight i.e. no time is available to learn the system slowly and when resources are limited for example when money is not available to employ extra staff and when the system is small (Laudon, 2000).

The advantage of this approach is that it is the cheapest in terms of time and money spent, it is simple to apply when changing over, and it is clear-cut. The disadvantage of this approach is that this method presents a very high risk, and there is no protection in the event of failure. If problems are encountered with the new system, it is very difficult to revert to the old system. The problems in the new system must be worked out until they are resolved. The cost of returning to the old system is high, and an organization is only likely to do this in very rare extreme circumstances, and is therefore relatively rare occurrence (Laudon, 2000).

Parallel approach

The parallel approach avoids the risks of direct cutover. Both the old and the new system are operated simultaneously for a period of time. Since all the processing is performed on all the files, both in the old system and the new system, this means that data files are up to date and so the switch to the new system can be made at any time. The decision is usually made to cutover to the new system at a predetermined time, although it can be made when users indicate that they are happy with the new system. This tends to be used when the new system is directly comparable with the old and when resources are available i.e. money to employ extra staff and pay for overtime (Burch, 1986).

The advantages with of parallel approach are that problems with the new system can be dealt with without disruption to normal operations, and this approach provides a high degree of protection to the organization from failure in a new system thus presents a considerable amount of security to the organization. The risk of failure is low as it offers standby facilities, it offers a useful crosscheck between the old and the new system, and it offers opportunity for gradual change (Laudon, 2000).

The disadvantage of parallel approach is that considerably increased effort and cost is required from the users to operate both systems. This will therefore be an important consideration in planning the length of time for parallel operation. It is also very expensive to run two systems at once and this will invariably involve overtime work. It also involves employment of extra Temporary staff, It is difficult to make direct comparison between the results provided by the two systems and even where discrepancies are real it is not easy to persuade people that it is not the new system that is at fault (Laudon, 2000). However, this approach has gained widespread popularity amongst organization due to the difficulties experienced by organizations in the past when a new system is to be implemented.

If parallel conversion is to be used, a few points should be kept in mind. First, a target date should be set to indicate when the parallel operation would cease and the new system will operate on its own. If possible the target date should be set at the end of the longest processing cycle (for instance at the end of the fiscal period and after year-end closings). Second, if a discrepancy occurs between the old and the new system, it should be verified that the inputs to both systems were the same. If the inputs are the same, the new program should be reviewed to make sure it is processing the transactions properly. In some instances, the old system may be the one that is not processing correctly (O'Brien, 2000).

Phased changeover or phase-in conversion

The Phased changeover or phase-in conversion approach involves changing from the old to the new system in a number of stages rather than at once or the new system gradually replaces the elements of old system. The division may be based on Location for example for a retail shop group, one store this month another the next month Subsystem. For example in a sales order processing system order entry may be changed one period and invoicing the next Sub file for example in the customer account file names beginning with A-F this week G-L next week. This tends to be used when a system is very large and cannot be learnt at once and when the risk involved is very high (Burch, 1986).

The advantages of Phased changeover or phase-in conversion approach are the opportunity to test the new system in operation, while minimizing the consequences of problems with it. If any major problems arise, and it is necessary to revert to the old system, then only a limited part of the organization is affected. It spreads the burden of the workload over time and it presents opportunities to learn from the problems of a previous phase (Laudon, 2000). Also the rate of change in a given organization can be minimized and data processing resources can be acquired gradually over an extended period of time (Burch, 1986).

The disadvantages of Phased changeover or phase-in conversion approach is that it is difficult to control a system working in two modes for example, different customers may be treated differently, getting different documents (manuals or computer prepared) for the same job. It takes a longer time to implement as it is done in phases and the cost of creating the temporary interfaces between the old and the new system. The time required to make gradual changeover are high, has a demoralizing atmosphere in the organization of never completing a system and it has limited applicability (Burch, 1986).

Pilot conversion or modular conversion

The pilot conversion or modular conversion approach implements a system in just one part of the organization such as a branch location while the rest of the organization continues to use the old system. For example an organization would install its new POS system at one of its stores using direct parallel or phased approach and when the problems are resolved the new system is implemented in the other locations (O'Brien, 2000).

The benefit of this approach is that it enables localization of conversion problems or risk, the problems identified in the system can be corrected before further implementation is attempted. It also allows training of end users to occur in one location at a time or allows other operating personnel can be trained in a "Live" environment before the system is implemented at their location. The disadvantage of this approach is that it takes long to convert as this takes place in locations, there is

need to interface between the old and new system which coexist until all locations have been converted (O'Brien, 2000).

2.3 Factors considered in choice of a conversion approach

Although a mix of factors determining the choice of one approach over another this varies widely from one company to another, research has revealed a series of themes that, in aggregate explain most of the factors that influence the choice of an approach (Ackoff, 1981). However, most organizations do have a formal way of converting from the old to the new system particularly on large and expensive software projects (Yano, 2003). The analyst must always plan the conversion well to avoid the creation of a "credibility Gap" between the old and the new system. A conversion plan provides a schedule of all the activities required to install the new system (O'Brien, 2000).

Avison (1998) asserts that because of the high cost incurred in software conversion, training set up and other costs in addition to changeover costs demands that organizations should plan as a first step beforehand to minimize the risk of choosing the wrong changeover approach. The approach selected should be cost effective, efficient and appropriate for the size of the organization and system. The cost should be measured by the amount of dollars spent and amount of support required (Laudon, 2000).

Many studies have stressed the importance of top management support as a necessary ingredient in successful system implementation. Since information systems are a highly integrated, their design, implementation, and operation require the complete cooperation of line and staff members from all segments of the business. Top management support can play a useful role in setting disputes and in providing clear signals to any doubts. They must create an environment for implementing a system and obtained results and must be seen as a participant in the implementation. Top management support in system conversion has two main facets: (1) providing leadership; and (2) providing the necessary resources. To convert a system smoothly and successfully, companies require a steering committee to participate in team

meetings and monitor the implementation efforts, spend time with people and provide clear directions of the project.

Willingness to provide the necessary resources is another indicator of top management commitment to the system project. The implementation could be seriously handicapped if some of the critical resources (such as people, funds and equipment) are not available. Thus, top management support has a positive impact on system conversion success (Iivari and Hirschheim, 1997).

For a large community around the world, including the very open societies, users make their judgment on an application through what the interface conveys to them. If it seems to be in violation with their culture, beliefs or perceptions, it will be considered as a potential invasion of identities, privacy and culture, hence, this type of approach could lead many to avoid using such an approach. Culture is therefore a very strong influence on choice of an approach whereby the Violation of norms and values always leads to resistance and consequently such an approach cannot be described as friendly and assessable. In the developing world in particular, cultural values control most of people's daily activities. Management culture for instance is a complicated arena and a developer has to fully understand its complexity before starting the system development, as its role appears to be very significant during the process of system conversion.

Hammer and Champy (1993) says the influence of socio-political issues appears more critical in developing countries than in the developed countries. At the same time, the rate of computerized system failures in developing countries is significant in comparison to the west. These conditions together raise the concern of "Rationality-reality gaps" between the two contexts in the way systems are converted. Failing to consider this reality during the process of development will make the usability and the use of the system fraught with difficulty. The conversion approach must match its environment in relation to technical, social and organizational concerns, including the stakeholders' awareness.

User involvement is effective because it restores or enhances perceived control through participating in the whole project plan. There are two areas for user involvement when the company decides to implement an information system, user involvement in the stage of definition of the company's system needs, and user participation in the implementation of systems. Often companies do not recognize the impact of choosing the right internal employees with the right skill set. Internal resources of a company should not only be experts in the company's processes but also be aware of the knowledge of information systems application in the industry (Laudon, 2000).

Involving users in the stage of choosing a conversion approach can decrease their resistance to the potential systems, since by this users have feelings that they are the people who choose and make the decision. Thus in considering the choice of an approach (Lucas, 1994) indicates that an organization should consider, the user involvement and influence. This has a lot of positive results, as they are also more likely to respond positively towards the conversion approach because they have been active participants in the change process itself (O'Brien, 2000).

In considering the choice of an approach the organization should state its present and future needs in advance. Also identifying the size of the organization will guide for the better choice of an approach (Lucas, 1994) However, organizations differ in their needs and therefore the conversion approach chosen differs from one organization to the other. An organization should therefore analyze its specific needs for example, whether a firm has multiple locations or not, volume of data to be converted, the size of the system required, the nature of data to be handled, the risk and cost involved and the time available to implement the system.

According to O'Brien, (2000) "project management has evolved in order to plan, coordinate and control the complex and diverse activities of modern industrial and commercial projects." Information systems implementation is a set of complex activities, involving all business functions and often requiring between one and two years of effort, thus companies should have an effective project management strategy

to control the implementation process, avoiding overrun of budget and ensuring the implementation within schedule.

Since systems conversions are enterprise-wide activities that integrate information and information-based processes within and across all functional areas in an organization, it's imperative to get support from all functional segments of the organization. Every person and department is responsible or accountable for the overall conversion process and key users from different departments are ensured to commit to the project conversion approach without being called back to their prior functional job position frequently. Thus, company-wide support has a positive impact on conversion approach success.

Data accuracy and loss is a major determinant of conversion success most user departments are mainly concerned with the Loss or destruction of documents during the conversion period. Most users will thus prefer an approach that ensures smooth conversion of the data and ensures that users do not loose ay important or sensitive documents. However, Laudon (2001) states that if conversion of information systems is not carefully carried out volumes of data may be lost or corrupted thus forcing users to enter the data a fresh. He cautions that analyst should be very careful with the approach they choose so as to avoid loss of data and maintain accuracy.

Laudon, (2001) says that time available to convert the system will determine the approach chosen because any approach should aim at minimizing the amount of time spent in converting from the old to the new system. An organization that has more time to implement the system should choose phased unlike one that is faced by lack of time could use direct approach as opposed to phased approach.

System structure, some projects are less structured than others. Their requirements are clear and straightforward so that outputs and processes can be easily identified. Users know exactly what they want and what systems should do there is almost no possibility of changing their minds such projects run a much lower risk than those whose requirements are relatively undefined fluid and constantly changing where

outputs cannot be easily fixed because they are subject to users changing ideas or because users cannot agree on what they want (Harmsen et al, 1994).

Experience with technology: The project risk will rise if the project team and the information system staff lack the required technical expertise. If a team is unfamiliar with the hardware, system software, application software or database management system proposed for the project it is likely that the following will occur: Unanticipated time slippage because of need to master new skills and variety of technical problems if tools have not been thoroughly mastered, excessive expenditure and extra time because of inexperience with undocumented idiosyncrasies of each new software and hardware.

For an approach to be successful the size of the system, which is determined by the number of modules in the system, should be considered. Many modules means a large system which takes more time to learn and thus an approach that allows more learning time of the whole system effectively would be considered (Laudon, 2000) says that the larger the system the more time and resources it requires to implement it is thus advisable to use an approach that would reduce on cost of time and resources.

The value of the old system if the old system is valuable to an organization then an approach that will maintain the existing together with the old could be used or if the old system is not considered valuable in terms of its use then overnight change may be preferred.

It is evidently clear that for successful system conversion factors like user involvement, proper end user training, organizational fit of the system, system structure, size of the system, time available, organizational support and proper project management should be well taken into consideration.

2.4 Challenges of system conversion

Many things can go wrong during the process of changing from the old to the new system, the challenges of information systems conversion projects has many faces

(Laudon, 2001). Some examples of challenges that many organizations could (but are not eager to) recount include:

End user resistance; no matter how good the new system is most people have a built-in inertia that cannot be convinced by arguments alone. For example the existing system can reward people in ways that all users know, but are afraid to admit. They will point out seemingly irrelevant problems in the new system, because it lacks the "hidden" rewards of the current system. Another often-overlooked fact is that many people simply cannot understand the value of a new system in abstract terms or concepts. They have to work with the system before they "understand" the added value (Applegate et,al, 1996).

Insufficient resources, which include lack of enough time and money whereby the budget for conversion activities especially for data conversion, are underestimated. This has led to the failure of many systems because the development team cannot perform their work effectively without enough resources (Lucas, 1994). Due to lack of time and enough money many software developers have been involved in performing substandard conversion work and this has led to the system producing disappointing business results (Avison and Fitzgerald, 1995).

Business process re-engineering (BPR) is defined by (Hammer and Champy, 1993) as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed". Implementing an information system involves re-engineering the existing business processes to the best business process standard. One of the principal reasons why large technologically sophisticated systems fail is that organizations simply underestimate the extent to which they have to change and re-engineering the existing business processes in order to accommodate their purchase.

No single quality of management practice is more highly correlated with success than employee participation. However, not all individuals who will use the system are involved in the development process, they are only involved in the conversion process whereby the training begins only when the system is about to be installed. This in

many instances has led to the resistance and lack of commitment by the users due to the fact that their views were not sought. This has been seen to cause a lot of problems and in event system failure (Lucas, 1994).

Most systems are developed in a situation whereby time is scarce, and in most instances systems are only developed in the interfaces but user documentation is left for a later date. These, in most instances leave the users with no references for managing the software. If users find problems in using the software and they are provided with no documentation then they stop using the system and thus failure of the project (Applegate et,al, 1996).

Lack of proper user training: Education and training refers to the process of providing management and employees with the logic and overall concepts of system conversion. Thus, people can have a better understanding of how their jobs are related to other functional areas within the company. The user is the people who produce results and should be held accountable for making the system perform to expectations. The main reason for education and training is to increase the expertise and knowledge level of the people within the company (Applegate et, al, 1996).

Provisions for system maintenance are inadequate, there exist insufficient information and thus system personnel who are trained to support the system and to make sufficient maintenance changes cannot do so effectively because the budget for the exercise is not sufficient. Thus in many cases has led to the failure of system conversion function (Desai et al, 2002).

In most cases development cost and time wildly exceed original. Compensation for costs overruns and delays that occur before the system is fully operational are not fully dealt with by the management. Thus most people involved in the conversion process are afraid of spending their money because in most instances they may not be compensated for. This in effect leads to substandard projects (Desai et al, 2002).

2.5 Conversion failure and Disasters

Abbot, (2000) demonstrates that conversion failure has lead to huge losses in monetary terms to organizations. He also asserts that numerous real-world examples exist in which companies have suffered losses, or caused others to suffer losses due to failed system conversion. This is also supported by Flowers, (1996) who shows that millions of dollars are wasted on fixing mistakes done during conversion and thus rendered the information systems total failure or abandoned. The cost of conversion failure can lead to financial catastrophe. These costs include loss of sales, legal fees, litigation costs, system failure costs, lost management time, lost employee time, incidental expenses, vendor charges and damages to the business (Desai et al, 2002). These problems could be averted if elaborate conversion procedures were put in place.

A study conducted by Computer world gave examples of conversion failure of Hilton Hotels Corporation, Mart Corporation and budget rent a car corporation. In 1988 this organizations contracted to a large sale information systems project with AMR information services Inc, a subsidiary of Americans Airline Corporation. The new systems called CONFIRM was to be the first to fully integrate hotel, rent a car, and airline reservation.

However, during the most critical stage of conversion the new system could not communicate very well. The program sending information from one processor could not coordinate with the program receiving information on the other processor. In the event of a system clash CONFIRM database could only be recovered in pieces and not in whole. This caused a lot of time and money wastage as they tried to make the conversion process a process, but after three and half years the project was abandoned and the main reasons given were mismanagement of the conversion process (Computer world, 1994).

In Kenya, a combination of custom-made and off-the-shelf software is used even in the same organization. Therefore conversion related problems couldn't be ruled out given that Kenya has become an important software market as evidenced by the setting up of

local offices by such giant software developers as Microsoft Corporation (Wachira, 2003). Although documentation on conversion failures and disasters in the Kenyan situation is not readily available, there are occasional newspaper reports of irregular conversion from the old to the new system.

CHAPTER 3

3.0: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the research method used in the research project. This includes the population of study, the sample, data collected and data analysis procedures applied.

3.2 Research Design

This research study took a descriptive approach and was aimed at establishing the various information systems conversion approaches and the relative important factors that influence the choice of one approach over the other. It also sought to establish the challenges faced during the system conversion process.

A descriptive approach was considered sufficient for this particular study since the researcher intended to describe the characteristics of the sample, and to establish the proportion of respondents in terms of their behavior. More in-depth study could not be done given that little study has been done in respect to information system conversion in Kenya.

3.3 Population

The population of interest in this study comprised one hundred and three (103) ICT consultants from ICT consulting services. The consultant's were chosen because they perform the function of system conversion. Consequently, they have knowledge skills and experience of system implementation and changeover approaches.

The current list of ICT consulting firms was obtained from the Nation Business directory 2004, the Kenya Computer society and Kenya telephone directory 2004. Judgmental sampling was employed to determine the most appropriate respondents

who had knowledge being sought for the study. The list of the ICT respondents is shown as Appendix 1.

ICT consultants approached to provide the information sought were all in Nairobi. This is because of the time and cost limitation, and also given most active ICT consultants firms are based in Nairobi. Also, the headquarters of the ICT firms are in Nairobi. Further it is in Nairobi where policy guidelines are set on the company operations. The respondent so selected is expected to be a good representation of most consultants.

3.4 Sampling

The study used a non-probability sampling method, the judgmental sampling, in order to focus on the respondents that had the knowledge sought. One hundred questionnaires were administered to the respondents in the selected firms. This size was selected on the basis that at least fifty should be returned at the end of the data collection exercise. Many studies show that the first mailing yields about 70% response rates and that a 50% response rate is adequate for analysis and reporting (Mugenda and Mugenda, 1999). The rationale was that even if the response rate were a low 50%, the conventionally acceptable number of 30 members of the relevant population would be reached, as it would also assume normal distribution from which generalization would be made. Coincidentally in this case 50 firms responded making about 50% response rate.

3.5 Data Collection

The study used primary data. The data needed to perform the study was collected from the ICT consultants using questionnaires. Questionnaire were largely administered on a "drop and pick later" method, to the heads of the ICT consultancy firms or departments. The respondents filled the questionnaires themselves.

At the point of dropping of the questionnaires, the researcher ensured that the document was intact and explained to the respondents what was expected of them. The questionnaires were filed and data collected was then coded, collated and edited.

The questionnaire for data collection was divided into four sections as shown in Appendix 3.

Section A was used to collect data on demographic information for both the firms and the consultants. The data so obtained helped results of analysis.

Section B was used to collect data on the extent to which various changeover approaches were used in the conversion process.

Section C was used to collect data on the challenges, which the ICT consultants face as they convert from old information systems to new information systems.

Section D was used to collect data on various factors that influence the choice of conversion approaches. The respondents were expected to indicate the extent to which they agreed with those factors in terms of their influences on the choice of conversion approaches.

3.6 Data Analysis

Descriptive statistics were used to summarize demographic data from Section A of the questionnaire. Specifically they involved cross tabulations, frequency distribution and percentages which were used to present the analyzed demographic information as well as to show relationships between selected demographic parameters and some aspects of changeover approaches.

In Section B of the questionnaire summarization, tabulation and frequency distribution was used to analyze data. This was in respect of the various changeover approaches used by the responding firms. This analysis was considered appropriate, as it gave an insight sought into the various changeover approaches that most firms used. It also

addressed the first objective of the study of determining the extent to which the firms use the various changeover approaches.

Factor analysis technique was used to summarize the challenges presented in Section C of the questionnaire impended the system conversion process. This was found desirable as it gave an insight into the clusters of challenges that are faced by many firms. Also there were many challenges, which could be summarized into a few by use of factor analysis. This was in line with the second objective.

Factor analysis was used to analyze the relative importance the respondents gave to various factors presented in Section D of the questionnaire. This was in line with the third objective. Factor analysis helped group variables with similar characteristics together. With factor analysis it was be possible to produce a small number of factors from a large number of variables that were capable of explaining the observed variance in the larger number of variables.

CHAPTER 4

4.0 DATA ANALYSIS AND DISCUSSION OF THE FINDINGS

4.1 Introduction

The data were collected using questionnaires of which 103 were dispatched. Out of the 103 questionnaires, 50 (50%) responses were received, edited, validated and analyzed. This chapter presents the data analysis techniques, results and interpretation

4.2 Demographic characteristics

4.2.1 Respondents profile

4.2.1.1 Job role

The respondents were analyzed in terms of the jobs they do in their firm. The results in Table 4.1 show that respondents gave their job roles as system analyst, computer programmers, database administrators, system administrators, and user support engineer. It is very clear that computer programmers were the most with a percentage of 26% followed by system analyst with a 24% these are the most commonly used professionals in the system conversion process and had the authority to give information on system conversion process.

Table 4. 1 Job roles

Job Roles	Frequency	Percent
System Analyst	12	24.0
Computer programmer	13	26.0
Database Administrator	3	6.0
System administrator	8	16.0
User support engineer	5	10.0
Computer programmer and Database administrator	1	2.0
System analyst and computer programmer and system admin	4	8.0
Systems analyst and user support engineer	4	8.0
Total	**50**	**100.0**

4.2.1.2 Gender

The gender of the respondents was analyzed so as to find out the proportion of men to women in the IT industry. Of the total population 70% were men and 30% were women as shown in Table 4.2. This explains the fact that the information technology is widely dominated by men, though women are getting into the IT career in the recent past.

Table 4. 2 Gender

Gender	Frequency	Percent
Male	35	70.0
Female	15	30.0
Total	**50**	**100.0**

4.2.1.3 Age Bracket

Age bracket of the respondents was considered of importance, as it would indicate the number of years that the professionals have worked in relation to their experience in the conversion process. As illustrated on Table 4.3 of the total population only 4% were between 20-25 years and 44% were between 26-35 years and only 8% were between 36-40%. Majority of the respondents between were old and one would expect older professionals to be more experienced and better knowledgeable on the system conversion process.

Table 4. 3 Age bracket

Age bracket	Frequency	Percent
20-25	2	4.0
26-30	22	44.0
31-35	22	44.0
36-40	4	8.0
Total	**50**	**100.0**

4.2.1.4 Years worked

The main aim was to determine the number of years the respondent had worked in a firm, which would determine the experience of the professionals. The total number of years worked ranged from 1-14. The majority of employees with a percentage of 44% worked for 5-9 years. This means that respondents had the relevant experience of system conversion and were thus qualified to provide information needed. This is demonstrated in Table 4.4.

Table 4. 4 Years worked

Years worked	Frequency	Percent
1-4	20	40.0
5-9	22	44.0
10-14	8	16
Total	**50**	**100.0**

4.2.2. Firm ownership

This aimed at establishing the ownership of most of the respondent's firms; Table 4.5 shows the distribution of firms of the respondents by ownership. A large number of 27 (54%) of the responding firms are mainly wholly locally owned.

Table 4. 5 Firm ownership

Firm ownership	Frequency	Percent
Wholly foreign owned	3	6.0
Wholly locally owned	27	54.0
Jointly owned	20	40.0
Total	50	100.0

4.2.3 Firms service sector

Table 4.6 indicates the service sector in which the firm operates. This was important, as it would assist in identifying the major firms involved in system development and conversion. Majority of the firms 18 (36%) is in the software sector this was very

relevant because software conversion process in mainly used in the system development process, which is a major function of the software companies.

Table 4. 6 Service sector

Service Sector	Frequency	Percent
Hardware	4	8.0
Software	18	36.0
IS management	10	20.0
Hardware + software	6	12.0
Software+ IS management	9	18.0
All above	3	6.0
Total	**50**	**100.0**

4.2.4. Total number of employees

The firm's from which the respondents were drawn were analyzed in terms of the number of employees. Table 4.7 indicates the number and percentage of employees in the given firms. The total number of employees ranged from 1 to 50. The majority of firms 22 (44%) had more than 10 but less than 20 employees. Since this variable refers to all cadres of staff, it may not have any bearing on Information system conversion process.

Table 4. 7 Number of employees

Number of employees	Frequency	Percent
1-9	6	12.0
10-19	22	44.0
20-29	13	26.0
40-49	7	14.0
Over 50	2	4.0
Total	**50**	**100.0**

4.2.5 Years in operation

Table 4.8 shows the analysis of the number of years in operation. The number of years in operation ranged from 1 to 50 therefore this variable was categorized to avoid

dealing with extreme values. 5 to 9 years category had the highest number of respondents, that is 24 (48%) and those with over 20 years were only one (2%). The distribution was however; fairly uniform and one would expect therefore that those with many years of experience had more experience and knowledge of information system conversion process.

Table 4. 8 Years in operation

Years in operation	Frequency	Percent
1-4	3	6.0
5-9	24	48.0
10-14	13	26.0
15-19	9	18.0
Over 20	1	2.0
Total	**50**	**100.0**

4.2.6 Number of branches

As can be demonstrated by Table 4.9 the highest number of firms 17 (40%) had only one branch. Whereas those that had five branches were the second highest with 8 (20%) and those with over ten branches were the least with 1 (2%). This did not have any bearing on the process of system conversion since it did not matter how many branches a firm had as long as they carried out the system conversion process.

Table 4. 9 Number of branches

Number of branches	Frequency	Percent
One	23	46.0
Two	8	16.0
Three	7	14.0
Five	8	16.0
Six	1	2.0
Total	**50**	**100.0**

4.3 Extent of use of conversion approaches

The respondents were asked to indicate the extent to which they used the various changeover approaches in the system conversion process. This is in line with the first objective of the study. The findings showed that parallel approach was the most used approach with 60% whereas the direct approach was the least used approach.

4.3.1 Direct approach

Table 4. 10 Direct approach

Direct approach	Frequency	Percent
Not at all	9	18.0
Small extent	29	58.0
Moderate extent	10	20.0
Large extent	1	2.0
Very large extent	1	2.0
Total	**50**	**100.0**

Direct approach involves changing from the old to the new system overnight. Table 4.10 shows that the highest population of 29 (58%) rarely used the direct approach, those who used to a large extent were only 2 (4%), while those that never used this approach at all were 9 (18%), this could be associated with the high risk involved in using the approach.

4.3.2 Parallel approach

Table 4. 11 Parallel approach

Parallel approach	Frequency	Percent
Small extent	2	4.0
Large extent	19	38.0
Very large extent	29	58.0
Total	**50**	**100.0**

Parallel approach involves using the new system in parallel with the old system until the new system is learned and hence the old system is dropped. Table 4.11 shows that parallel approach was used to a very large extent of 29(58%), moderately used was 19 (38%) and the small extent was 2 (4%), this could be associated with the low level of risk associated with this approach.

4.3.3 Phased Changeover approach

Table 4. 12 Phased changeover

Phased approach	Frequency	Percent
Small extent	4	8.0
Large extent	29	38.0
Very large extent	17	34.0
Total	**50**	**100.0**

Phased approach involves introducing the new system in modules or phases. Table 4.12 demonstrates that many responding firms also largely used phased approach as it had 17 (34%), it was also moderately used with 29 (38%) and a to a least extent of 4 (8%) usage by the responding firms.

4.3.4 Pilot Approach

Table 4. 13 Pilot conversion approach

Pilot approach	Frequency	Percent
Small extent	15	30.0
Large extent	30	60.0
Very large extent	5	10.0
Total	**50**	**100.0**

Pilot approach involves introducing the system to one branch or department and when the system is fully learned in one department then it is introduced to the next until the whole organization has learned the new system. Table 4.13 shows that pilot approach was used to a large extent by only 5 (10%) and to a very large extent by 30 (60%) and to a small extent by 15 (30%).

Table 4. 14 Mean and standard deviation of the approaches

Type of Approach	Mean	N	Std. Deviation
Direct Approach	2.12	50	.80
Parallel Approach	4.50	50	.71
Phased Changeover Approach	4.26	50	.60
Pilot Conversion Approach	3.74	50	.75

From the Table 4.14 the most popular approach is the Parallel approach with a mean of 4.50 and a standard deviation of 0.71. This could be associated with the low risk of the approach and also the ease in learning the approach by the employees. Despite the fact that it is very expensive to run the two systems ICT firm still preferred it to the others.

The Phased changeover approach is next preferred one with a mean of 4.26 and a standard deviation of 0.6, this could be due to the fact that the risk is well spread by first solving problems from a certain module and then moving on to the next module.

The next preferred approach is the pilot approach with a mean of 3.74 and a standard deviation of 0.75, these further spreads the risk by introducing the system to one branch and after it is fully learned and is working it is then introduced to the other branches. The popularity of this is low because it takes a lot of time to implement the system and may thus not be fully preferred.

The least used approach is the direct approach with a mean of 2.12 and a standard deviation of .80. This has the highest risk because it provides no fall back position incase of an error and may thus lead to huge losses in the firms involved.

If an attribute has a high mean and a high variation it means that there were extremes in the way respondents rated that particular variable. For example the mean of 4.50 for the parallel approach indicates that it is used consistently to a very large extent by most companies and it is the thus the most popular approach so to say.

4.4 Factor Analysis of the challenges experienced during information system Conversion.

This section addresses the second objective of the study, which is to determine the challenges or problems encountered by the ICT consultants in Kenya during the information system conversion process. Data collected were subjected to factor analysis.

Factor analysis is a technique applicable when there is a systematic interdependence among a set of observed or manifest variables and the researcher is interested in finding out something more fundamental or latent which creates this commonality. Thus factor analysis seeks to resolve a large set of measured variables in terms of relatively few categories, known as factors.

4.4.1 The correlation Matrix

Each respondent has indicated the level to which they agreed or disagreed on the various challenges that affected the information system conversion process. However,, there were some problems some of which could be said to be similar to each other . Thus factor analysis was used to identify such problems and group them together into meaningful classes.

The principle concern of factor analysis is to find the latent variables or factors among observed variables. It does this by grouping variables with similar characteristics together, thereby producing a small number of variables, which makes it very easy to explain the observed variance in relation to the larger number of variables. Factor analysis allows the researcher to group variables into factors based on the correlation between the variables. Correlation is Correlation is a statistical technique, which can show whether, and how strongly pairs of variables are related. This can be done by providing a correlation matrix which is a matrix giving the correlations between all pairs of data sets. A matrix is a rectangular array of elements (or entries) set out by rows and columns.

In a correlation matrix of variables, the existence of clusters of large correlation coefficients between subsets of the variables suggests that the variables could be measuring aspects of the same underlying dimension or factors (Field, 2000) Attempts are made to reduce the correlation matrix down to its component dimensions by looking for variables that correlate highly with a group of other variables outside that group

4.4.2 Correlation matrix

Table 4.15 shows the correlation matrix of the challenges considered important in the choice of a conversion approach by the respondents in this study. The extraction method was the primary component Analysis that seeks to maximize the sum of squared loadings of each factor extracted in turn. Its main aim is the construction out of a given set of variables new variables called principal components, which are linear combinations.

Table 4. 15 Correlation Matrix

	F1	F2	F3	F4	F5	F6	F7	F8
F1	1.000	0.656	0.42	0.223	-0.094	0.409	0.73	0.732
F2	0.656	1.000	0.306	0.312	0.03	0.432	0.62	0.576
F3	0.42	0.306	1.000	0.458	-0.044	0.144	0.609	0.544
F4	0.223	0.312	0.458	1.000	0.016	0.349	0.568	0.64
F5	-0.094	0.03	-0.044	0.016	1.000	0.33	-0.208	-0.152
F6	0.409	0.432	0.144	0.349	0.33	1.000	0.531	0.457
F7	0.73	0.62	0.609	0.568	-0.208	0.531	1.000	0.882
F8	0.732	0.576	0.544	0.64	-0.152	0.457	0.882	1.000
F9	0.393	0.521	0.199	0.494	-0.064	0.571	0.625	0.548
F10	0.634	0.632	0.358	0.226	0.04	0.607	0.753	0.708
F11	0.466	0.418	0.237	0.166	0.321	0.623	0.473	0.496
F12	0.502	0.332	0.367	0.145	0.096	0.419	0.539	0.428
F13	0.627	0.674	0.266	0.574	0.158	0.672	0.743	0.727
F14	0.651	0.572	0.472	0.627	-0.216	0.409	0.748	0.768
F15	0.206	0.29	0.356	0.19	0.258	0.29	0.235	0.268
F16	0.669	0.537	0.403	0.425	0.213	0.551	0.721	0.74
F17	0.483	0.435	0.034	0.327	0.233	0.555	0.532	0.644
Determinant = 7.232E-08								

Table 4.15 Correlation Matrix (continued)

	F9	F10	F11	F12	F13	F14	F15	F16	F17
F1	0.393	0.634	0.466	0.502	0.627	0.651	0.206	0.669	0.483
F2	0.521	0.632	0.418	0.332	0.674	0.572	0.29	0.537	0.435
F3	0.199	0.358	0.237	0.367	0.266	0.472	0.356	0.403	0.034
F4	0.494	0.226	0.166	0.145	0.574	0.627	0.19	0.425	0.327
F5	-0.064	0.04	0.321	0.096	0.158	-0.216	0.258	0.213	0.233
F6	0.571	0.607	0.623	0.419	0.672	0.409	0.29	0.551	0.555
F7	0.625	0.753	0.473	0.539	0.743	0.748	0.235	0.721	0.532
F8	0.548	0.708	0.496	0.428	0.727	0.768	0.268	0.74	0.644
F9	1.000	0.58	0.3	0.324	0.66	0.526	0.098	0.394	0.497
F10	0.58	1.000	0.609	0.502	0.618	0.482	0.381	0.661	0.704
F11	0.3	0.609	1.000	0.49	0.503	0.287	0.389	0.606	0.502
F12	0.324	0.502	0.49	1.000	0.4	0.402	0.322	0.436	0.403
F13	0.66	0.618	0.503	0.4	1.000	0.693	0.183	0.769	0.71
F14	0.526	0.482	0.287	0.402	0.693	1.000	0.3	0.614	0.425
F15	0.098	0.381	0.389	0.322	0.183	0.3	1.000	0.479	0.279
F16	0.394	0.661	0.606	0.436	0.769	0.614	0.479	1.000	0.661
F17	0.497	0.704	0.502	0.403	0.71	0.425	0.279	0.661	1.000
Determinant = 7.232E-08									

4.4.3 The Communalities

Communalities show the amount of variance in the variables that has been accounted for by the extracted factors. A high value of communality means that not much of the variable is left over after the problems represent is taken into consideration means that not much of the variable Each challenge has associated with it a variance reflecting the variation of respondents. The amount of variance for each activity that is explained or accounted for by a specific factor is the communality of the variable. Communality in this case is thus the percentage of a challenge variance that contributes to the correlation with other challenges or is common to other challenges. Table 4.16 show the communalities calculated. IT is clear that each challenge has a relatively high communality. Thus each challenge belongs to some cluster or factor.

Table 4. 16 communalities

	Initial	Extraction
Insufficient conversion time	1.000	.777
Insufficient funds for Conversion	1.000	.563
Lack of user involvement in the conversion process	1.000	.804
Inadequate user documentation	1.000	.913
Lack of compensation of costs and overruns and delays during conversion	1.000	.811
Inadequate budget	1.000	.713
Lack of proper management	1.000	.911
Lack of Management support	1.000	.867
Diversion of resources provided for conversion	1.000	.678
Intended users ignore the operational system and do the job the old way	1.000	.792
Impatience of end users	1.000	.695
End users resistance during the conversion process	1.000	.547
Poor coordination of conversion activities	1.000	.873
Lack of proper conversion performance evaluations	1.000	.781
Users' disinterest with the conversion process	1.000	.664
Incompetent IT staff to manage the conversion process	1.000	.759
The systems falls into disuse when original users are transferred	1.000	.719

Extraction Method: Principal Component Analysis.

4.4.4 Factor extraction

Table 4.17 shows all the factors extracted from the analysis along with their Eigen values, the percent of variance attributed to each factor, and the cumulative variance of the factor and the previous factors. The first challenge accounts for 50.212% of the variance, the second 11.185% the third 7.728% and the fourth 6.567%. This shows that only these four challenges should be considered important and the rest are not significant.

Table 4. 17 Total variance explained

Total Variance Explained

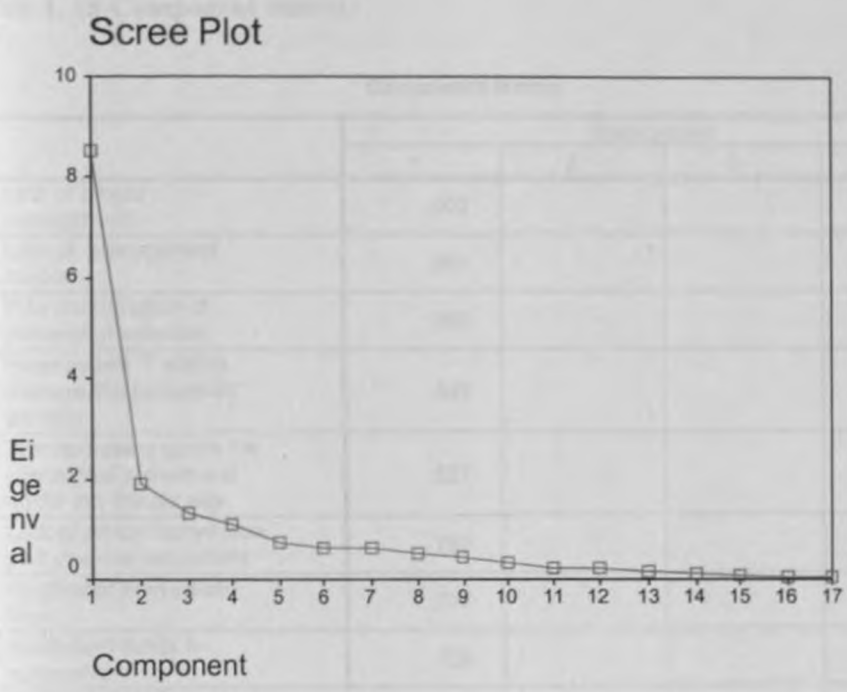
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Componen	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.536	50.212	50.212	8.536	50.212	50.212	5.141	30.239	30.239
2	1.901	11.185	61.397	1.901	11.185	61.397	3.941	23.180	53.419
3	1.314	7.728	69.125	1.314	7.728	69.125	1.932	11.364	64.783
4	1.116	6.567	75.693	1.116	6.567	75.693	1.855	10.910	75.693
5	.728	4.284	79.977						
6	.642	3.778	83.754						
7	.615	3.617	87.371						
8	.514	3.025	90.397						
9	.438	2.579	92.975						
10	.315	1.853	94.828						
11	.229	1.344	96.172						
12	.212	1.247	97.419						
13	.154	.903	98.323						
14	.117	.688	99.010						
15	.698E-02	.394	99.404						
16	.386E-02	.317	99.721						
17	.742E-02	.279	100.000						

Extraction Method: Principal Component Analysis.

4.4.5 The Scree plot

Figure 1 is a graph of the Eigen values plotted against all factors. This observation is very important as it helps us in knowing how many factors to maintain. The point of interest is usually where the curve starts to flatten. As seen in the figure 1 the curve begins to flatten after factors 4 and 5. Given that factor 4 has an Eigen value of more than one it is considered and as factor 5 has an Eigen value of less than 1 it is left out. Thus only 4 factors are considered significant. This confirms that only four challenges are considered important in analysis.

Figure 1 Scree Plot



4.4.6 Factor matrix

Once factors have been extracted, it is possible to calculate the loading of the challenges on each factor. The higher the absolute value of the loading the more the challenge contributes to the variable. Table 4.18 shows that only 4 challenges have been extracted. The gaps on the Table represent loadings that are less than 0.5, the use of gaps makes reading the Table easier.

Table 4. 18 Component matrix

Component Matrix

	Component			
	1	2	3	4
Lack of proper management	.902			
Lack of Management support	.891			
Poor coordination of conversion activities	.869			
Incompetent IT staff to manage the conversion process	.845			
Intended users ignore the operational system and do the job the old way	.827			
Lack of proper conversion performance evaluations	.782			
Insufficient conversion time	.778			
Insufficient funds for conversion	.729			
The systems falls into disuse when original users are transferred	.726			
Inadequate budget	.697			
Diversion of resources provided for conversion	.677			
Impatience of end users	.651			
End users resistance during the conversion process	.595			
Lack of compenation of costs and overruns and delays during conversion		.802		
Lack of user involvement in the conversion process	.513		.622	
Users' disinterest with the conversion process			.585	
Inadequate user documentation	.577			.679

Extraction Method: Principal Component Analysis.

a. 4 components extracted.

4.4.7 Factor Rotation

Factor rotation main objective is to reduce the number of factors on which the variables under investigation have high loadings. This changes nothing but makes interpretation of the analysis easier as shown in Table 4.19.

Table 4. 19 Rotated component matrix

	Component			
	1	2	3	4
Intended users ignore the operational system and do the job the old way	.826			
Insufficient conversion time	.787			
Impatience of end users	.573			
End users resistance during the conversion process	.664			
Lack of proper management	.647	.586		
Insufficient funds for conversion	.625			
The systems falls into disuse when original users are transferred	.622			
Incompetent IT staff to manage the conversion process	.620			
Inadequate budget	.522			
Inadequate user documentation		.875		
Poor coordination of conversion activities	.552	.729		
Diversion of resources provided for conversion		.703		
Lack of proper conversion performance evaluations		.661		
Lack of Management support	.584	.630		
Lack of user involvement in the conversion process			.833	
Users' disinterest with the conversion process			.616	
Lack of compenation of costs and overruns and delays during conversion				.899

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 20 iterations.

4.4.8 Isolation of challenges for each factor

Isolation of challenges for each factor involves isolating each challenge that constitutes each factor based on the factor loadings. These are the correlation between the factors

and the challenges encountered, Table 4.20, shows challenges for each factor based on a minimum correlation of 0.7.

Table 4.20 Isolation of challenges

FACTOR	CHALLENGES/VARIABLES
Factor 1	• Intended users ignore the operational system and do things the old way • Insufficient conversion time • Impatience of end users • End users resistance • Lack of proper management • Insufficient funds • Inadequate budget • Incompetent IT staff • System falls into disuse when original users are transferred • Poor coordination • Lack of management support
Factor 2	• Lack of proper management • Inadequate user documentation • Poor coordination of conversion activities • Diversion of conversion resources • Lack of performance evaluations • Lack of management support
Factor 3	• Lack of user involvement, • Users disinterest in the system
Factor 4	• Lack of compensation for cost overruns and delays during conversion

Factor 1 is where most of the challenges fall under. These include; intended users ignore the operational system and do things the old way, insufficient conversion time, impatience of end users, end users resistance, lack of proper management, insufficient funds, inadequate budget, incompetent IT staff, system falls into disuse when original users are transferred, poor coordination, and lack of management support.

Factor 2 indicates that lack of proper management, inadequate user documentation, poor coordination of conversion activities, diversion of conversion resources, lack of performance evaluations, lack of management support all fall under the same fact.

Factor 3 revolves around challenges like lack of user involvement, and users disinterest in the system.
Factor 4 highlights the challenge of lack of compensation for cost overruns and delays during conversion.

From the above it is clear that most of the challenges fall under factor 1, which should thus be well evaluated so as to minimize the total challenges encountered in the conversion process.

4.5 Factor analysis of factors considered in the choice of a conversion approach

This section mainly addresses the study's third objective, which is to determine the relative importance of factors that affect the choice of information system conversion approaches by the responding firms.

4.5.1 Correlation Matrix

Each respondent rated the importance to which they attach to various factors that they considered in the choice of an approach. However, there may be some groups of factors that are similar to each other and thus factor analysis was used to identify such factors and group them together. The principle concern of factor analysis is to resolve a large set of measured variables in terms of relatively few categories known as factors. This technique allows the researcher to group variables into factors based on correlation between the variables (Kothari 2003).

In correlation matrix of variables, the existence of clusters of large correlation coefficients between subsets of the variables suggests that the variables could be measuring aspects of the same underlying dimension or factors (Field, 2000). Attempts are made to reduce the correlation matrix down to its component dimensions by looking for variables that correlate highly with a group of other variables outside that group.

The following is correlation matrix of the factors considered important in the choice of a conversion approach by the respondents in this study. The extraction method was the primary component Analysis.

Table 4. 20 Correlation matrix

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12
F1	1.000	-0.078	0.575	0.724	0.57	0.39	0.23	0.446	0.46	0.63	0.254	-0.147
F2	-0.078	1.000	-0.01	-0.18	0.089	0.33	-0.01	0.203	-0.1	-0.2	0.368	0.292
F3	0.575	-0.012	1.000	0.667	0.341	0.11	0.39	0.381	0.59	0.61	-0.13	-0.043
F4	0.724	-0.181	0.667	1.000	0.577	0.41	0.38	0.506	0.71	0.65	-0.09	-0.1
F5	0.57	0.089	0.341	0.577	1.000	0.38	0.3	0.704	0.23	0.22	0.227	0.018
F6	0.386	0.334	0.106	0.405	0.38	1.000	0.17	0.273	0.1	0.05	0.304	0.171
F7	0.231	-0.01	0.387	0.375	0.295	0.17	1.000	0.479	0.32	0.22	-0.09	0.234
F8	0.446	0.203	0.381	0.506	0.704	0.27	0.48	1.000	0.44	0.21	0.305	0.378
F9	0.455	-0.1	0.585	0.712	0.227	0.1	0.32	0.438	1.000	0.77	0.084	0.203
F10	0.63	-0.159	0.612	0.651	0.224	0.05	0.22	0.213	0.77	1.000	0.091	-0.2
F11	0.254	0.368	-0.13	-0.09	0.227	0.3	-0.09	0.305	0.08	0.09	1.000	0.419
F12	-0.147	0.292	-0.04	-0.1	0.018	0.17	0.23	0.378	0.2	-0.2	0.419	1.000
F13	-0.054	0.222	0.126	-0.05	-0.148	0.31	0.34	-0.083	0.14	0.13	0.284	0.201
F14	0.026	0.317	0.153	0.122	0.38	0.32	0.18	0.288	0.05	0.13	0.245	0.047
F15	0.406	0.226	0.321	0.365	0.634	0.45	0.39	0.376	0.14	0.18	0.331	0.051
F16	0.261	0.439	0.344	0.142	0.336	-0.05	0.36	0.441	0.32	0.4	0.26	0.04
F17	0.028	0.23	0.152	0.174	0.259	-0.02	0.23	0.152	0.22	0.25	0.024	-0.217
F18	0.333	0.05	0.227	0.403	0.601	0.34	0.27	0.37	-0.07	0.05	0.009	-0.305
F19	0.375	0.052	0.207	0.619	0.53	0.58	0.29	0.556	0.51	0.35	0.388	0.326
F20	-0.392	0.162	-0.03	-0.06	-0.193	0.19	0.14	-0.031	-0.06	-0.2	-0.28	0.02
F21	0.288	0.243	0.227	0.527	0.439	0.41	0.33	0.611	0.53	0.33	0.182	0.245
F22	0.006	0.3	0.139	0.214	0.061	0.44	0.38	0.32	0.18	0.03	0.125	0.367
F23	0.416	0.105	0.453	0.672	0.719	0.53	0.38	0.612	0.45	0.37	0.215	0.296
F24	0.125	0.311	0.113	0.079	0.429	0.12	0.08	0.537	0.12	0.15	0.398	-0.124
F25	0.756	0.086	0.53	0.528	0.63	0.05	0.36	0.636	0.46	0.56	0.33	0.016
F26	0.307	0.292	0.162	0.2	0.44	0.41	0.47	0.553	0.22	0.06	0.464	0.644
F27	0.63	0.03	0.349	0.666	0.53	0.54	0.31	0.434	0.56	0.56	0.327	0.078
F28	0.562	0.13	0.622	0.716	0.623	0.41	0.45	0.612	0.59	0.49	0.151	0.322
F29	0.5	-0.004	0.392	0.67	0.708	0.3	0.43	0.504	0.37	0.45	0.03	-0.12
F30	-0.015	0.237	0.116	0.278	0.642	0.16	0.32	0.648	0.24	0	0.256	0.287
F31	0.493	-0.056	0.452	0.717	0.35	0.41	0.29	0.463	0.7	0.54	0.243	0.305
F32	0.426	0.135	0.37	0.405	0.668	0.19	0.52	0.591	0.29	0.27	0.061	0.175
F33	0.676	0.13	0.509	0.486	0.375	0.25	0.43	0.386	0.38	0.39	0.114	-0.045
F34	0.35	0.081	0.402	0.67	0.561	0.37	0.49	0.586	0.44	0.43	-0.11	-0.012
F35	0.271	0.064	0.082	0.366	0.318	0.33	0.29	0.73	0.51	0.24	0.338	0.518

Table 4.21: Correlation Matrix (continued)

	F13	F14	F15	F16	F17	F18	F19	F20	F21	F22	F23	F24	F25
F1	-0.05	0.026	0.41	0.261	0.028	0.333	0.375	-0.392	0.288	0.006	0.416	0.13	0.756
F2	0.222	0.317	0.23	0.439	0.23	0.05	0.052	0.162	0.243	0.3	0.105	0.31	0.086
F3	0.126	0.153	0.32	0.344	0.152	0.227	0.207	-0.027	0.227	0.139	0.453	0.11	0.53
F4	-0.05	0.122	0.37	0.142	0.174	0.403	0.619	-0.057	0.527	0.214	0.672	0.08	0.528
F5	-0.15	0.38	0.63	0.336	0.259	0.601	0.53	-0.193	0.439	0.061	0.719	0.43	0.63
F6	0.309	0.319	0.45	-0.05	-0.02	0.342	0.576	0.194	0.41	0.438	0.527	0.12	0.052
F7	0.344	0.176	0.39	0.36	0.23	0.272	0.29	0.136	0.328	0.383	0.381	0.08	0.363
F8	-0.08	0.288	0.38	0.441	0.152	0.37	0.556	-0.031	0.611	0.32	0.612	0.54	0.636
F9	0.136	0.048	0.14	0.316	0.218	-0.067	0.514	-0.061	0.525	0.184	0.448	0.12	0.46
F10	0.128	0.13	0.18	0.4	0.252	0.051	0.347	-0.238	0.327	0.026	0.366	0.15	0.555
F11	0.284	0.245	0.33	0.26	0.024	0.009	0.388	-0.277	0.182	0.125	0.215	0.4	0.33
F12	0.201	0.047	0.05	0.04	-0.22	-0.305	0.326	0.02	0.245	0.367	0.296	-0.1	0.016
F13	1.000	0.075	0.31	0.155	0.176	0.003	0.084	0.158	0.109	0.224	0.114	0.08	-0.03
F14	0.075	1.000	0.47	0.443	0.492	0.47	0.444	0.082	0.47	0.499	0.503	0.6	0.022
F15	0.306	0.465	1.000	0.413	0.423	0.676	0.497	-0.13	0.36	0.422	0.624	0.38	0.389
F16	0.155	0.443	0.41	1.000	0.728	0.287	0.084	-0.07	0.494	0.255	0.282	0.61	0.566
F17	0.176	0.492	0.42	0.728	1.000	0.51	0.199	0.075	0.447	0.256	0.271	0.56	0.24
F18	0.003	0.47	0.68	0.287	0.51	1.000	0.41	-0.034	0.237	0.322	0.543	0.49	0.277
F19	0.084	0.444	0.5	0.084	0.199	0.41	1.000	0.007	0.554	0.421	0.75	0.23	0.292
F20	0.158	0.082	-0.13	-0.07	0.075	-0.034	0.007	1.000	0.182	0.353	0.057	0.09	-0.35
F21	0.109	0.47	0.36	0.494	0.447	0.237	0.554	0.182	1.000	0.608	0.583	0.49	0.277
F22	0.224	0.499	0.42	0.255	0.256	0.322	0.421	0.353	0.608	1.000	0.498	0.29	-0.14
F23	0.114	0.503	0.62	0.282	0.271	0.543	0.75	0.057	0.583	0.498	1.000	0.31	0.389
F24	0.084	0.599	0.38	0.609	0.555	0.491	0.23	0.092	0.491	0.293	0.314	1.000	0.31
F25	-0.03	0.022	0.39	0.566	0.24	0.277	0.292	-0.35	0.277	-0.14	0.389	0.31	1.000
F26	0.142	0.369	0.51	0.297	0.076	0.208	0.577	-0.003	0.389	0.508	0.606	0.16	0.361
F27	0.201	0.262	0.51	0.246	0.285	0.325	0.793	-0.036	0.491	0.15	0.613	0.18	0.546
F28	0.111	0.271	0.48	0.336	0.161	0.221	0.596	-0.204	0.577	0.28	0.751	0.12	0.504
F29	0.02	0.341	0.49	0.463	0.411	0.414	0.397	-0.041	0.638	0.224	0.681	0.35	0.533
F30	0.021	0.538	0.52	0.455	0.504	0.503	0.517	0.162	0.582	0.425	0.698	0.63	0.248
F31	0.102	0.318	0.36	0.13	0.109	0.156	0.779	-0.127	0.62	0.421	0.593	0.09	0.261
F32	-0.04	0.31	0.52	0.435	0.308	0.362	0.436	-0.121	0.419	0.167	0.613	0.23	0.614
F33	0.091	-0.12	0.51	0.341	0.163	0.331	0.255	-0.217	0.101	0.116	0.264	0.06	0.574
F34	0.087	0.4	0.48	0.394	0.4	0.516	0.574	0.241	0.738	0.531	0.758	0.37	0.36
F35	-0.06	0.141	-0	0.15	-0.07	-0.045	0.598	0.099	0.606	0.335	0.472	0.27	0.315

Table 4.21: Correlation Matrix (continued)

	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35
F1	0.307	0.63	0.562	0.5	-0.015	0.493	0.426	0.676	0.35	0.271
F2	0.292	0.03	0.13	-0.004	0.237	-0.056	0.135	0.13	0.081	0.064
F3	0.162	0.349	0.622	0.392	0.116	0.452	0.37	0.509	0.402	0.082
F4	0.2	0.666	0.716	0.67	0.278	0.717	0.405	0.486	0.67	0.366
F5	0.44	0.53	0.623	0.708	0.642	0.35	0.668	0.375	0.561	0.318
F6	0.408	0.536	0.413	0.304	0.155	0.405	0.192	0.246	0.373	0.333
F7	0.473	0.307	0.452	0.427	0.322	0.287	0.515	0.427	0.493	0.287
F8	0.553	0.434	0.612	0.504	0.648	0.463	0.591	0.386	0.586	0.73
F9	0.223	0.563	0.593	0.369	0.235	0.696	0.287	0.377	0.439	0.508
F10	0.056	0.559	0.494	0.452	0.003	0.537	0.274	0.392	0.433	0.243
F11	0.464	0.327	0.151	0.03	0.256	0.243	0.061	0.114	-0.112	0.338
F12	0.644	0.078	0.322	-0.12	0.287	0.305	0.175	-0.045	-0.012	0.518
F13	0.142	0.201	0.111	0.02	0.021	0.102	-0.037	0.091	0.087	-0.055
F14	0.369	0.262	0.271	0.341	0.538	0.318	0.31	-0.118	0.4	0.141
F15	0.511	0.506	0.476	0.494	0.519	0.355	0.517	0.51	0.475	-0.002
F16	0.297	0.246	0.336	0.463	0.455	0.13	0.435	0.341	0.394	0.15
F17	0.076	0.285	0.161	0.411	0.504	0.109	0.308	0.163	0.4	-0.073
F18	0.208	0.325	0.221	0.414	0.503	0.156	0.362	0.331	0.516	-0.045
F19	0.577	0.793	0.596	0.397	0.517	0.779	0.436	0.255	0.574	0.598
F20	-0.003	-0.036	-0.204	-0.041	0.162	-0.127	-0.121	-0.217	0.241	0.099
F21	0.389	0.491	0.577	0.638	0.582	0.62	0.419	0.101	0.738	0.606
F22	0.508	0.15	0.28	0.224	0.425	0.421	0.167	0.116	0.531	0.335
F23	0.606	0.613	0.751	0.681	0.698	0.593	0.613	0.264	0.758	0.472
F24	0.161	0.179	0.118	0.353	0.634	0.085	0.228	0.062	0.373	0.265
F25	0.361	0.546	0.504	0.533	0.248	0.261	0.614	0.574	0.36	0.315
F26	1.000	0.505	0.471	0.243	0.472	0.372	0.615	0.317	0.385	0.558
F27	0.505	1.000	0.612	0.492	0.259	0.693	0.538	0.507	0.543	0.456
F28	0.471	0.612	1.000	0.68	0.434	0.737	0.639	0.49	0.608	0.456
F29	0.243	0.492	0.68	1.000	0.549	0.422	0.612	0.289	0.766	0.244
F30	0.472	0.259	0.434	0.549	1.000	0.274	0.496	0.013	0.611	0.401
F31	0.372	0.693	0.737	0.422	0.274	1.000	0.271	0.377	0.485	0.478
F32	0.615	0.538	0.639	0.612	0.496	0.271	1.000	0.42	0.641	0.403
F33	0.317	0.507	0.49	0.289	0.013	0.377	0.42	1.000	0.242	0.087
F34	0.385	0.543	0.608	0.766	0.611	0.485	0.641	0.242	1.000	0.471
F35	0.558	0.456	0.456	0.244	0.401	0.478	0.403	0.087	0.471	1.000

4.5.2 The Communalities

The communality shows how much of each variable is accounted for by the underlying factor taken together. A high value of commonality means that not much of the variable is left over after whatever factors represent is taken into consideration. Each of the factors has associated with it a variance reflecting the variation of the respondents. The amount of variance associated with each factor is thus the communality of the variable. Communality here is the percentage of a factor variance that contributes to the correlation with other factors or is common to other factors. The Table 4.22 shows the communalities calculated. The extraction method was the principal component analysis.

Table 4.22 shows that each factors considered in the choice of an approach has a relatively high communality. This means that not much of the variable is left over after the factors represent is taken into consideration thus the factors belong to some cluster or factor.

Table 4. 21 communalities

Communalities

	Initial	Extraction
Size of the system being implemented	1.000	.906
Top management support of the approach	1.000	.678
cost benefit justification of the approach	1.000	.664
Conversion risk attributed to the approach	1.000	.943
Ability to enhance end user motivation	1.000	.896
Value of the old system	1.000	.891
Amenability of the approach	1.000	.748
Volume and nature of data handled	1.000	.879
Ability to minimise cost	1.000	.889
Implications of data files conversion with the approach	1.000	.880
Suitability of the approach to organizational structure	1.000	.897
Ability of the approach to enhance latest leading edge technology	1.000	.929
Organisational structure	1.000	.658
Volume of work being handled by the system	1.000	.715
Approach support for end user training	1.000	.875
Intergrated nature of the system being implemented	1.000	.922
Complexity of the system being implemented	1.000	.799
Flexibility of the approach	1.000	.837
Adequacy of specialist involved in the conversion	1.000	.878
Size of the organisation	1.000	.777
Company commitment to the approach	1.000	.829
End users support of the approach	1.000	.724
Employee resistance to the appoach	1.000	.864
Structure of the system being implemented	1.000	.842
Clients recommendation	1.000	.914
Employee understanding of the approach	1.000	.831
Need to minimise conversion time	1.000	.761
Conversion approach's popularity	1.000	.788
End users' extent of training in system	1.000	.725
Extent of system test	1.000	.867
Adequacy and availability of client staff	1.000	.868
IT skills of client staff	1.000	.766
Availability of funds	1.000	.767
Adequacy of system documentation	1.000	.877
Confidence attained by end users	1.000	.883

Extraction Method: Principal Component Analysis.

4.5.3 Factor extraction

The percentage of variance explained is the summary measure indicating how much of the total original variance of all the factors explained. Table 4.23 indicates that 35 factors have been extracted. The extraction method was the principal component analysis. However, not all factors were maintained in the analysis. Factors with relatively large Eigen values were considered while those with relatively small Eigen were left out. Eigen values or latent root indicate the relative importance of each factor in accounting for the particular set. Only eight factors were considered significant as shown in the Table.

Table 4. 22 Total variance

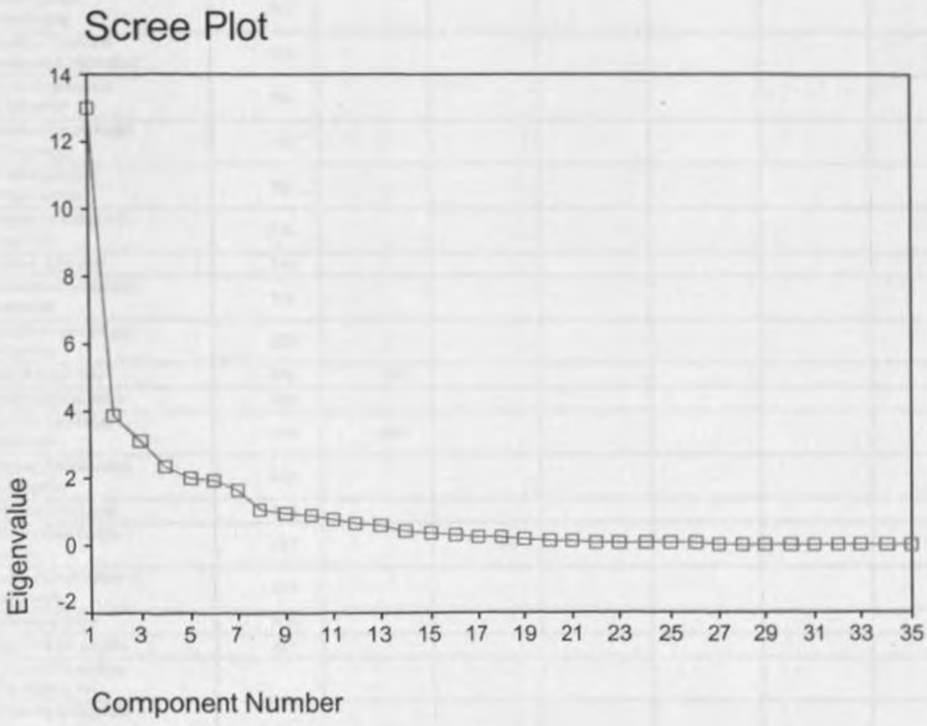
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.993	37.122	37.122	12.993	37.122	37.122
2	3.911	11.176	48.297	3.911	11.176	48.297
3	3.095	8.842	57.139	3.095	8.842	57.139
4	2.346	6.702	63.842	2.346	6.702	63.842
5	1.971	5.633	69.475	1.971	5.633	69.475
6	1.914	5.468	74.942	1.914	5.468	74.942
7	1.661	4.746	79.688	1.661	4.746	79.688
8	1.079	3.082	82.770	1.079	3.082	82.770
9	.915	2.614	85.384			
10	.853	2.439	87.822			
11	.750	2.142	89.964			
12	.649	1.853	91.817			
13	.616	1.761	93.578			
14	.429	1.227	94.805			
15	.345	.987	95.792			
16	.301	.860	96.652			
17	.251	.718	97.370			
18	.209	.596	97.966			
19	.188	.538	98.504			
20	.122	.349	98.854			
21	.106	.303	99.157			
22	7.769E-02	.222	99.379			
23	5.795E-02	.166	99.544			
24	4.318E-02	.123	99.668			
25	3.820E-02	.109	99.777			
26	3.370E-02	9.629E-02	99.873			
27	1.733E-02	4.953E-02	99.923			
28	1.480E-02	4.228E-02	99.965			
29	1.033E-02	2.951E-02	99.994			
30	1.930E-03	5.514E-03	100.000			
31	5.957E-16	1.702E-15	100.000			
32	1.833E-16	5.237E-16	100.000			
33	-8.01E-17	-2.287E-16	100.000			
34	-3.43E-16	-9.799E-16	100.000			
35	-6.55E-16	-1.872E-15	100.000			

Extraction Method: Principal Component Analysis.

4.5.4 The Scree plot

The Scree plot below confirms that only eight factors have been selected. This is a plot of the Eigen values against the component (Factor) numbers. The point of inflexion on the curve suggest that only eight factors are significant

Figure 2 Scree plot



4.5.5 Factor matrix

Once factors have been extracted, then it is possible to calculate the loading on each factor. Factor loadings are those values, which explain how closely the variables are related to each one of the factors discovered. This is well demonstrated on Table 4.24. The extraction method used was the principal Component Analysis. Eight components were extracted.

Table 4. 23 Component matrix

	Component							
	1	2	3	4	5	6	7	8
Employee resistance to the appoach	.862							
Conversion approach's popularity	.822							
Adequacy of system documentation	.799							
Volume and nature of data handled	.779							
Need to minimise conversion time	.765							
Adequacy of specialist involved in the conversion	.765							
Ability to enhance end user motivation	.762							
Conversion risk attributed to the approach	.756							
End users' extent of training in system	.753							
Company commitment to the approach	.744							
IT skills of client staff	.718							
Adequacy and availability of client staff	.705							
Approach support for end user training	.683							
Extent of system test	.652	.520						
Clients recommendation	.648							
Size of the system being implemented	.634	-.585						
Employee understanding of the approach	.633							
Ability to minimise cost	.614							
Confidence attained by end users	.563		.550					
cost benefit justification of the approach	.555							
Availability of funds	.520							
Value of the old system	.501							
Structure of the system being implemented								
Implications of data files conversion with the approach	.537	-.571						
Volume of work being handled by the system		.530						
End users support of the approach		.528						
Top management support of the approach		.522						
Ability of the approach to enhance latest leading edge technology			.736					
Complexity of the system being implemented			-.611					
Flexibility of the approach	.530		-.532					
Suitability of the approach to organizational structure				.678				
Size of the organisation				-.567				
Intergrated nature of the system being implemented	.545				.545			
Organisational structure						.726		
Amenability of the approach	.545						.626	

Extraction Method: Principal Component Analysis.

a. 8 components extracted.

4.5.6 Factor Isolation

Table 4. 24 Isolation of factors

FACTOR	VARIABLES/FACTORS
Factor 1	• Employee resistance to the approach • Conversion approach popularity • Adequacy of system documentation • Volume and nature of data handled • Need to minimize conversion time • Adequacy of specialist involved • Ability to enhance end user motivation • Conversion risk attributed to the approach • End user extent of training in the system • Company's commitment to the approach • IT skills of the client staff • Adequacy and availability of client staff • Approach support for end user training • Extent of system test • Clients recommendation • Size of system being implemented • Employee understanding of the system • Ability to minimize cost • Confidence attained by end users • Cost benefit justification of the approach • Availability of funds • Value of the old system • Implications of data files with the approach • Flexibility of the approach • Integrated nature of the system being implemented • Amenability of the approach
Factor 2	• Extent of system test

	• Size of the system being implemented • Implications of data files with the approach • Volume of work being handled by the system • End users support of the system • Top management support of the approach
Factor 3	• Confidence attained by end users • Ability of approach to enhance latest leading edge technology • Complexity of the system being implemented • Flexibility of the approach
Factor 4	• Suitability of the approach to the organization structure • Size of the organization
Factor 5	• Integrated nature of the system being implemented
Factor 6	• Organizational structure
Factor 7	• Amenability of the approach
Factor 8	• Ability of approach to enhance end user resistance

Factor 1 indicates that most factors have been grouped under this factor due to their similarity. These include employee resistance to the approach, conversion approach popularity, adequacy of system documentation, volume and nature of data handled, need to minimize conversion time, adequacy of specialist involved, ability to enhance end user motivation, conversion risk attributed to the approach, end user extent of training in the system, company's commitment to the approach.

Also included in factor 1 are IT skills of the client staff, adequacy and availability of client staff, approach support for end user training, extent of system test, clients recommendation, size of system being implemented, employee understanding of the system, ability to minimize cost, confidence attained by end users, cost benefit justification of the approach, availability of funds, value of the old system, implications of data files with the approach, flexibility of the approach, integrated nature of the system being implemented, amenability of the approach.

Factor 2 indicates a focus on extent of system test, size of the system being implemented, implications of data files with the approach, volume of work being handled by the system, end users support of the system and top management support of the approach.

Factor 3 concentrates on confidence attained by end users, ability of approach to enhance latest leading edge technology, complexity of the system being implemented, and flexibility of the approach.

Factor 4 revolves around suitability of the approach to the organization structure and size of the organization

Factor 5 involves integrated nature of the system being implemented

Factor 6 is organizational structure

Factor 7 is amenability of the approach

Factor 8 underscores ability of approach to enhance end user resistance

It is thus clear that though there was 35 factors indicated in the questionnaire most factors were grouped together under factor 1 and the rest were distributed to factor 2, 3, 4, 5, 6, 7,and 8. Thus bringing a final eight factors.

CHAPTER 5

5.0 SUMMARY, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter a summary of the findings, the conclusions and the recommendations are presented. In addition suggestions for further research and the limitations of the study are also given.

5.2 Summary of the findings

5.2.1 Demographic information

Demographic data were collected and analyzed mainly to provide more information for confirming the findings, mainly on the conversion approaches mainly utilized during the system conversion process.

It was found out that 25 (50%) of the staff were programmers and system analyst most of them being males between ages 20-35 who are the main personnel used in system conversion. This high number is an advantage since they are well versed with the various challenges and factors that influence the choice of an approach and thus leading to the selection of parallel approach, which has the lowest risk factors.

Further, 28 (56%) are in the software and IS management sector with majority having been operation for 5-19 years. This means that most of them carry out system conversion and thus have more experience in selection of conversion approaches.

5.2.2 Conversion approaches

The study aimed at determining the extent to which various changeover approaches are utilized in the conversion process. Findings of this study show that firms with several years in operations and relatively large numbers of system programmers mainly utilize the parallel approach in the conversion process, because it is associated with fewer risks and it provides a fall back position incase of failure of the new system.

The least commonly used approach is the direct approach, This could be due to the risk associated with it in that it offers no fall back position and also that in case of any failure then the organization may stand a risk of loosing important information.

5.2.3 Factors considered important in selection of conversion approach

The study also was expected to determine the relative importance of factors considered important in the selection of conversion approaches. It was found that all the factors were considered important because they have very high means of above 4.49 and the lowest mean of 2.74. However, the emphasis was on confidence attained by end users, adequacy of system documentation, extent of system test, complexity of the system being tested, volume of work being handled by the system, and conversion risk attributed to the approach.

5.2.4 Challenges of system conversion

With respect to challenges experienced during system conversion they do not seem to significantly hinder the conversion process since all of them have very low means of between 2.29 and 1.43. The leading challenges are diversion of resources intended for the conversion process, intended users ignoring the operating system and doing things the old way, inadequate budget, and insufficient conversion time.

5.3 Conclusions

The main finding of this study is that the highest numbers respondents were mainly the programmers and the IS managers who had the knowledge on system conversion. Also most of ICT consultants mainly used the parallel approach as they converted from the old to the new system. This was mainly determined by selection factors, those considered very important included the confidence attained by end users being the most important factor followed by complexity of the system being implemented, implications of data files being converted, complexity of the system being implemented and flexibility of the approach.

Challenges like diversion of resources intended for the conversion process to other uses, intended users ignoring the operating system and doing things the old way, inadequate budget, and insufficient conversion time were considered the most important obstacles in enhancing successful system conversion.

5.4 Limitations of the study

The study was limited by its small sample across a wide range of business sectors domestic and IT and organization sizes. Also, there were limitations to the perceptual and self-reported data collected in this study. Survey responses from the key managers in some organizations surveyed could be biased since the approach was what they may have personally requested or supported. Also the respondents were difficult to reach personally and many were not cooperative in filing out the questionnaires.

Also lack of adequate finances was a major limitation especially since the research assistants have increased their charges. Time was also a major challenge as it was not possible to collect more diverse data and also use the interviewing technique in data collection and also carry out more advanced data analysis techniques.

Another limitation was the lack of adequate literature in the area of system conversion in the Kenyan setting and the researcher had to use the Internet a lot and separate conversion information from the general system development process information.

5.5 Suggestions for further research

This study has highlighted that changeover approaches and the selection factors are considered important in Kenya. It has also created awareness of the information system conversion process in Kenya. However, more in-depth studies should be carried out in the area of system conversion. Such studies could include the information required to carry out successful system conversion, realistic expectations about the conversion process, types of conversion plans that could be utilized by various organizations, the perceived importance of the system conversion process, data conversion procedures and strategies during system conversion process, and the risk and challenges of online information system conversion.

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APPENDIX 1: LIST OF COMPUTER CONSULTING FIRM

1. Alien technologies
2. Amarco (U)
3. Alphatech Microsystems
4. Alphax Inforsys LTD
5. Ankem computer services
6. Arch way Technologies Ltd
7. Asa computerized information
8. Assured agencies
9. Brilliant tubrials
10. Bug two thousand systems
11. Business connection and technologies
12. Business inn Ltd
13. Capital systems
14. Cebeth enterprises
15. Club internet (k)
16. Computer capacities and innovations
17. Computer ways Ltd
18. Computer World
19. Computer Technics Ltd
20. Cantatrice High Tech co. Ltd
21. Copy Cat Ltd
22. Cyber commerce
23. Carlbro (Kenya) Ltd
24. Dac-Net communications Ltd
25. Daket computer services Ltd
26. Data Dynamics Ltd
27. Data reach services
28. Dataflex computer consultants
29. Desktop micro services Ltd
30. Digital Systems solutions
31. Double com computers
32. Escom computers
33. Executive support consultants
34. Enhance computer engineering
35. Finesse Technologies Ltd
36. Fintech Ltd
37. Fishnet Technologies Ltd
38. Forest 2000 plus electronics
39. Government information Technology services (GITS) depts.
40. Graft silicon Ltd
41. Hospitality system consultants
42. Hp East Africa
43. Houston Technologies Ltd.
44. IBM East Africa LTD
45. Infoline consultants
46. Information professionals Africa
47. Impact Communications
48. Insight Technologies
49. Institute of computer applications Ltd
50. Institute of Advanced Technology
51. Inter computer services
52. IQ plus (k) Ltd
53. Jill computers
54. Ken Data systems Ltd
55. Laser view inter systems
56. Limpo Business Systems Ltd
57. Matrix Group
58. Micro Kenya Ltd
59. Managecom systems Ltd
60. Mann Oscar Inner connections
61. Millennium datacomm Ltd
62. Mighty micro computer services
63. Micropad computer information network
64. Microlan
65. Micro Expert Ltd
66. Maxtech solutions
67. Novacom consultants
68. Nyoro computer services Ltd
69. Niche Network management systems.
70. Network Source Ltd
71. Netedge computer point
72. NCR (Kenya) Ltd
73. Orbix Ltd.
74. Openview business Systems
75. Octagon Data Sytems
76. On-time solutions Ltd
77. Ojanga Asego Systems Ltd
78. Protocols micro computer applications
79. PCTech System Ltd
80. Prodata Computers Ltd
81. Protect management consultants
82. Prosoft consultants
83. Prime computer
84. Precision software consultants
85. Passnet consultants Ltd.
86. Papustech Agencies
87. Regional Computers Ltd
88. Reed technology system
89. Ramtionias computer consultants
90. Sunrays electric engineering services
91. Stade systems Ltd.
92. Sportsman business system and services
93. Solution to information system Ltd.
94. Software Wise Kenya Ltd.
95. Software Applications Ltd.
96. Software Technologies Ltd.
97. Software Technics Ltd
98. Sleywed Technology Ltd.
99. SoftWise (Kenya) Ltd
100 Telerosa Computer Services
101 Vision technologies
102 Willpower Communications Ltd
103 Zodiac Systems Ltd

APPENDIX 2: LETTER OF INTRODUCTION

Dorcas Ngure
P.O Box 00100-48379
NAIROBI

September 06, 2004

Dear Sir/Madam

RE: MBA RESEARCH PROJECT

I am a student at University of Nairobi, pursuing a Master of Business Administration Degree. In partial fulfillment of the requirements for this degree, I am carrying out a research on **Factors influencing the choice of information system changeover approaches used by Information and Communication Technology consulting firms in Kenya**

Because of your experience and position as a key knowledge holder, I am requesting you to answer the questions here attached in respect to the research. All the information you disclose will be treated in strict confidence and in no instance will your name or that of the firm be mentioned in the report.

Your kind assistance will be highly appreciated.

Thank you.

DORCAS E.W. NGURE
MBA STUDENT

Joel K. Lelei
UNIVERSITY SUPERVISOR

APPENDIX 3: QUESTIONAIRE

FACTORS INFLUENCING THE CHOICE OF INFORMATION SYSTEM CHANGEOVER APPROACHES USED BY INFORMATION AND COMMUNICATION TECHNOLOGY CONSULTING FIRMS IN KENYA

SECTION A. DEMOGRAPHIC FACTORS

Respondent's profile

1. Which gender are you (Tick whichever applies)
   Male [ ]
   Female [ ]
2. In which age brackets are you (Tick whichever applies)

Below 20	[ ]
20-25	[ ]
26-30	[ ]
31-35	[ ]
36-40	[ ]
41-45	[ ]
46-50	[ ]
51-55	[ ]
56-60	[ ]
Over 60	[ ]

3. How many years have you worked as an ICT Consultant?

_____

4. How would you describe your main job role (Tick whichever applies)
   a) System analyst [ ]
   b) Computer programmer [ ]
   c) Database administrator [ ]
   d) System administrator [ ]
   e) User support engineer [ ]
   f) Others specify

_____
_____
_____
_____

Organization

5. In which service sector does your firm belong to? (Tick whichever applies)

a) Hardware [ ]
b) Software [ ]
c) IS management [ ]
d) Others
(specify)_____

_____

_____

6. Please tick the option that best describes the ownership of your firm

Wholly Foreign owned [ ]
Wholly Locally owned [ ]
Jointly owned [ ]

7. If your organization is jointly owned between foreign and local investors, what is the proportion of ownership? (Tick whichever applies)

Largely foreign owned [ ]
Largely locally owned [ ]
Equally owned (Locally and foreign) [ ]

8. Indicate the number of employees, years in operation and the number of branches in the columns provided.

Item	Number
Number of employees	
Years in operation	
Number of branches	

SECTION B. CHANGEOVER APPROACHES USED BY FIRMS

Please rate (by ticking appropriately) the extent to which you have used the following changeover approaches during information systems conversion process

	1 Not at all	2 Small extent	3 Moderate extent	4 Large extent	5 Very large extent
1) Direct approach i.e. (changing from the old to the new at once or overnight whereby the operations of the old system are stopped and the use of the new system starts.)					
2) Parallel approach i.e. (the old and the new systems run simultaneously until sufficient confidence is gained in the new system or until everyone is assured that the new system functions correctly and then the old is dropped.)					
3) Phased Changeover approach i.e. (the new system being introduced in incremental stages, which are divided by function, organizational units served hardware on which the new system will reside, or some other factor.					
4) Pilot conversion approach i.e. (introducing a part of the system into one carefully designated organizational area. When the pilot version is complete and working smoothly it is installed throughout the rest of the organization either simultaneously or in stages.)					
5) Others (specify and describe)					

SECTION C. CHALLENGES ENCOUNTERED DURING SYSTEM INFORMATION CONVERSION

Indicate by ticking the degree to which you agree with the following statements as problems encountered during the process of information system conversion.

	Strongly agree	Agree	Neither agree nor disagrees	Disagree	Strongly disagree
1. Insufficient conversion time					
2. Insufficient funds for conversion					
3. Lack of user involvement in the conversion process					
4. Inadequate user documentation for the conversion process					
5. Lack of compensation of costs overruns and delays during conversion					
6. Inadequate budget for the conversion process					
7. Lack of proper management of system conversion process					
8. Lack of Management support during conversion					
9. Resources provided for conversion are diverted to other functions.					

	Strongly agree	Agree	Neither agree nor disagrees	Disagree	Strongly disagree
10. Intended users ignore the operational system and do the job the old way					
11. Impatience of end users with initial disappointing results produced by the system					
12. End user resistance during the conversion process					
13. Poor coordination of conversion activities					
14. Lack of proper conversion performance evaluations					
15. Users disinterest with the conversion process					
16. Incompetent IT staff to manage the conversion process					
17. The system falling into disuse as soon as its original users are transferred elsewhere					
18. Others (Specify)					

SECTION D: FACTORS CONSIDERED IN CHOICE OF A CONVERSION APPROACH.

During system conversion some factors influence the choice of an approach. Rate by ticking appropriately the importance you attach to various factors when you choose a conversion approach.

	1 Not important	2 Somewhat Important	3 Important	4 Very Important	5 Extremely Important
1) Size of the system being implemented					
2) Top management support of the approach					
3) Cost benefit justification of the approach					
4) Level of conversion risk attributed to the approach					
5) Approach ability to enhance end user motivation					
6) Value of the old system being changed					
7) Amenability of approach to facilitation of interaction between users and system developers					
8) Volume and nature of data to be handled by the system					
9) Approach ability to minimize the cost involved in conversion process					
10) Implications of data files conversion with the approach					
11) Suitability of the approach to organizational structure.					
12) Ability of the approach to enhance latest leading edge technology.					
13) Organizational culture					
14) Volume of work being handled by the system					
15) Approach support for end user training					
16) Integrated nature of the system being implemented					
17) Complexity of the system being implemented					

	1 Not important	2 Somewhat important	3 Important	4 Very important	5 Extremely important
18) Flexibility of the approach					
19) Adequacy of specialist involved in conversion					
20) Size of organization in which the system is being implemented					
21) Broad-based company commitment to the approach					
22) End users support of the approach					
23) Employee resistance to the approach					
24) Structure of the system being implemented.					
25) Clients recommendation					
26) Understanding of the approach by employees					
27) The need to minimize conversion time					
28) Popularity of the conversion approach					
29) Extent of end users training in the system or similar systems					
30) Extent of the system test					
31) Adequacy and availability of client staff					
32) IT skills of client staff					
33) Availability of funds					
34) Adequacy of system documentation					
35) Confidence attained by end users with the system					
36) Others (specify)					

THANK YOU VERY MUCH FOR YOUR ASSISTANCE