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TITLE: INFORMATION SYSTEM FAILURE CAUSES-AN INVESTIGATION IN KENYAN ORGANIZATIONS

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Declaration

This project, as presented in this report, is my original work and has not been presented for any other university award.

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Sign: ..... **Date:** 7th Dec 2009

This project has been submitted as part-fulfillment of the requirement for Masters of Science in Information Systems of the University of Nairobi with my approval as the University Supervisor.

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Dedication

This project is dedicated with great appreciation to my best friends and companions Martin Gwada and Kesley Gwada.

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Acknowledgments

First and most, I want to thank my God for His grace in giving me strength and single-mindedness that has enabled me to come this far in this post-graduate program.

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Abstract

Information system development failures still plague the software development industry despite advances in the development process. Learning from an Information System Development Project (ISDP) failure plays a key role in the long term success of Information systems development process. In addition, learning from failure assumes a higher level of significance in the context of Kenya, a developing country since it is very important that the scarce resources are optimally utilized. This thesis reports on several causes of failed ISDP to inform the reader about the various complexities involved in information systems development projects in Kenya.

To investigate the situation of IS/IT projects failure, it is critical to clarify criteria of success/failure, identify influential factors, and finally propose appropriate recommendations through realizing reasons behind the causes of failure. The research reveals that managerial/strategic and cultural factors have the most influential impact for that matter. It is mandated that Kenyan organizations promote the commitment and support of senior management, raise general awareness for IS/IT projects' structure and functionality, and foster a correct cultural context to prevent failure in this kind of projects.

The major aim of the research was to propose a model that outlines the major causes and indicators that may lead to Information System Project Failures. Other objectives carried out in the research include; investigation of various system development practices and finding out of factors that lead to IS development failures in Kenyan organizations. This research was carried out by use of questionnaires and interviews to IS practitioners and users in Kenyan organizations.

The outcome of this thesis is a model of several causes of failure in ISDP process. A prototype system was developed from the model to help Project Manager gauge the viability of a project before and during the development. This model enhances the understanding of the broad range of factors that influence the success of information systems development (ISD) projects.

1. CHAPTER 1: INTRODUCTION

Most contemporary firms face dramatic pressures for continual change and adaptation in their business environments. Pressures toward globalization, competitive agility, and customer centeredness are compelling firms to re-examine their traditional structures and work processes and engineer new value-adding processes. Further, information technologies are becoming critical to the capabilities developed by firms to compete effectively in the emerging information-intensive business environments. As a result, firms are investing significantly in ICT projects for building seamless ICT processes, and knowledge-based applications for competitive agility.

Most of these organizations spend millions of dollars each year on the acquisition, design, development, implementation, and maintenance of information systems vital to their mission programs and administrative functions. The need for safe, secure, and reliable system solutions is heightened by the increasing dependence on computer systems and technology to provide services and develop products, administer daily activities, and perform short- and long-term management functions.

Information Systems failures are rarely publicized as widely as IS successes. This is despite the fact that, lessons gleaned from past IS failures may keep organizations from repeating the same foibles over and over again. Failure is defined not only by the metric of technical performance inadequacy, but also by organizations' inability to successfully select needed technology; implement technology; resolve conflicts between various factions and departments; resistance of users in accepting IS products; and failure to accurately project future needs

Heeks (2003) conducted an investigation of e-government projects in developing countries. The results of his survey show an extremely disappointing position: 35% projects are total failures, 50% projects are partial failures, and 15% projects are successes.

It is evident from literature that a substantial portion of total IS projects ends in full or partial failures. Results of some existing studies from Kenya and other developing countries are:

- David Gichoya (2005) has reported widespread failure of ICTs in Government of Kenya.
- Baark and Heeks (1999) found that all donor-funded projects in China were partial failures.
- Moussa and Schware (1992) concluded that almost all World Bank-funded projects in Africa were partial failures

The IS failure research is of paramount importance in developing countries where the failure rate is higher as compared to industrialized countries. This scenario has established the need for studying

ISDP in Kenya, especially the failed ones. It may be said that there are more opportunities and lessons for learning from failed IS projects than there are from the successful IS projects.

This research is of significance to a wide audience in the IS community who are interested in understanding the impact and various factors that lead to failure of an ISDP in the peculiar environment of a developing country like Kenya. The end product of this project is a model of the factors that cause IS failures. Essentially, the frequencies of the responses to each of the questions within the survey instrument are used to populate the proposed model. Each project component included within the model is represented as a survey question. The completed model can easily perform an analysis in order to isolate the probable effect of a component (variable) on overall project success/failure.

These findings are important because they can assist managers in early evaluation of on-going projects and enable them to address the investigated development issues

1.1. Problem Definition

Information systems development is a complex process. Most Information systems projects are challenging because they require attention to the interests, motivations, expectations, and actions of a variety of stakeholders, including IS professionals, senior management, business management, and external partners, such as vendors and consultants. Further, a variety of institutional, social, and technological factors usually affect progress on such projects and the prospects for successful outcomes from these projects. In fact, the literature is filled with examples of failed efforts. Therefore, a deeper understanding of complexity of Information systems projects in organizations is required; the factors that should be addressed in the successful management of IS projects. The processes that are likely to be effective in such projects.

Research suggests that failed projects suffer from the poor management of people- related problems rather than technical problems; [Linberg 1999; Sumner 1999; DeMarco and Lister 1999] however, it is important to analyze project failures from all perspectives. Poor software development practices places organizational resources, such as time, money and the pool of software practitioners (programmers, database developers, system analysts, etc.) at risk.

Practitioners become burned out, de-motivated and are likely to have decreased personal productivity. This may lead to increased staff turnover, which again leads to lower (team) productivity. The end-result is that time; money and organizational goodwill are placed at further risk. Unfortunately, commonly used productivity and cost metrics only provide project managers with a 'snap shot' of the current state of the project.

Most information systems development projects have failed to meet their goals such as satisfaction of end-user needs, development within budgeted costs, implementation on time, and development

in accordance with organizational standards. This is mainly because many organizations practice *adhoc-development*. This is where systems development often takes place in a rather chaotic and haphazard manner relying entirely on the skills and experience of the individual staff members performing the work. Adhoc development may be practiced entirely or for subset of the development (small projects).

With this kind of development, process capability is unpredictable because the software process is constantly changed or modified as the work progresses. Schedules, budgets, functionality and product quality are generally inconsistent. Performance depends on capabilities of individuals and varies with their innate skills, knowledge and motivations. Performance can only be predicted by individual capability rather than organizational capability. Success that rests solely on the availability of specific individuals provides no basis for long term productivity and quality improvement throughout an organization.

With the existence of an organization-wide software process, system development process does not entirely depend on the same individuals being available for each system development project. Information System projects can produce excellent results through both the heroic efforts of a dedicated team and mature proven software process.

1.2. Research Questions

The questions that were pertinent in this research are;

- What information system development practices lead to IS failures?
- Is it possible to determine whether or not an information system will fail in the early stages?

1.3. Objectives

The main objective of this research was to propose a model that outlines the causes and indicators that may lead to ISDP failures in Kenyan organizations.

Other objectives include:

- To investigate various systems development practices by different organizations
- To find out the factors of IS development project failures occurring in Kenyan organizations.
- To devise a model of the indicators of information system and project failure based on a literature review and survey
- To develop a prototype system that can be used to calculate the success potential of an Software project

1.4. Project Scope

The range of issues concerning the general topic of Information system project failures is vast – defining criteria for project success/failure, identifying factors, investigating the reasons behind existence of these factors and also bringing up solutions to tackle these causes – which requires a large volume of research to cover all these related aspects. To narrow down this large array of issues and become more specific, this research is aiming to address the area of factors triggering the Information System project failures in Kenyan organizations employing these systems.

Moreover, the failure analysis of Information System projects is drastically multi-faceted in terms of the perspective from which the topic is examined. The survey subjects' being studied in the course of this research are mostly all IT practitioners and IS users who have been involved in development of an Information system. This being said, the viewpoints of other key stakeholders such as senior management in hosting organizations (project sponsors), any system users, etc. are not taken into account for the sake of limiting the scope of the research. The different role players in a project could have different appreciation of failure factors attributing a project which keeps the subject open for further research.

This research does not intend to make any distinction among the type of organizations in its investigation and study them collectively regardless of being public or private sector and the nature of the business they are involved in. Time and again academic researches have shown evidence that the typology of organizations employing an IS/IT project could be a significant parameter to be considered when scrutinizing the failure of IS/IT projects that again will keep the doors open for an expansion to the present research.

The study confined itself to factors that lead to failure in Information system development processes. This study did not focus on technological specifications and detailed financial costs.

1.5. Project Justification

This study provided a greater understanding of some of the components of the software development process leading to cancelled, or projects that are delivered late and over-budget, and/or do not meet customer/user requirements. This project research sought to focus management attention on the importance of a number of failure components of the software development process. Downstream problems can be avoided or lessened if these components receive more managerial attention. This project research can be used to raise awareness among project managers of the potential downstream impact of their actions (or inactions) during a software development process. The impact includes various aspects of the resulting software product, including its timeliness of delivery, affordability and ability to meet customer/user requirements. This study was

also intended to help make the development process more repeatable, resulting in better project estimation and planning.

Increasingly, organizations have no choice but to adopt and follow a systems development process. Many organizations have aggressively committed to total quality management goals to increase competitive advantage. There is a need for organizations to understand the best approaches to employ in a particular system development process, hence need for a systematic and uniform process for information systems development. The IS development failure in Kenya poses more importance for learning and investigation of causes of failure, as the failure not only wastes the allocated resources but also discourages further investment.

Kenya, a third world country, has limited availability of resources such as money and skilled power and suffers uncertain political environment. Thus opportunity costs are unquestionably high with ISDP failures. For these reasons a failure in development of IS in Kenya creates a significantly important area of research. This research is significant because it identifies key practices in systems development processes across different organizational sectors. In this regard the study tries to find out practices of system development in some organizations. The guidance provided at the end of this research can be tailored to the individual project based on cost, complexity, scope of the effort, needs of the decision authorities and criticality to the organization's mission. Further, managers can use the insight gained to evaluate the status of an on-going development project while it is still early enough to take corrective action, regardless of the methodology used

Several previous Researches have been done on the factors that lead to Information System Failures and they continually show that companies have difficulty with information technology (IT) projects to complete on time or on budget. In fact many are cancelled before completion or not implemented. Al Neimat, Taimour (2005)

In his research on "Factors Affecting the Successful Implementation of ICT Projects in Kenya Government" David Gichoya (2005) mentioned that factors of failure can either be barriers or inhibitors. Barriers are those occurrences that hinder ICT implementation. While Inhibitors do not necessarily prevent the implementation of ICT projects but they do prevent advancement and restrict successful implementation and sustainability.

1.6. Concept of Information Systems

In the modern economy of today's world, enterprises are largely investing in information systems and technology and particularly in the ways these can help them in managing their businesses. This transition has appeared to be an indispensable change in most of prosperous companies on the ground that it is increasingly believed these investments could be rich sources of competitive advantage (Gardner, 1998). The term of 'information systems' has originally born to refer to any wide variety of computing hardware, communication technology and software combinations designed to manipulate information related to certain business processes (Flowers, 1996). It is believed that the concept of information systems is fundamentally interdisciplinary to the extent that technological disciplines intersect with managerial, psychological and sociological paradigms (Yeo, 2002).

There has been enormous research on the processes and outcomes of information systems development in organizations. Several studies have generated a wealth of findings and knowledge about effective management of system development processes. According to a study by Kirsch, Laurie J (2000), the development of an integrative framework for Information system development process consists of seven core concepts;

- Tasks- These are distinct work activities carried out for a distinct purpose. In the ISD context, a task is a work done to build the system and can vary from project to project.
- Stakeholders- These are persons or a group of people with a vested interest in the outcome of and Information System Development project. Examples include: the project manager, analysts, programmers, management, vendors and consultants.
- Agenda- A set of goals, objectives or expectations relative to the development effort. Agenda may include task related goals such as satisfaction of end-users, development within budgeted costs, implementation on time and development in accordance with organizational standards.
- Transactions- refer to specific informal and formal means through which stakeholders ensure that appropriate tasks are completed.
- Context- refers to occurrences or incidents outside of the project team but which affected the teams work and the course of the project. The incidents are triggers that have an impact on downstream activities of the team.
- Structure- Structure is defined as the "policies and activities occurring within the organization that prescribe or restrict the behavior of organization members." In the

Information System Development context there are three likely sources of structure: methodologies, development tools, and organizational policies and rules.

- Outcomes- These are results realized at any point during the Information systems development process. The outcomes may be the result of a planned or unplanned evaluation.

1.7. Project Success and Failure Criteria

Projects that meet agreed upon business objectives, and are completed on time and within budget make up the generally accepted industry 'standard' organizational/managerial definition of project success. User satisfaction is the single most widely cited measure of system success in the information systems literature. From this the opposite can be assumed to be true, that projects that DO NOT meet agreed business objectives, and are NOT completed on time and NOT within the budget make up the definition of project failure. This definition has traditionally been used because it is, in part, relatively easy to measure.

The facts of the lists of characteristics to successful or failed projects vary a lot in their scope and purpose; they are either very general or very specific related only to a special case (Pinto & Slevin, 1989). Horine (2005) has come up with some sensible reasons to answer why finding attributes of a successful/failed project is not at all a straightforward matter. He believes that lack of a universal harmony to compromise project success/failure metrics, lack of common collective acceptance standards among all key stakeholders engaged in a certain project, and the discrepancy between what business companies call project success/failure and that of textbooks which investigate the matter from a theoretical and utopian viewpoint are amongst the most important reasons.

1.7.1. Success

From a global perspective, Kerzner (2003) has described a successful project with seven characteristics as 'critical success factors' (CSFs);

- within the planned time,
- within the predicted budget,
- aligned with expected performance and specification level,
- accepted by the client,
- minimum or mutually agreed on scope alterations,
- minimum disturbance of the main stream of work flow in the host organization,
- the least effect on the corporate culture.

Duncan (1987), Blaney (1989) and Redmill (1990) also explicitly have nominated these criteria for a project success; whereas the last three ones are more contemporary needing more speculation. Kerzner (2003) discusses that in modern project management, it is almost impossible to see that a

project is finished without any alteration in its initial scope which in turn might diminish the morale of the work or eventually even bring the project to a total halt. It is advisable to keep the level of change for project scope to its minimum and those really needed to be taken into account should be in complete consensus of both project manager and client. Possible disruptions occurring in the every day's work flow in the host organization because of the ongoing project is the other issue. By mistake many project managers might think of the project as a stand-alone entity happening in an organization which is not always possible. A viable project should be managed within the guidelines, policies, procedures, rules and directives of the host company. The corporate culture is the other focal issue. A project destined to success can not deviated from cultural norms reigning a certain parent company even though the project's nature, its management and team are essentially not aligned with those cultural values. Successful project notation and excellence in project management in an organization is only and only achieved through a continuous stream of managed projects which requires strong and visible corporate commitment to project management concept.

Several studies have shown that there is great disagreement on how different role-players such as project users or IT managers are weighing success/failure definitions. When it comes to IT managers' point of view, while they believe in 'meeting user requirements' as both a success and failure criterion, they prioritize 'meeting timescales and budgets' as to avoid project failures and 'meeting expected quality' and 'organization's commercial prosperity' as significant signs for a successful project. On the other hand, from project users' perspective, where 'meeting user requirements' and 'staying in the planned budget' are recognized as criteria for both success and failure, they specifically identify their own 'happiness' as a success criterion and 'achieving project purpose' as a failure criterion. These results will bring out two main conclusions; firstly the criteria for project success must be agreed on by all the engaged parties far before the actual project gets started and it should get reviewed constantly as the project goes ahead. Since most of the success criteria are subjective issues, they are strongly prone to change. The definition 'good quality should be clearly depicted in the mind of all main stakeholders at the very beginning of the project. IT managers might define quality as maintainability, capacity for expansion or efficiency whereas project users could describe it as usability or responsiveness to system request.

Horine (2005) from an idealistic perspective summarizes a comprehensive score of qualities and traits common among those most successful projects. He from an academic point of view believes that although no two projects are completely identical and each has its own set of unique challenges, there exists always a shared core of principles lying at the heart of any project success. A successful project should:

- Be aligned with organizational objectives
- Have effective top-management support

- Have effective and competent leadership
- Address all key stakeholders' agreement on the purpose, goals, and scope of the project
- Address all key stakeholders' shared common vision on the project results
- Address all key stakeholders' shared realistic expectations for the project results
- Have results that meet the expectations of the key stakeholders
- Be able to manage and validate stakeholders' expectations constantly all the way to the end
- Make an investment in proper planning
- Have clearly defined and agreed upon scope, approach, and deliverables during planning
- Communicate clearly each stockholder's and team member's role(s) and responsibilities
- Place a high priority on accurate and complete work effort estimates
- Develop and agree upon a realistic schedule
- Make the project team to have a strong results-focus and customer-orientation
- Provide consistent, effective, and focused on 'understanding' project communications
- Measure project progress consistently from the current baseline
- Pursue aggressively project issues and subsequent action items
- Foster a strong sense of collaboration and teamwork
- Manage closely expectations and changes surrounding scope, quality, schedule, and cost
- Provide skilled project resources when needed
- Identify proactively risk and determine mitigation strategies to reduce project exposure
- Anticipate and overcome obstacles to ensure project meets objectives

1.7.2. Failure

The complex nature of finding a definition of failure due to the need to consider various stakeholders is important when looking at software development projects.

In order to get a concisely focused definition of project failure, it is first appropriate to present some considerations and components of project failure. Specifically, there are three major factors that influence the notion of project 'failure':

i. The perspective of one or more project stakeholders, influenced by the culture, practices and system-related goals of the organization being asked to define failure. Various Stakeholder perspective influences his/her perception of project failure, as all aspects of project development are filtered through this perception.

ii. The development process and/or the resulting software product. Failure factors of the development process can be considered in relation to a particular stage of the product lifecycle.

iii. The Non-technical and/or technical focus.

An additional failure consideration for many software development managers is that a project results in cancellation. In the strict sense of intention to design, construct and deliver a completed software-based product, termination should be considered a failure, at least to some extent. Regardless of whether a project is considered to be a failure or not, cancellation is clearly not the most desirable outcome for any project stakeholder. The Standish Group's widely cited research equates project cancellation with failure.

1.7.3. Project stakeholders

The variety of project stakeholders adds some complexity to the task of defining project failure. A schema for system evaluation developed by Klein and Jiang [2001] includes the following typical project stakeholders:

Senior/Executive Management: Oversee project managers, provide political support for this project, and may interact with MIS management, project managers and/or customer/users.

Project Manager: Oversee the project development team and interacts with customer/users.

Customer/user: Pays for and/or uses the completed software system.

Software Practitioner: Includes programmers, database designers and system analysts.

Senior Management interacts with the Software Project Manager, who interacts with both Developers/IT Professionals and the Customer and Users. Developers and IT Professionals interact with their Software Project Manager and the Customer and Users. Finally, the Customer and Users interact with the Software Project Manager and Developers and IT Professionals. In some instances, there is also interaction between Senior Management and the Customer and Users.

Each of these groups brings different backgrounds, and has different expectations and understanding of any metric that might be collected in order to evaluate project success or failure.

1.7.4. Process/Product

Process/Project management: including meeting cost, schedule and quality objectives, quality of project management process itself and the satisfaction of project stakeholders needs as they relate to project management process.

Product: including effects of the final product as they relate to meeting the goals and purpose of the system, business outcomes (including impacts at both the organizational and individual levels), technical performance of the system, efficiency of the product's operations (considering cost, time and productivity), end-user satisfaction with the completed system and the personal satisfaction of development staff (including professional growth, and challenging and interesting work).

1.7.5. Technical vs. Non-Technical Issues

The technical issues of software development include those directly related to hardware and software. Non-technical issues relate to people and managerial-related components of the development process. Non-technical, people-related components of the software development process tend to be under-managed. And several reasons for this include:

- *Project managers* often lack managerial training, particularly in the realm of software development. Project managers are generally not trained to manage the job, but rather are trained, and have experience, in how the job is done. Historically, many organizations have rewarded employees (often technical people) with opportunity to manage, though not all of these people are 'management material'. It has been suggested that the "criteria, climate and rewards" associated with being a high performing software engineer are often not compatible with good managerial characteristics. As a result, the information technology field has promoted many practitioners with little or no managerial training or experience to managerial positions. The end-result, as Boehm suggests, is "poor management can increase software development costs more rapidly than any other factor", as its effects ripple throughout the development process, including scheduling, estimating, and team management and motivation. In short, lack of management skills has direct implications for project risk management, and ultimately project success or failure. Boehm suggests that successful projects are often cited as having good risk managers. The Standish Group *[www.standishgroup.com]* continues to conduct studies of domestically developed software projects and they note that most projects fail due to a lack of "skilled project management". Skilled management includes the selection and utilization of an appropriate development methodology. This further speaks to the need for knowledgeable managers and effective managerial practices, as schedule and budgets are often padded in order to merely appear successful (from an organizational/managerial perspective) and well managed at the end of the project. When a project is acknowledged to be late, it is generally not due to development effort by practitioners, but rather more often to a lack of a sound, well thought out scheduling effort. As a result, care should be taken when evaluating the relative success of a project from an organizational/managerial perspective. Mismanagement can include pressure-packed schedule estimates and/or the application of an inappropriate, perhaps overly restrictive, development lifecycle methodology. Such practices often leave practitioners de-motivated and unhappy, which can lead to burnout, the need to train new staff, staff turnover and late delivery. Because software practitioners usually construct software in teams and group dynamics are important to efficient project development,

turnover interferes with the formation of cohesive and productive development teams, which in turn hampers productivity.

- *The High-Tech Illusion:* DeMarco and Lister [1999] described the "High-Tech Illusion" as a second reason why managerial effort and emphasis is so often placed on technical issues. That is, anyone who is professionally involved in a relatively new technology, such as software development, believes that he or she is in an "intrinsically high-tech business". As a result, they tend to over-manage technical issues and lose sight of the critical and on-going role that people, particularly software practitioners, play in these 'high-tech' businesses. Managing technical issues tends to be more straightforward than managing people. A third reason for under-management of the non-technical issues is that managing technical issues tends to be more straightforward than managing people, who 'come pre-packaged' with their unique personalities, strengths, weaknesses and opinions. Related to this are the managers of development projects who have some difficulty in relating to practitioners, in terms of their different professional roles within the development process. In addition, the practitioners' perception of project success does not necessarily match that of project manager or the more senior management within the organization for which the system is being developed. Managers who attempt to motivate their development team as they themselves would prefer to be motivated are not likely to succeed

Some notable research has failure divided into two phases:

- development failures (goals, technology, economy, view of organization, process characteristics, self-image) and
- Use failures (technical solution, data problems, conceptual problems, people reactions, complexity).

Chris Sauer highlights five main indicators of failure. This classification provides a suitable framework to help make initial diagnosis of the type of failure.

- *Correspondence failure*-Failure to achieve predefined objectives
- *Process failure*-Failure to produce a system in given limits
- *Interaction failure*-Level of use or user satisfaction failure
- *Expectation failure*-Inability to meet the expectations of specific stakeholder
- *Terminal failure*-Project terminated, can't be tolerated more. The ability to abandon the project when there is no probability of success.

In this research, IS failure has been defined as any phenomenon that hinders the success of an information system during development, installation, deployment, implementation and continuous use of that system.

Heeks (2002) observes that there is a big difference between ICT implementation and use between developed and developing countries. However, Westrup (2002) observes that similarities can also be expected. These similarities include funds which are never sufficient, bureaucracy and user needs. The difference is how problems are addressed in different countries. Most developing countries are characterized by limited computer applications, inadequate infrastructure and shortage of skilled manpower (Odedra 1993). Odedra (1993) notes that "this situation exists not merely due to lack of financial resources, but largely due to lack of coordination at different levels in making effective use of the technology". This uncoordinated efforts can only result in duplication if each department implements its own IS projects without due regard to compatibility within the government.

Poulymenakou and Serafeimidis (1997) from the London School of Economics, UK, feel that IS can be perceived to fail in three different ways:

- during development;
- at the stage of introduction to the users' organization (implementation); or
- at some point during their operation.

They found that in the unsuccessful IT projects, the project was managed as a technology project. An IT project can often lead to failure because of the lack of human considerations. Some of the elements of failure identified were:

- approaches to the conception of systems;
- IS development issues (e.g. user involvement);
- systems planning;
- organizational roles of IS professionals;
- organizational politics;
- organizational culture;
- skill resources;
- development practices (e.g. participation);
- management of change through IT;
- project management;
- monetary impact of failure;
- "soft" and hard" perceptions of technology;
- systems accountability;
- project risk;

- prior experience with IT;
- prior experience with developing methods;
- "faith" in technology;
- Skills, attitude to risk.

According to researchers at the Northern Illinois University, the issues that contribute to information system failures are:

- user involvement and influence (creation of systems that do not reflect the business need; systems' deliverables receive a negative reaction because of lack of participation; ineffective communications between IS and user);
- management support (most common failure of projects is the lack of full commitment by all affected management—results in poor perceptions, insufficient funding, organizational issues, and low implementation priority);
- complexity and risk;
- project management (failure to effectively plan and execute the project cycle, oversights on costs, benefits, schedules, and/or personnel, poorly managed and organized and not recognized by superiors).

Abou .B N. and Romana A. (2005) gave some of the causes of ISD failure in Pakistan, (a developing country like Kenya) as:

- Insufficient support from users
- Project involves multiple units
- The project causes changes in the business processes.
- Users' information needs change rapidly.
- Users' business processes change rapidly.
- The project causes changes in organizational structure.
- IT architecture changed rapidly.
- Software development tools changed rapidly.

Another study by May (1998) illustrates the major causes of information project failure. The author generates nine causes of failure based on the input of practitioners and consultants:

- poor user input;
- stakeholder conflicts;
- vague requirements;
- poor cost and schedule estimation;

- ❖ lack of matching between skills and job;
- ❖ failure to plan;
- ❖ communication breakdowns;
- ❖ poor architecture;
- ❖ and late failure warning signals

Linberg (1999) used development projects reports, interviews and surveys to assess what contributes, from the perspective of practitioners, to a successful project. Participants were asked, "*What was the most successful project that you have worked on, and why?*"

The common themes were:

- The project was a technical challenge.
- The product worked the way it was intended to work.
- The team was small and high performing.

Participants in Linberg's study (1999) were also asked,

"*What was the least successful project that you have worked on, and why?*" and the common themes were as follows:

- Poor project management.
- Poor marketing research [relates to developing systems that do not match the customer/users technical platform; i.e. hardware and/or operating system].

Linberg developed a project success continuum from the practitioner's perspective, which includes whether the project was completed or cancelled. For each of these two outcomes, projects were rated as one of the following:

- *Failed:* completed projects that were characterized by the development of a product that "causes customer discontent" due to lack of perceived quality.
- *Low success:* cancelled projects that were characterized by practitioners that did not learn anything new which could be applied to a subsequent project.
- *Successful:* completed projects that were characterized by average cost, effort and schedule performance when compared to the industry as a whole.
- *High success:* cancelled projects that were characterized by new knowledge for practitioners and artifacts that could be applied to future development work.
- *Exceptionally successful:* completed projects that were characterized by "meeting all quality, cost, effort and schedule expectations".

1.8. Some Major Factors of Failure

1.8.1. Lack of top management commitment to the project

Several research and studies on the Information system projects failure put vast amount of emphasis on insufficient support from senior management and leadership through setting unclear purpose from employing a certain project, incapability to manage complexity, under-nourishing initiatives, failure to anticipate short-term disruptions, inability to demonstrate the invisible progress and eventually disregard for the stability and maturity of the used technology as a major cause of Information system failures. Glaster (2005) underlines the necessity to provide the most qualified staff and resources for supporting initiatives in establishing a new Information system project. He also admits the fact that any new changes resulted from newly introduced Information System project would for sure disrupt in short-terms the everyday routine of the work in any system. This needs support and encouraging words of the top management to mitigate the frustration raised in the morale of subordinates. Glaster (2005) suggests that top management must continuously strive to reveal the fulfillment of series of short-term deliverables to the organization. The last but not the least, he recognizes the fact that an adopted technology in a Information System project could require a lot to reach to a certain level of stability, supportability and maturity prior to be completely acceptable by the users and the host organization. The emerging technologies of this kind always bear with them a high risk of failure on one hand, but on the other hand they could provide a tremendous competitive advantage by letting the host organization achieve differential value by being an early adopter. Running pilot projects experiencing the immature technology with limited implementation scope and minimizing the potential harms are considered as a subtle solution in these cases.

1.8.2. Incomplete/Changing Requirements

Most software project failures are due to errors in the software requirements specification. According to (UK Health, 2003) requirements issues accounted for 40% of the causes of Software project failures. , hardware failures for 26%, software bugs 11%, maintenance issues 6% and system use around 17%". According to (Standish, 1995) CHAOS survey, the top two "project impaired" factors were "incomplete requirements" and "lack of user involvement". Also according to Annie, I. Anton, (2003), the software industry is "clearly, facing a requirements engineering crisis. Finding and fixing a software problem after delivery is often more expensive then finding and fixing it during the requirements and design phase".

It is important to understand the problem before expressing the requirements for the solution. It is normal that small projects can succeed without formal requirements engineering, but any project of

a considerable size and complexity requires proper requirements (Annie, I. Anton, 2003). As argued by (Nuseibeh, and Easterbrook, 2000) the primary measure of success of a software system is the degree to which it meets the purpose for which it was intended. Broadly speaking, software systems requirements engineering is the process of discovering that purpose, by identifying stakeholders and their needs, and documenting these in a form that is agreeable to analysis, communication, and subsequent implementation.

1.8.3. Poor Planning

The relationship between project planning aspect and the degree of success/failure in projects is quite a controversial matter. Where there is a vast amount of positive ideas in favor of a concrete planning for a project to ensure the success, the literature review has brought to the scene some opposing opinions. Dvir *et al.* (2003) argue that even though a decent level of planning for a successful project is vital, there is not an essential positive correlation between planning and success – if not negative all together. Kippenberger, (2000) believes that in reality being able to perform a project according to what has been planned is an exception rather than a norm. He actually believes that too much emphasis on planning and trying to stick to it would decrease the chances of success for a project. He reveals two important points related to excessive attachment to the plans; firstly, financial planning focuses more on the cost than the time, so spending excessive efforts to save money to avoid cost overruns, will create delays which result in time overruns that are more costly than what was planned for. Secondly, when it comes to time planning (scheduling), project managers either constantly look backwards or so fixed at the present moment to compare the progress according to the plan which consequently prevents them from looking forward and anticipating changes and doing corrections in time.

1.8.4. Under Funding and Bad Estimations

Funding that does not last right throughout a project may contribute to delaying the project's completion (Procaccino J. Drew 2002). Further, practitioners have reported the importance of a sponsor/champion from their process perspective [Procaccino and Verner 2001) Having enough funds to last throughout a project also relates to the importance practitioners place on having other stakeholders participate in the decision-making process

1.8.5. Poor Relationship Management

This relates to User Relationships. Lack of trust and inadequate user involvement, unclear roles and expectations among users or other stakeholders can lead to Information system project failure.

1.9. Research Models

Literature has several models for assessing failure and the way forward for ICT systems in general. Some of these models were considered relevant to this research.

1.9.1. The ITPOSMO model

The ITPOSMO model was envisaged by Heeks (2002). The ITPOSMO model seeks to explain the high rates of failures of information systems in developing countries This model assumes the designers of IS are remote which means their contextual inscriptions are liable to be significantly different from user actuality. It assumes the designers come from developed countries or have been trained in developed countries and their knowledge of the local circumstances is at variance with the local reality. This model can be used in explaining some of the reasons as to why implementation of ICT in Kenya fails. According to Heeks (2002), local improvisation is done to reduce actuality-reality gaps. This can be through hybrids that recognize local capacities and improve success rates. However, Heeks notes that schemes to develop these hybrids in the Developing Countries are virtually nonexistent thus hampering improvisation. Participative approaches to implementation e.g. group working and end-user involvement; have to be carefully considered since most have been developed for the industrialized countries. Examples of how these participative IS techniques were a failure, are the case of Mexico's General Hospital and an end-user development initiative for health IS in South Africa (Heeks 2002). The implementations failed because of the large gap between design assumptions and requirements and actuality of organizations into which ICT was introduced. The conclusion drawn is that these implementations failed because there was too large a gap between the design assumptions and requirements of those techniques and the actuality of organizations into which they were introduced and not necessarily because of participative design is necessarily wrong.

1.9.2. A descriptive conceptual framework for developing countries context

This model which was developed by David Gichoya (2005) seeks to identify the characteristic challenges, which make ICT implementation in Kenya government fail to succeed. The model illustrates the key factors in ICT implementation in government. The input variables are categorized into factors for success (drivers and enablers), and factors for failure (barriers and inhibitors). The factors for failure are those occurrences that constraint proper/smooth implementation of ICT projects in government. These can either be barriers or inhibitors.

Barriers can be considered as those occurrences that hinder ICT implementation. The barriers are as listed below.

- Infrastructure
- Finance
- Poor data systems and lack of compatibility
- Skilled personnel
- Leadership styles, culture, and bureaucracy
- Attitudes

Inhibitors do not necessarily prevent the implementation of ICT projects but they do prevent advancement and restrict successful implementation and sustainability. The inhibitors are as listed below.

- User needs
- Technology
- Coordination
- ICT policy
- Transfer of ICT idolizers
- Donor push

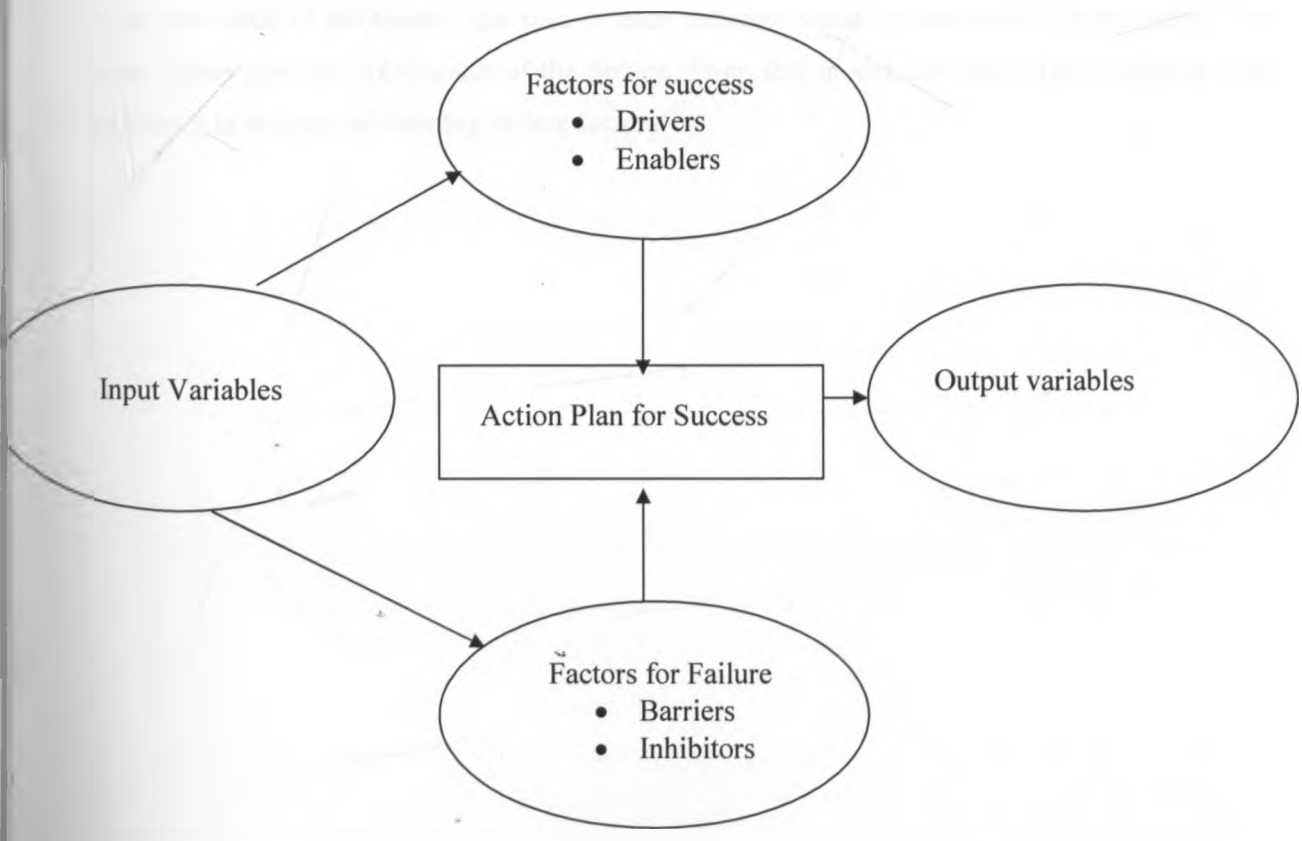


Figure 1-1: Descriptive framework for ICT success or Failure (David Gichoya, 2005)

1.9.3. IS Sphere Model

Feghali, T. and Zbib, I.J. (2007) identified twenty nine (29) project failure indicators in order to establish a prevention model. These are categorized into three different headings:

- Cultural
- Managerial
- Technical

A predictive model to test IS and project failure was proposed. The proposed IS failure model is represented by a sphere (IS-Sphere) and can be used to help IT managers gauge their progress in terms of preparedness to prevent and predict IS failure in their enterprises. This study defines IS failure as any phenomenon that hinders the success of an information system during development, installation, deployment, implementation and continuous use of that system.

The three values that give the coordinates of the radius of the sphere with its centre at (0, 0, 0) are based on the three factors derived from the categories: managerial, cultural and technical. Each factor is dependent on the values of its respective indicators. The Indicator value is the average of all responses for that indicator. Thus a sample of the respondents rates an indicator on a scale of 1-7 and average is calculated. The indicators were then scaled down to take a value between 0 and 1. To get the value of the factors, the sum of each indicator values is calculated for that factor. The factor values give the coordinates of the Sphere. From this model, the larger the IS-Sphere is the healthier it is in terms of resisting failure factors.

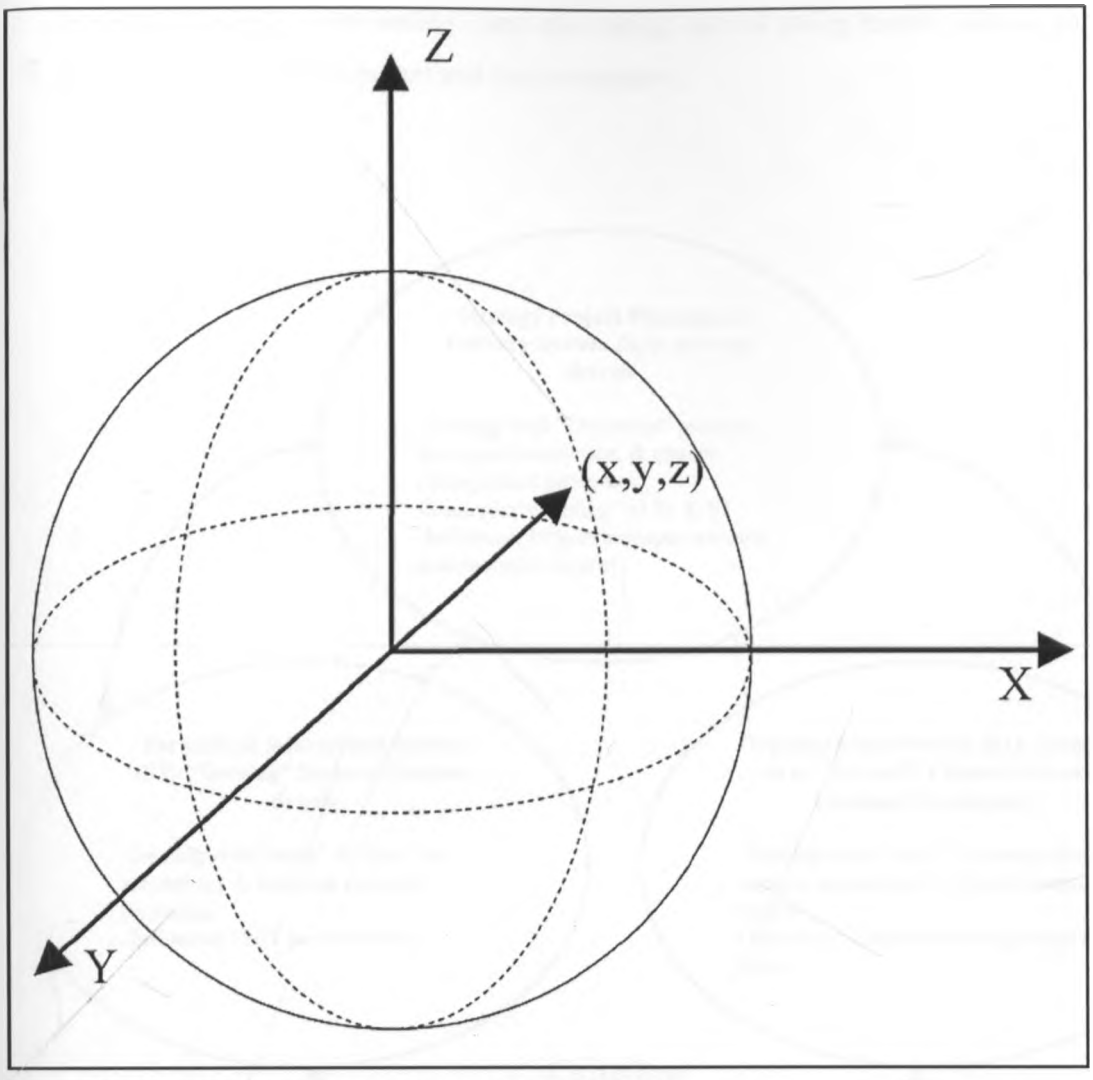


Figure 1-2: IS Sphere Model (Feghali, T. and Zbib, I.J. 2007)

The coordinates on the three-dimensional (3D) factors are values generated from each of the three factors: Cultural, managerial and technical.

1.9.4. Yeo IS projects success/failure factors model

Yeo (2002) in a very interesting work has created a broad systematic framework capable of presenting a wide range of possible success/failure factors. Yeo in his triple-system(S) model represents three systems: organizational system (S1) as a primary system which is to be 'served' and is context-driven, formalized information system (S2) as a supporting system which is to be 'serving' S1 and is content-driven and finally strategic project planning and delivery system (Sp) which operates in the organizational context of S1 in order to deliver a successful S2 and thus is process-driven system. Sp has a very holistic role and responsibility that is overseeing the process

of preparing, planning, coordinating , and also taking care of rising social, cultural and technical issues in the system's development and implementation.

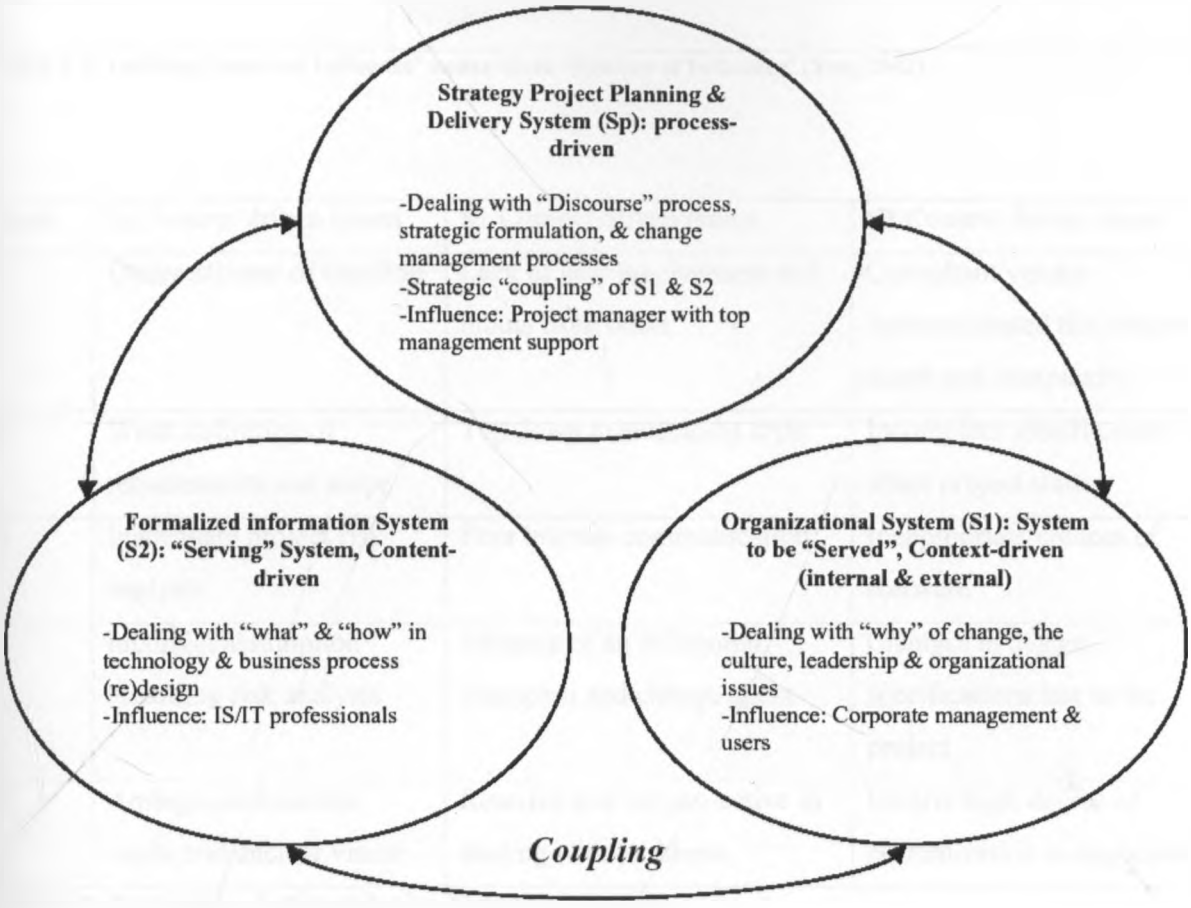


Figure 1-3: IS/IT projects success/failure factors model (Yeo, 2002)

This consolidating triple-S model provides a rigorous framework to pinpoint, group and analyze a host of success/failure factors when it comes to IS/IT project subject. Yeo in his article names these three systems as *spheres of influence* (SOI) and afterwards nominates 10 main *issues of influence* (IOI) which go under SOIs according to their relevance. These issues in turn are translated to lists of failure factors identified by the researcher from an in-depth literature review. Table below demonstrates the outcome of this endeavor.

Sp Process driven issues	**S1 Context driven issues**	**S2 Content driven issues**
Related to	*Related to*	*Related to*
Business planning	Corporate culture	Information technology

Project planning	Corporate management	Business process and system design
Project management and control	Users	Is professional and knowledge resources
	Politics	

Table 1-1: Defining 'Issues of Influence' under three 'Spheres of Influence' (Yeo, 2002)

Rank	Sp Process driven issues	S1 Context driven issues	S2 Content driven Issues
1	Underestimate of timeline	Lack of user involvement and inputs from onset	Consultant/vendor underestimated the project scope and complexity
2	Weak definition of requirements and scope	Top down management style	Incomplete specifications when project starts
3	Inadequate project risk analysis	Poor internal communication	Inappropriate choices of software
4	Incorrect assumption regarding risk analysis	Absence of an influential champion and change agent	Changes in design specifications late in the project
5	Ambiguous business needs and unclear vision	Reactive and not pro-active in dealing with problems	Involve high degree of customization in application

Table 1-2: Top 5 failure factors under Sp, S1 and S2 (Yeo, 2002)

1.9.5. Project Success Model

Model developed by Douglas Havelka, Kimberly Conrad, and Bonnie Glassberg. The model was developed from a comprehensive set of factors that impact information systems development project. The model can be used to improve the likelihood of project success.

The output of the model is a set of factors that can be used by managers to improve the development process or by researchers to further investigate the relationships among the various factors. The factors identified were classified into ten separate categories: *System, Team, Process, Domain, Project, Organizational, Management, User Personnel, IS Personnel,* and *Communication.*

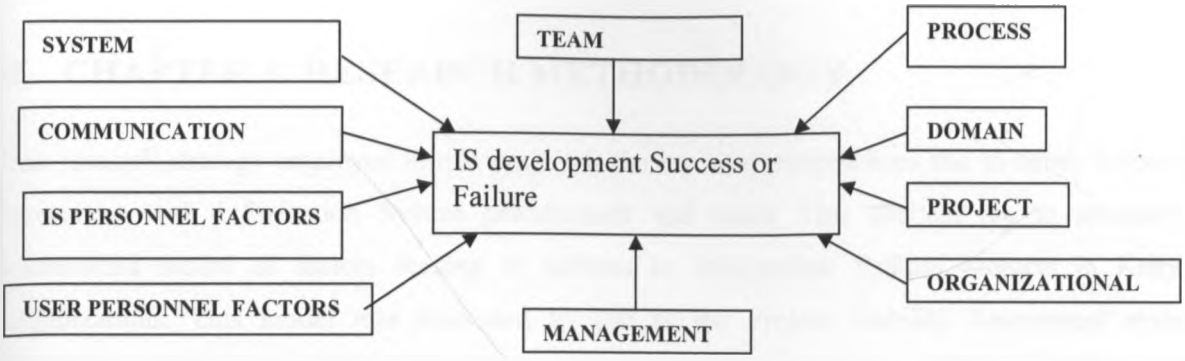


Figure 1-4: Project Success Model (Douglas Havelka, Kimberly Conrad, and Bonnie Glassberg)

2. CHAPTER 3: RESEARCH METHODOLOGY

The research strategy employed in this project is the use of questionnaires and in-depth follow-up interviews with Information System practitioners and users. This enabled me to structure a customized model of factors leading to failures in Information System projects in Kenyan organizations. This model was evaluated by use of the Project viability Assessment system developed from the causes of failures analyzed with the responses from the survey. The methodology adopted includes:

- Literature review of relevant ISD methodologies in general; this includes study of online journals and papers.
- Study of online models in use for factors that lead to failures in Information system processes.
- Survey and case studies about existing practice and problems among Kenyan companies. The survey was conducted by use of questionnaires. Follow up interviews were also done for the questionnaire responses that were not clear to the researcher. The inputs were then used for formulating adapted ISD methods, techniques, and practices. A prototype system was designed from the proposed model and evaluated by use of data collected from the questionnaires

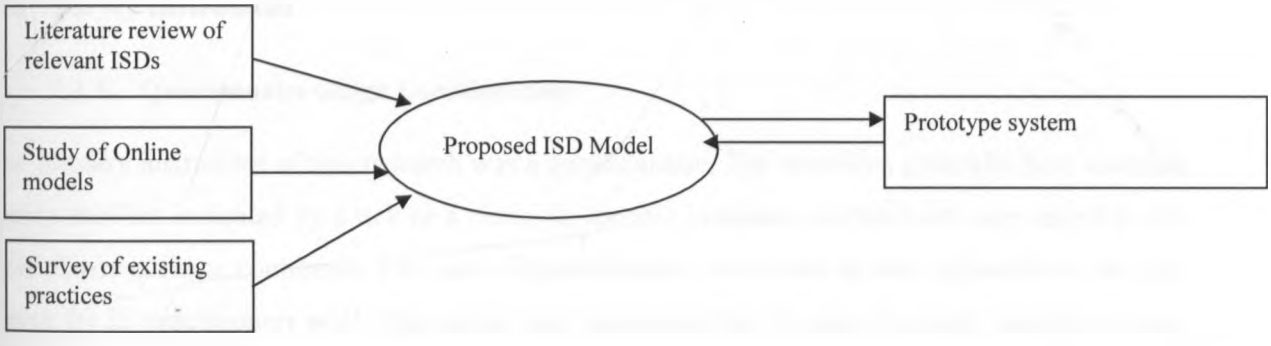


Figure 2-1: Research design

The primary objective was to propose a model that outlines causes and indicators that may lead to ISP failures. Both technical perspectives and User (both end users and senior management) perspectives were examined. The User group included representatives from any level of employees that have been involved in development of an IS system. The individuals in the user groups had varied degrees of interaction with IS specialists and all had participated in the ISD development process in some manner.

Linstone (1999) says that, "the concept of multiple perspectives is a remedy intended to overcome domination by the technical perspective. Similarly, an end user will not likely examine the

technical aspect, since he would assume that the technical issues would be taken care of by someone familiar with that domain". This research has employed the multiple view perspective as a deliberate instrument to capture parallel views and not necessarily to avoid domination by any one stakeholder. The model was designed to embrace the public and private sectors as well as educational institutions. There are many differences in the circumstances of IS development between each of this organizational types but some degree of commonality can be expected.

2.1. Data gathering Process

In order to be able to suggest possible ways of preventing software failures, it is necessary to investigate in detail, what is going on in the real software world. To do this it is first necessary to examine what has gone before with a view to determining what general characteristics of failure tend to become apparent. Current work at this point is directed at finding a means of taking symptoms and "distilling" them into the true characteristics of a system problem. This takes into consideration that errors creep into the very best of practices owing to very understandable coincidences of a number of events. E.g. an apparent symptom can be given as "software package inadequacy" but was actually due to the private agenda of an individual within the project team. What this has meant is gathering extensive cases from the literature and conducting field work to gather information during on-going system problem and success scenarios.

2.2. Survey Instrument

2.2.1. Questionnaire design Considerations

The primary instrument of this research was a questionnaire. The questions generally have multiple choice answers indicated by a tick or a circle. In specific instances, respondents were asked to add their observations or comments. Two sets of questionnaires were used in each organization one was meant for IS practitioners while the second one was meant for IS users. In-depth interviews were used as follow-ups for responses that were not clear to the researcher. This approach provided new insights, grounded in the Kenya IS development reality, into factors that lead to the failure of IS Development projects.

Finally, questions on similar themes were grouped together and were sequenced to form a logical progression where possible. More difficult questions were put before easier ones given the complexity and length of the survey. One other key consideration in the questionnaire design was providing all questions in a closed form. This resulted in a data form that was easier to code and analyze than open questions.

The questionnaires and the interviews used the framework of the Project Success model by Douglas Havelka, Kimberly Conrad, and Bonnie Glassberg to be informed of some of the factors for ISD failures. The model shows the factors that can be used by IS managers to improve the development process or by researchers to further investigate the relationships among the various factors. The Project Success model (Havelka D., Kimberly C., and Glassberg B.) has the following factors:

a. **System factors** are characteristics or properties of the computer-based information systems that support the organization's business processes. They may influence information systems development (ISD) project outcome by increasing the amount of work required or the level of difficulty involved. The system factors are: current system quality, system size, and system integration.
b. **Team factors** are attributes or characteristics related to the project team charged with designing and developing the new system. These factors include: team composition, team size, team authority, and team motivation.
c. **Process factors** are characteristics of the information systems development process itself. The process factors include: planning, data gathering techniques, feasibility study, and testing.
d. **Domain factors** are those factors that are characteristics or properties of the application or business domain. These factors include" unique requirements, stability of requirements, flexibility required, and complexity of the application. Although domain factors may be difficult or impossible for managers to control, they can be evaluated. Appropriate strategies can then be determined to address challenges that some domains pose.
e. **Project factors** are those constructs that are based on the specific development project being studied. The project factors identified are the budget, control of the project, initiator, leader, time/schedule constraints, and goal congruence.
f. **Organizational factors** are those properties, characteristics, or attributes of the organizational culture or structure that may affect ISD project success. The organizational factors identified were hardware and software environment, multiple user areas, politics, rapport between IS and users, and outside resources.
g. **Management factors** are those that are characteristics of the organizations management structure for controlling and directing development activities. The management factors identified were accountability, adequate supervision, management commitment, and management goals for the system.
h. **User factors** include: user communication skills, user bias, and user commitment. Characteristics and attributes of the users of the system being developed can influence the project's success. The primary reason for user participation in systems development is to

transfer their job knowledge. Without an adequate level of communication skills, the communication and interaction between the users and IS personnel may be difficult. Users that have a high level of understanding of the current system should be able to point out specific problems and areas for improvement that can be incorporated into the new system. User commitment to the project will directly impact the project's success. Users that want the project to succeed will be more willing to provide documents, answers to questions, and perform other development activities.

i. **IS personnel factors** on the systems development team will also impact the project's success. These IS factors are: IS communication skills, experience, technical IS skills, bias, and domain knowledge. Communication skills of the IS personnel can be expected to affect the level of communication and knowledge exchange during development. Some organizations, recognizing the lack of adequate IS communication skills, have begun using facilitators to enhance the level of communication between IS personnel and users. The ISD process is dependent on communication between many individuals. For an ISD project to be successful user and IS personnel must incorporate their respective knowledge into the application.

j. The **communication factors** impact the ability to exchange knowledge. The communication factors include: clarification/feedback, communication among team members, persuasion, and interaction between users and IS personnel.

2.2.2. Sampling Technique and Sample Size

Two sets of questionnaires were sent to one hundred (100) IS managers and IS users in the Kenya to look at why information systems development processes may fail. There were twenty one (21) respondents reporting on seventy three (73) distinct projects. Nine (9) Follow-up interviews were conducted for questionnaires that were not clear to the researcher. Among the user group, there were twenty (20) respondents.

No attempt was made to apply any sampling theory in selecting the participants. Priority was given to expected success in recovering participant responses so that the research could be completed without additional complications. Respondent organizations were therefore selected based on previous acquaintance with the researcher. This enabled the bypassing of the usual obstacles that would be encountered in questionnaire based research.

2.3. System Design and Development

The software project viability system was developed so as to be used to evaluate the model that is proposed in the research. The system was designed to help software project stakeholders to assess the potential success of ISD projects.

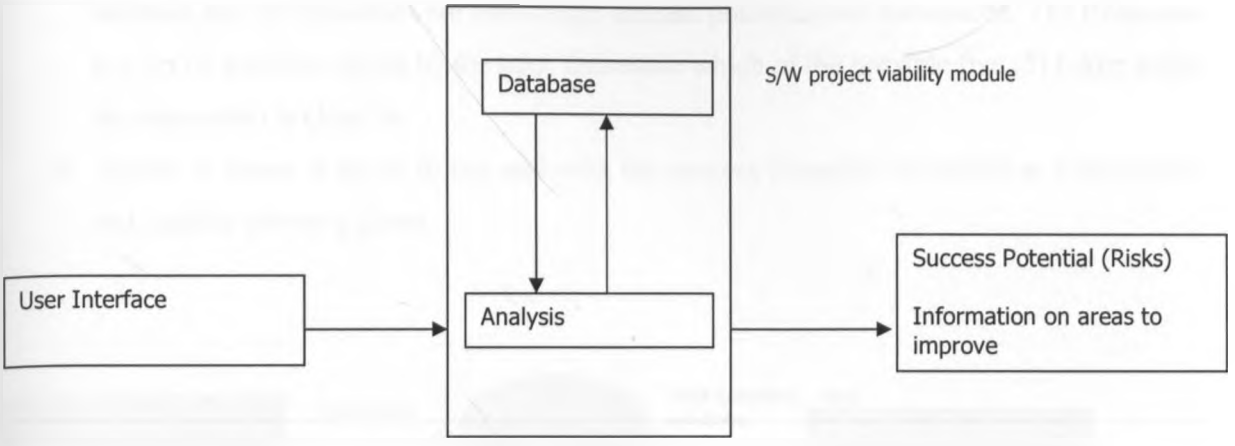


Figure 2-2-System Architecture of proposed prototype system

2.3.1. System Design

- *The software project viability assessment system*: This module has a database which contains three tables:
  - *User table*- used to store user information. The users table distinguishes between administrators group and non-administrative users group of the system. These two groups have different roles in the system. The administrative users can add and edit user information, issue rights and privileges in using the system. They can also edit the system parameters to suit the project being investigated. The non-administrative users use the system to compute the project viability/success potential only.
  - *The Parameters table* is used to store the relative importance scores for the different factors that cause failure.
  - *The questions table* stores the questions for the system. The Analysis module picks the set of responses of the user, does a calculation of the success potential and appropriate information based on the success potential is given.
- *Administrators Module*: In this module, administrators
  - Can add, edit or delete questions in the table questions.
  - can also edit the parameters (relative scores) in the parameters table
  - Can add users and edit users rights/privileges

This is to make the system adaptable to the environment since its applicability is dependent on the individual project based on cost, complexity, scope of effort and its criticality to the organization's mission.

- *User Interface*: This provides a set of questions to the user. Questions are queried from database and the responses are used to get success potential and discussions. The Responses to a set of questions given by the user, determine which of the possible five (5) Likert scales the respondent is close to.
- *Report*: A report is given to the user with the success potential calculated as a percentage and suitable advice is given.

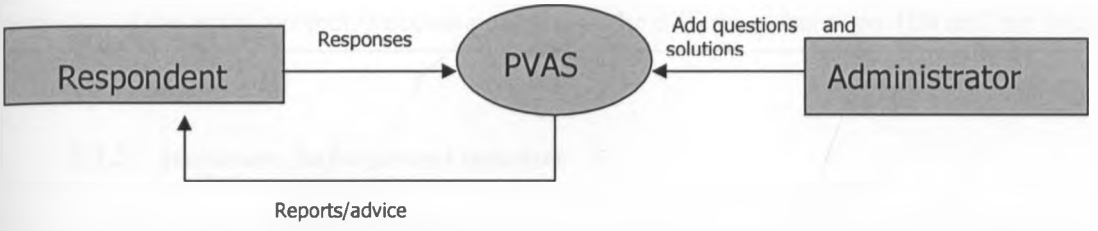


Figure 2-3-Context Data Flow Diagram of proposed prototype system

2.3.2. Computation of the success Potential

Success potential has been calculated as the difference between the maximum possible points (100%) and the sum of the failure potential for each factor. The computation has been analyzed as follows:

The user inputs a response by selecting one of the choices of the likert scale given for each question on the user interface. All these option have been assigned the Likert scale values as shown below:

- Very likely-5
- Likely-4
- Possible-3
- Unlikely-2
- Very Unlikely-1

The failure potential of each factor was computed using the formula:

$S_x = (F_1 * L_a)$/maximum value of Likert Scale

Where S_x =Failure Potential for the factor

F_1=relative score assigned to the factor

L_a = Likert scale option selected

The maximum value of Likert Scale which is five (5)

Total Success Potential for the entire project = 100-(Sum (Sx))

EXAMPLE

Q1: What is the likelihood that Lack of top management support may be/have been encountered in the project?

Supposing a user selects *unlikely*, the Likert scale value for unlikely is 2, the relative score for the factor lack of senior management is 13%

Thus

Failure Potential, S_x = (13%*2)/5= (0.13*2)/5= 5.2

All other factors are calculated in the same manner and a summation is done to obtain the failure potential of the entire project. Success potential is the difference between 100 and the failure potential obtained.

2.3.3. Hardware, Software and Interface

To implement the model and algorithm, a stand-alone, Pentium 4 laptop, installed with Visual Studio, was used. The programming language chosen was Visual Basic.net 2005 for its ease of availability and attractive user interface. The sample code appears in APPENDIX B.

3. CHAPTER 4: FINDINGS AND DATA ANALYSIS

This chapter presents details of the analysis and findings of the study. The chapter also presents the proposed framework of the IS failure Model. More emphasis was placed on responses with respect to ISD failures.

3.1. Results and Findings

The main outcome of this research was a model that includes some of the early and on-going components that affect the success of the software development process. The proposed model can assist in determining the relative importance of each of the factors that lead to failures in system development addressed in the research.

The model was intended to provide project managers with insight into some of the risks that can threaten the development process and the resultant product.

3.1.1. IS project failure definition

In determining the success/failure of the IS projects, Sauer's definition of IS project failure was used. Chris Sauer's attempted to classify the failures categories. The classification is given in the ***Table4-1*** below and this classification provides a suitable framework to help make initial diagnosis of the types of failure. The third column in the table indicates the types of failures evident in this research.

Type	Description	Presence in Survey
Correspondence failure	Failure to achieve predefined objectives	Positive
Process failure	Failure to produce a system in given limits	Positive
Interaction failure	Level of use or user satisfaction failure	Positive
Expectation failure	Inability to meet the expectations of specific stakeholder	Positive
Terminal failure	Project terminated, can't be tolerated more	Negative

Table 3-1 : Failure Classifications (Chris Sauer)

N.B Positive indicates that that type of failure was notable in the research while negative means the failure was not fully notable in this research.

According to Heeks R. (2002), ICT success or failure in developing countries can be categorized into three depending on the degree of success

- *Total failure*: the initiative never implemented or in which a new system was implemented but immediately abandoned.
- *Partial failure*: which major goals of the initiative are unattained or in which there are significant undesirable outcomes.
- *Success*: most stakeholders attain their major goals and do not experience undesirable outcomes.

3.2. Data Analysis

The results of the questionnaire are divided into two sections

- Section one: General Questions
- Sections two: Questions related to Causes of Software project failures

In section one has few questions which are of general nature. Summarized questions on factors of project failure were also placed in this section given the complexity and length of the survey. Thus respondents gave their responses on the twelve main categories of failure.

In section two, the questions were particular to the causes of Information systems project failures. The respondents not only gave answers to the main categories but also to the indicators under the categories.

Q1 Which sector is your organization primarily in?

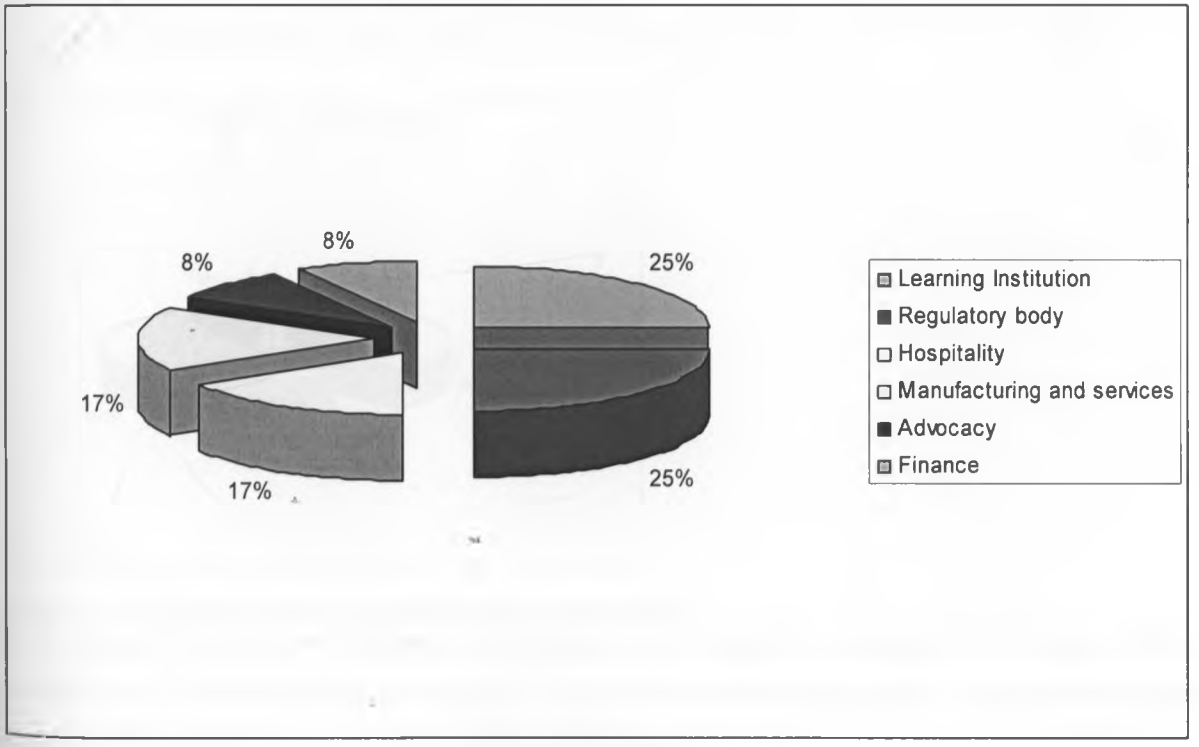


Figure 3-1: Which sector is your organization primarily in?

The purpose Q.1 was to know about the respondent's organizational sector. It's partially used to describe the environment of the respondent.

Q2: How long have you been involved in ICT project development?

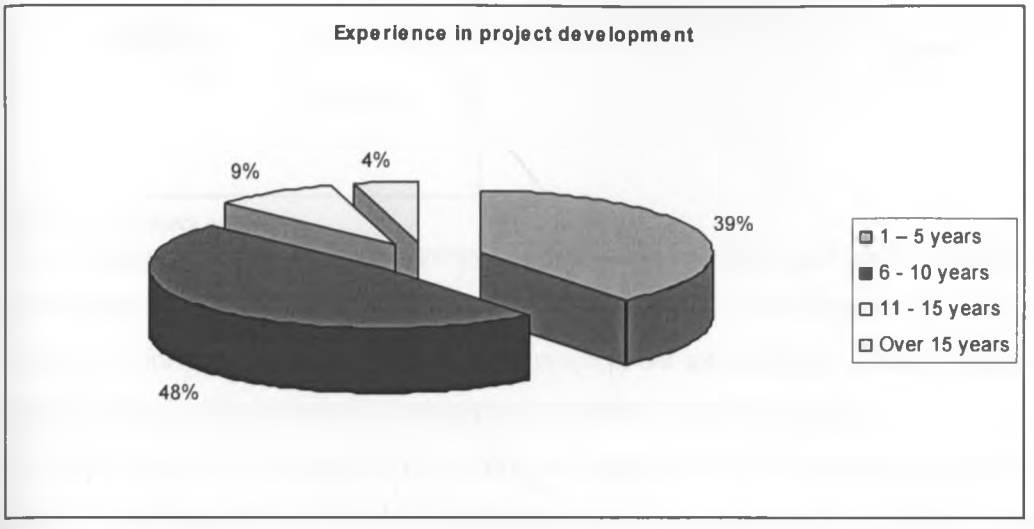


Figure 3-2: How long have you been involved in ICT project development?

This question partially describes the respondent and it helps to validate the appropriateness of the respondent to answer this survey. It is also included so that perhaps its implications can be investigated for subsequent studies.

Q3: On average, how many projects have you undertaken?

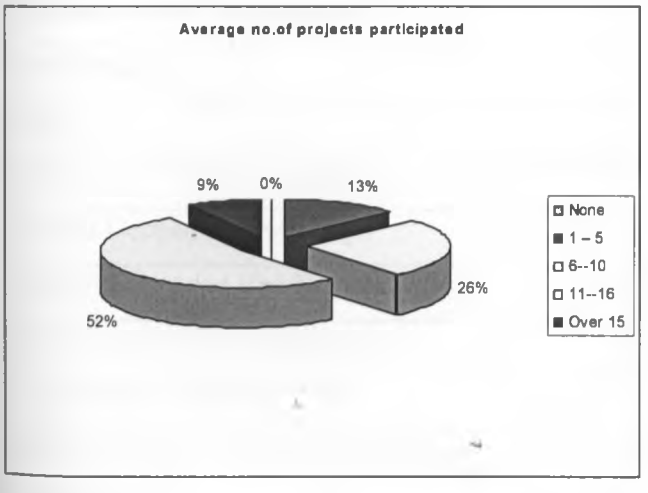


Figure 3-3: On average, how many projects have you undertaken?

In the figure 4-3 above, the respondents have good knowledge and experience on the basis of their participation in different software projects. It means they are the right people with right knowledge to lead me towards achieving the objectives of the survey.

Q4 List some of the projects you have undertaken and the outcome

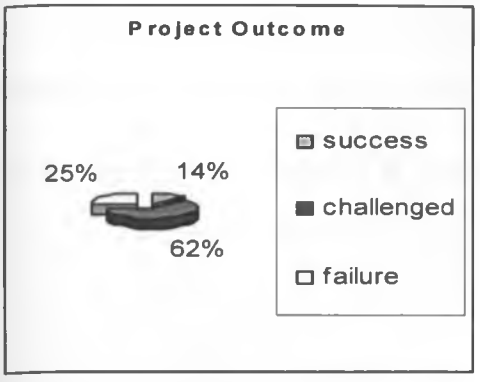


Figure 3-4: Project outcomes

The working estimates from the survey suggest that more than half (62%) of Information system development projects were partial failures. This figures may not necessary be used as evidence that very few Information system development projects are total failures. This is because most of the organizations surveyed feared on admitting total failure of their systems.

Q5: With respect to the failed IS projects, the respondents were asked to rate the factors below from 1 (most frequent) to 10 (least frequent) as to why the organization's IS failures may occur.

	Frequency (No. of Respondents)									
Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Lack of top management commitment to the project	18	0	0	0	0	0	0	0	0	0
Incomplete/Changing Requirements	16	0	1	1	0	0	0	0	0	0
Poor Relationship Management	2	14	0	1	1	0	0	0	0	0
Improper Project Management	0	1	2	14	0	0	1	0	0	0
Poor Planning	2	6	0	0	0	1	6	1	1	1
Scope	0	1	0	1	13	2	0	1	0	0
Inappropriate Technology base	7	0	0	0	0	0	3	4	1	3
External Dependencies-foreign	3	1	2	1	3	0	2	0	4	2
Under Funding and Bad Estimations	0	0	2	1	0	14	0	0	1	0
Scheduling- artificial deadlines	4	0	0	0	0	0	1	13	0	0
Poor Personnel training/skills	0	2	0	0	0	9	0	1	2	4
Lack of effective Development process/ methodology	1	0	0	1	0	0	4	11	0	1

Table 3-2: Factors that lead to failures from survey

In this question, the causes of failure mentioned in the literature review were used. Lack of top management commitment to the project had the highest number of respondents who chose one as the most frequent cause of failure

Generally, all the factors are important in the success or failure of an Information system software project but with the help of respondent's response, it's possible to see which factors are more important in respondents' point of view.

Q6 For the IS projects that fail, at what stage are they likely to fail?

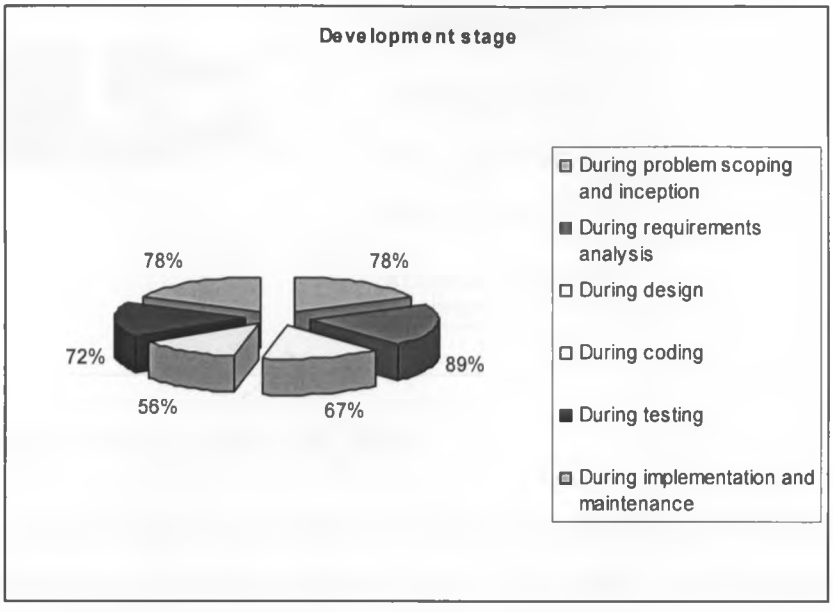


Figure 3-5: percentage of Yes Responses for stages at which IS projects fail

As can be deduced figure 4-5 above, 89% of the respondents agreed that information systems projects fail at the requirement analysis stage. This can be due to the fact that if the scope of project could not be visualized by all of the stakeholders at the start of the process then the system analysts may be influenced to overlook or not fully understand the requirements of different users.

Q7: Which of the following system development practices do you carry out during an information system development project?

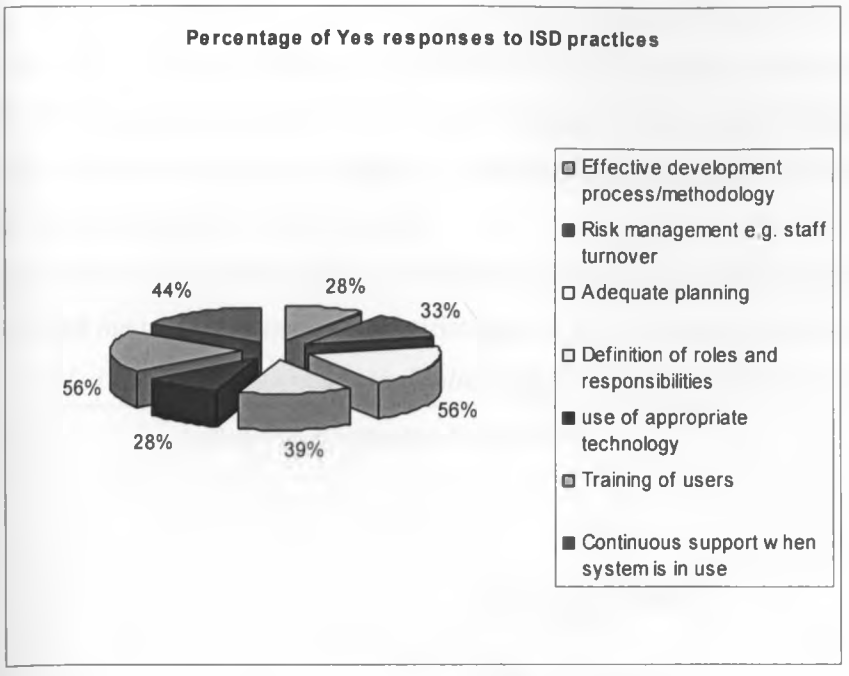


Figure 3-6: Percentage of Yes Responses to ISD practices

This question sought to answer that Objective two of this research, i.e. to find out the common practices in Information system development projects. The results show that most organizations look at planning for their projects as part of the solution though not necessarily as an enabling tool to avoid failures

The second part of the survey draws on the results from the first part. In this section, the respondents were asked their point of view on the causes of software failure for each of the subcategories under the main categories. Answer to each factor was chosen one out of five options: 'very unlikely, 'Unlikely, 'Possible, 'likely and 'very likely' which according to Likert scale are coded by values from 1 to 5. To simplify the analysis of this data, the responses to each factor are divided into two groups of those: 'likely and 'very likely' (group A) and the group of those 'very unlikely, 'unlikely, and 'possible', (group B). The analysis is shown in the appendix C.

3.3. Analysis of user perceptions on failure

The Information System failure itself is often influenced by the perception of people who are involved in it (Peterson et al., 2002; Poonand Wagner, 2001). This necessitated the need to capture the users' perception of failure. This research examined both IT Practitioners' perspectives and User perspectives to get the causes of failure in IS projects. Users have greatest influence on system design and their views may address both the system concerns and the strategic needs of the organization. The individuals in the user groups had varied degrees of interaction with IS specialists and all had participated in the ISD project in some manner. Getting this kind of users was important

in this research because use of any user may introduce some bias as they may not be IT savvy. However, no separate analysis was done for the user group. This is because users' perspectives of IS failure are more inclined to the "social" nature of the system. However, the model developed in this research can form the nucleus or basis for any future related studies. There were twenty (20) users who responded to this survey

The introduction section of the questionnaire was used to capture the users' details. These details assisted me to determine the appropriateness of the respondent in answering the questionnaire.

Q1: Level of Participation in Application development. Please select one- the most common

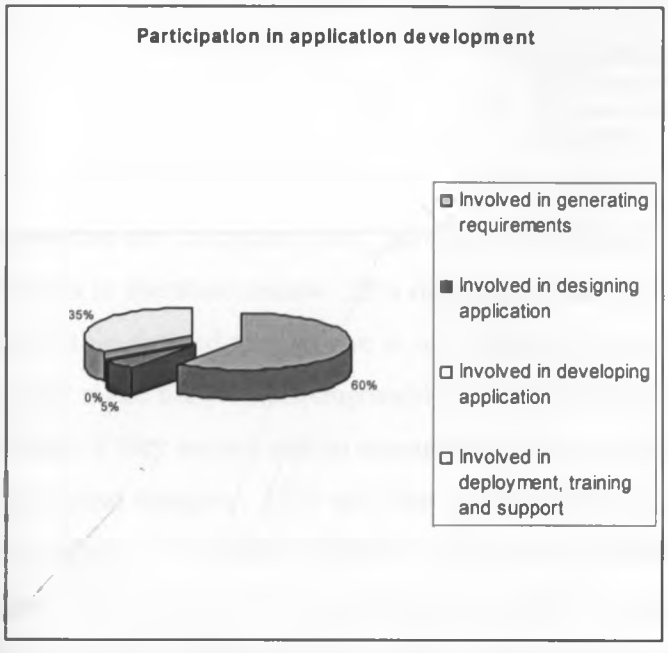
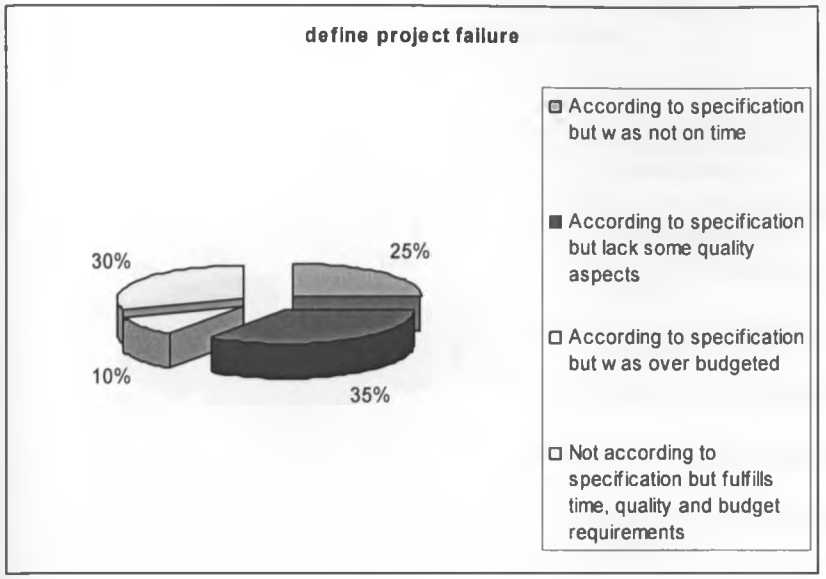


Figure 3-7: Level of participation in application development

In this question 60% of respondents are involved in generating user requirements. No respondent was involved in developing application.

Q2: How would you define software project failure? Please select one



This question was to capture users' perception of failure. This was made with the help of mentioned definitions in literature review. 25% respondents are agreed that a project is failure when it never comes within defined time. Time is an important factor since "lack of project management and planning" make the projects impossible to finish within defined time. Planning and Management are useless if they are not able to manage the timely completion of a project.

In the second category, 35% said that they consider a project failure when it never fulfills the quality aspects of a project. Quality is a necessary element as company pay to get high quality projects. 10% respondents considered that a project is not successful if it's never completed within defined budget. At the end, there was an option which is inverse of above three and that is "A project is not according to specifications but fulfils time, quality and budget parameters" and 30% agreed that a project is defined failure when it never fulfils basic requirement specifications.

Q3: Opinions about application systems. Please select one.

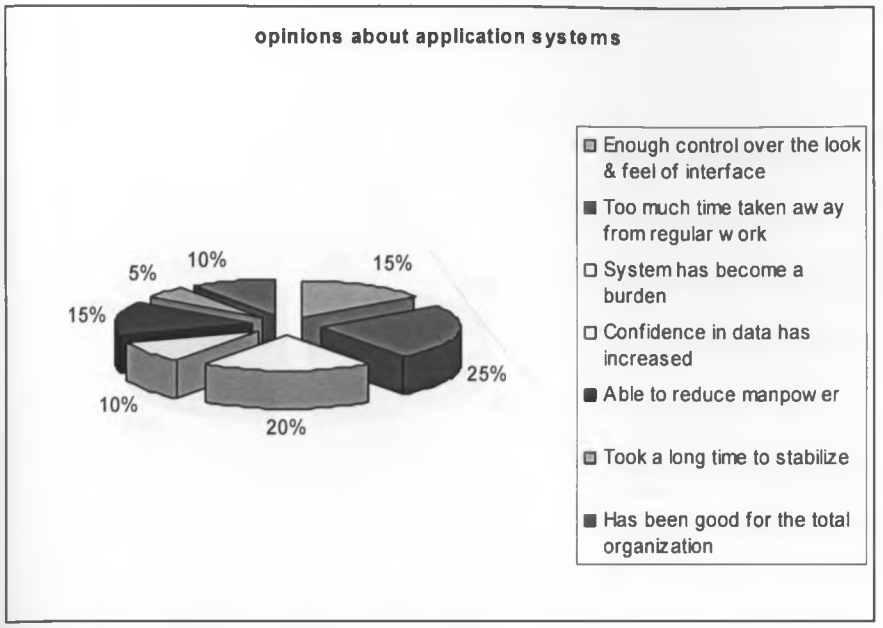


Figure 3-8: Opinions on application systems

This question was used to capture the users' attitude towards application systems. Both positive and negative opinions are captured.

Q4: Problems encountered in the recent application systems

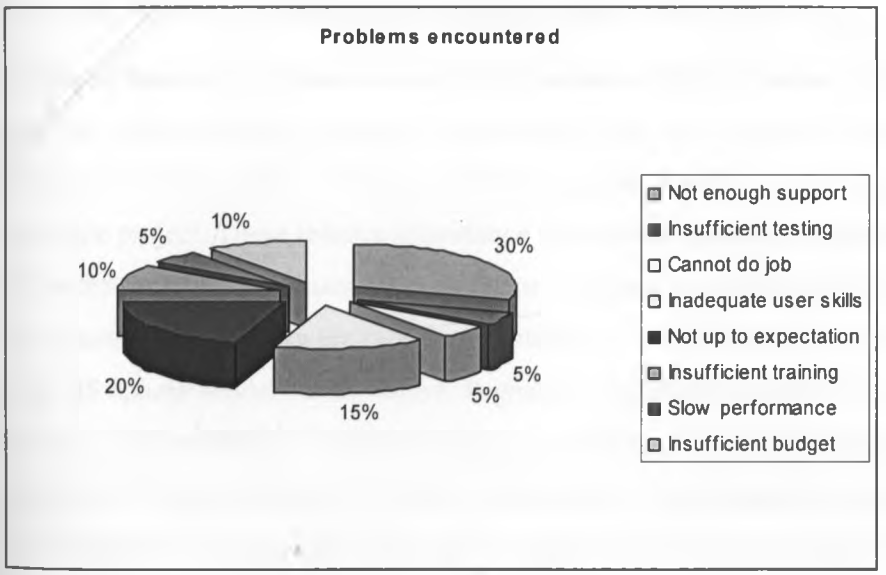


Figure 3-9: problems encountered

The question was asked so as to act as a lead question to causes of software project failures. The highest number of respondents (30%) said that the major problem was lack of enough support.

Q5: Probable cause of these problems

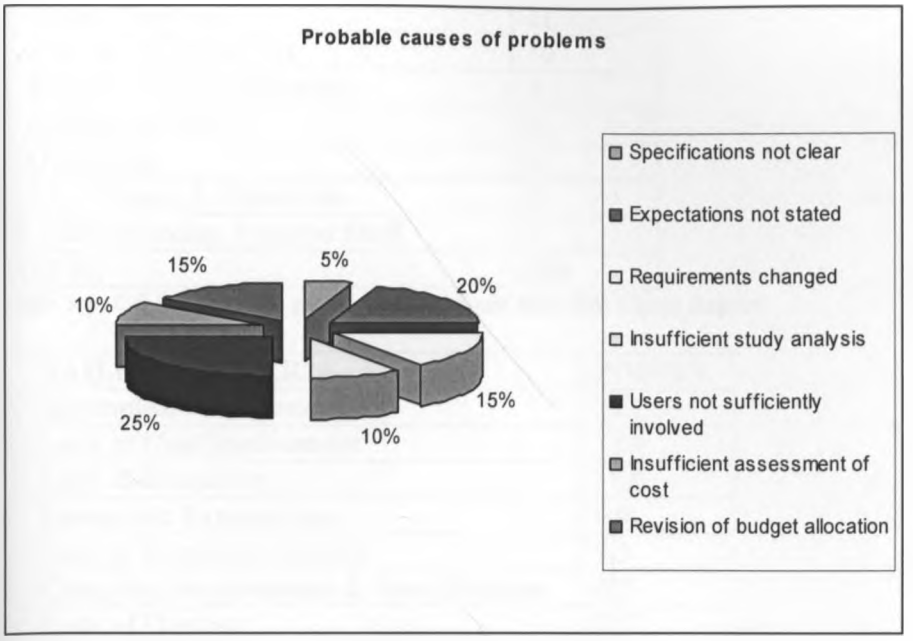


Figure 3-10: Probable causes of problems

In figure 4-10 above, the survey respondents gave 25% in favor of "users not sufficiently involved" as a major cause of failure. 20% respondents selected "expectations not stated" as a second major cause of software project failure.

3.4. Calculation of relative importance scores for the factors

Assigning relative importance scores to the factors of failures was an uphill task. This is due to the fact that determination of relative importance scores in research work is a result of thorough deliberations by a body of experts which was not feasible in this case. This is an individual academic project. These relative importance scores were arbitrarily selected by the researcher based on the frequency of responses for each factor of failure to yield a score of one hundred (100) points. These scores were used in the prototype system used to calculate the project success potential.

In the IS sphere Model for IS failure, Feghali, T. and Zbib, I.J. (2007) calculated the values of the factors of failure based on responses from a survey. The CHAOS Report surveyed IT executive managers. For the purposes of project comparison, The Standish Group used the project success criteria from the surveyed IT managers to create a success potential chart and project failure criteria to create a Failure Potential chart. Each of the factors of failure and success were given values/scores based on the input from the surveyed IT managers. The **tables 4-3** and **4-4** below list the criterion in order of importance with their appropriate points as used by the CHAOS report.

SUCCESS CRITERIA	POINTS
1. User Involvement	19
2. Executive Management Support	16
3. Clear Statement of Requirements	15

4. Proper Planning	11
5. Realistic Expectations	10
6. Smaller Project Milestones	9
7. Competent Staff	8
8. Ownership	6
9. Clear Vision & Objectives	3
10. Hard-Working, Focused Staff	3
TOTAL	**100**

Table 3-3: CHAOS success points adapted from Standish Chaos Report

FAILURE CRITERIA	POINTS
1. Incomplete Requirements	13.1
2. Lack of User Involvement	12.4
3. Lack of Resources	10.6
4. Unrealistic Expectations	9.9
5. Lack of Executive Support	9.3
6. Changing Requirements & Specifications	8.7
7. Lack of Planning	8.1
8. Didn't Need It Any Longer	7.5
9. Lack of IT Management	6.2
10. Technology Illiteracy	4.3
11. Other	9.9
TOTAL	**100**

Table 3-4: Chaos failure points adapted from Standish Chaos report

Standish Chaos report points were derived from the percentage of responses to the factors of failure and/or success. The report further calculated the success potential of the project by getting sum of values for all the factors.

To calculate the values/scores for factors of failure for this research, the same design as the CHAOS report was used, thus the scores for the factors of failure used in this research were also devised from the survey. In similarity with IS Sphere Model for IS failure by Feghali, T. and Zbib, I.J. (2007), the scores for the failure factors were calculated based on the input from the respondents in the survey. This approach was preferred because of its simplicity.

The scores for the factors of failure in this research were formulated from the Likert scale which usually has one a scale of (1) to five (5). Each of the choices of the Likert Scale has points one (1) to five (5). Since the questionnaire required responses to be from one (1) most frequent to ten (10), the least frequent, the scale was expanded to one (1) to ten (10). The most frequent choice one (1) was assigned ten (10) points and the least frequent choice ten (10) had one (1) point. The number of responses for each factor was multiplied with the corresponding points and total score (sum) calculated.

This resulted in the points as shown in the column *score* in **Table 4-5** below. The total score for all points was calculated; in this case the total was one thousand, three hundred and seventy three (1373). A relative importance score was then calculated as a percentage of the total scores as shown in the last column of **Table 4-5** below.

Example to show calculation of the relative score for the factor of lack of top management commitment is shown below:

i. Get the score

Score = (18*10) + (0*9)+(0*8)+(0*7)+(0*6)+ (0*)5+ (0*4)+ (0*3)+ (0*2)+ (0*1)

=180+0+0+0+0+0+0+0+0+0+0=180

ii. Get the relative importance score as a percentage

Relative score = (180/1373)*100

=13%

Factor/Points	1	2	3	4	5	6	7	8	9	10	Score	Relative importance Score
1. Lack of top management commitment to the project	18	0	0	0	0	0	0	0	0	0	180	13%
2. Incomplete/Changing Requirements	16	0	1	1	0	0	0	0	0	0	175	13%
3. Poor Relationship Management	2	14	0	1	1	0	0	0	0	0	159	12%
4. Improper Project Management	0	1	2	14	0	0	1	0	0	0	127	9%
5. Poor Planning	2	6	0	0	0	1	6	1	1	1	109	8%
6. Scope	0	1	0	1	13	2	0	1	0	0	107	8%
7. Inappropriate Technology base	7	0	0	0	0	0	3	4	1	3	99	7%
8. External Dependencies-foreign	3	1	2	1	3	0	2	0	4	2	98	7%
9. Under Funding and Bad Estimations	0	0	2	1	0	14	0	0	1	0	95	7%
10. Scheduling- artificial deadlines	4	0	0	0	0	0	1	13	0	0	83	6%
11. Poor Personnel training/skills	0	2	0	0	0	9	0	1	2	4	74	5%
12. Lack of effective Development process/ methodology	1	0	0	1	0	0	4	11	0	1	67	5%
TOTAL											**1373**	**100.00%**

Table 3-5: Relative importance scores of the factors of failures from survey responses

3.5. Framework for the Proposed IS failure Model

The proposed model clearly defined the factors related to ISP failures. The main *data set* on which the framework for the proposed IS failure Model was based was on data collected in a survey of factors that contribute to ISP failures and the literature review. These are grouped into twelve main

categories. Each category also has indicators (subcategories) for failure under it and this sum up to 34 indicators as shown in table below:

Factors of Failures and their Indicators	
1) Top management commitment to the project	**7) Inappropriate Technology base**
1a) Lack of top management commitment to the project	7a) Introduction of New Technology
1b) Inadequate supervision from top managers	7b) Inappropriate technology
1c) Lack of Consultants support that last right through the project	**8) External Dependencies-foreign**
2) Incomplete/Changing Requirements	8a) Importation of foreign packages
2a) Lack of Frozen Requirements	**9) Under Funding and Bad Estimations**
2b) New and/or Unfamiliar Subject Matter for Both Users and Developers	9a) Under Funding of Development projects
2c) Inadequate documentation of user requirements	9b) Bad Estimations
3) Poor Relationship Management	**10) Poor Scheduling**
3a) Poor Communication among team members	10a) Artificial deadlines
3b) Unrealistic user expectations	**11) Poor Personnel training/skills**
3c) Low level of Cooperation from Users	11a) Lack of Required Knowledge/Skills in the Project Personnel.
3d) Growing Sophistication of Users	11b) Lack of "People Skills" in Project Leadership
3e) Lack of necessary knowledge of the application among the users assigned	11c) Poor Team Relationships
3f) Inappropriate experience of the users	11d) Insufficient/Inappropriate Staffing
3g) User resistance during the project implementation	11e) Staffing Volatility
4) Improper Project Management	**12) Development process/ methodology**
4a) Improper change management	12a) Lack of Effective Development Process/Methodology
4b) Lack of effective project management skills	12b) Lack of quality standards
4c) Lack of Effective project management methodology	
4d) Improper definition of roles and responsibilities	
4e) Poor risk management	
5) Poor Planning	
5a) No Planning or Inadequate Planning	
6) Scope	
6a) Unclear/Misunderstood Scope/Objectives	
6b) Scope Creep	

Table 3-6: Categories and related indicators of factors for failure

3.6. Dimensions and Descriptions of the proposed model

The **Table 4-7** below shows the dimensions/categories of failure, their related indicators and a small description of each of the indicator is also illustrated. This broader categorization was done to incorporate the unique responses from the survey and, some of the factors that may not have been represented in the earlier studies.

Dimensions/Indicators	*Description*
1 **Top management commitment to the project**	

1.1	Lack of top management commitment to the project	This includes oversight by executives and lack of visibility of their commitment, lack of committing required resources and not changing policies as needed. A climate of change in the business and organizational environment also creates instability in the project. There can also be unstable corporate environment which includes competitive pressures that radically alter user requirements, and sometimes making the entire project obsolete.
1.2	Inadequate supervision from top managers	Laying blame for "lack of client responsibility" on the project leader rather than on the users.
1.3	Lack of Consultants support that last right through the project	Consultant adequate support creates a reliable environment for upper management and employees to become familiar with a new IS
2	**Incomplete/Changing Requirements**	
2.1	Lack of Frozen Requirements	Because the needs of the users change, the requirements change. Consequently the system will never be moved into production because none of the requirements are ever completed. Alternatively, freezing a subset of the functionality and delivering allows for the completion of the system and update releases as required.
2.2	New and/or Unfamiliar Subject Matter for Both Users and Developers	Lack of domain knowledge leads to poor requirements definition
2.3	Inadequate documentation of user requirements	Sometimes the ISP experiences misunderstanding of the requirements. This is due to not thoroughly defining the requirements of the new system before starting, consequently not understanding the true work effort, skill sets and technology required to complete the project. Lack of domain knowledge for Both Users and Developers may also lead to poor requirements definition. There can also be inadequate documentation of user requirements.
3	**Poor Relationship Management**	
3.1	Poor Communication among team members	Without an adequate level of communication skills, the communication and interaction between the users and IS personnel may be difficult. Communication skills of both the users and IS

		personnel can affect the level of knowledge exchange during development.
3.2	Unrealistic user expectations	Expectations determine the actual success or failure of a project. Expectations mismatched with deliverable - too high or too low – can cause problems. Expectations must be correctly identified and constantly reinforced in order to avoid failure
3.3	Lack of Cooperation from Users	Users refuse to provide requirements and/or refuse to do acceptance testing.
3.4	Growing Sophistication of Users	Users are more knowledgeable, have seen sophisticated applications, apply previous observations to existing project
3.5	Lack of necessary knowledge of the application among the users assigned	These may influence information systems development (ISD) project outcome by increasing the amount of work required or the level of difficulty involved.
3.6	Lack of appropriate experience of the user representatives	Users assigned who lack necessary knowledge of the application or the organization
3.7	User resistance during the project implementation	Certain individuals do not want to conform the change because of general phobia of computers or they are worried their jobs are Threatened
4	**Improper Project Management**	
4.1	Improper change Management	Each process needs a process to manage change so that scope and budget are controlled. Scope creep is a function of ineffective change management and of not clearly identifying what equals success.
4.2	Lack of Effective Project Management Skills	Project teams are formed and the project manager does not have the power or skills to succeed. Project administration must be properly addressed.
4.3	Lack of Effective Project Management Methodology	The team employs no change control, no project planning or other necessary skills or processes.
4.4	Improper Definition of Roles and Responsibilities	Members of the project team and the organization are unclear as to their roles and responsibilities.
4.5	Poor Risk Management	Countering the wrong risks.

5	**Poor planning**	
5.1	No Planning or Inadequate Planning	Attitude that planning is unimportant or impractical
6	**Scope**	
6.1	Unclear/Misunderstood Scope	It is impossible to pin down the real scope due to differences or fuzziness in the user community.
6.2	Scope Creep	Not thoroughly defining the scope of the new system before starting, consequently not understanding the true work effort, skill sets and technology required to complete the project.
7	**Inappropriate Technology base**	
7.1	Introduction of New Technology	Using new, or 'bleeding edge', technology that has not been used successful at other companies, or major technological shift occurs during the project.
7.2	Inappropriate technology	Trying to achieve a particular task/project without the appropriate tools.
8	**External Dependencies-foreign**	
8.1	Importation of foreign packages	craze for foreign packages with cheep price do not allow the growth of indigenous developers
9	**Under Funding and Bad Estimations**	
9.1	Under Funding of Development	Setting the budget for a development effort before the scope and requirements are defined or without regard to them (i.e., picking a number out of the air).
9.2	Bad Estimation	Lack of effective tools or structured techniques to properly estimate scope of work. Unrealistic cost estimates cause illogical or sub-optimal planning, strategy, and decisions.
10	**Poor Scheduling**	
10.1	Artificial deadlines	Presence of unrealistic deadlines or functionality expectations in given time period. - 'crash projects' in which test time or training time is reduced – using something other than work effort required to determine when the new system should move into production.
11	**Poor Personnel training/skills**	
11.1	Lack of Required Knowledge/Skills in the Project Personnel.	e.g., technology, business knowledge and experience

11.2 Lack of "People Skills" in Project Leadership	PM tries to "manage" schedules, technology, requirements, etc., ignoring that management is dealing with people on the team.
11.3 Poor Team Relationships	Strains existing in the team due to such things as burnout or conflicting egos and attitudes.
11.4 Insufficient/Inappropriate Staffing	Not enough people or people with wrong skills/insufficient skills assigned to project, regardless of availability
11.5 Staffing Volatility	At some point in the project, losing the key project manager, analysts or technicians (especially in new technology).
12 **Development process/ methodology**	
12.1 Lack of Effective Development Process/Methodology	Leading to quality problems - Documentation, Software and Testing—poor estimating -- insufficient time for up-front work, e.g., design—little flexibility for change—insufficient testing.
12.2 Lack of quality standards	no literature for development process or techniques

Table 3-7: Proposed IS failure model and descriptions

4. CHAPTER 5: DISCUSSIONS

In this chapter, discussion of objective results and the evaluation of the model designed in Chapter 4 are presented. This evaluation comprises of testing, results of the testing and a discussion of the results.

4.1. Discussions

4.1.1. Overview

This survey revealed that even though causes of failure are known, they are still repeated. There is need to develop a model of common factors of failure. The factors were then given relative importance scores based on the survey responses. From this a system that can help to test the viability of a software project was developed.

4.1.2. Objective one results

Objective one: To investigate various system development practices by different organizations.
The most common system development practices revealed were adequate planning, training of users and continuous support of the system. Most of the respondents do not have effective development methodology.

4.1.3. Objective two results

In the study, objective two was to find out the factors that lead to IS development project failures in Kenyan organizations
The categories of the factors of failure discovered in the study were:

- Top management commitment to the project
- Incomplete/Changing Requirements
- Poor Relationship Management
- Improper Project Management
- Poor Planning
- Scope
- Inappropriate Technology base
- External Dependencies-foreign
- Under Funding and Bad Estimations
- Poor Scheduling

- ❖ Poor Personnel training/skills
- ❖ Development process/ methodology

Several indicators that form the category of failure were also discovered.

The investigation of these indicators included the following:

- ❖ An extensive literature review identified some aspects of the software development process failures (Chapter 2).
- ❖ Questionnaires responses and interviews with software practitioners (programmers, database developers, system analysts, etc.) and Information System users identified aspects of the development process that practitioners considered inconsequential to project success.

4.1.4. Objective three results

The third objective: To devise a model of indicators of ISDP failures.

Both the literature review and questionnaire responses with practitioners provided support for the creation of a model that included some of the factors of failure in the software development process. Through the survey, the respondents were asked to consider a particular project that they had worked on, with emphasis on several aspects related to top management commitment to the project, Incomplete/Changing Requirements, Poor Relationship Management, Improper Project Management, Poor Planning, Scope, Inappropriate Technology base, External dependencies-foreign, Under Funding and Bad Estimations, Poor Scheduling, Poor Personnel training/skills and Development process/ methodology

The research model developed is an Information System Failure Model. The prototype system developed can be used by IS stakeholders in assessing the viability of their projects before undertaking them or during the process.

4.1.5. Objective four results

The last objective: to develop a prototype system that can be used to assess the viability of a software project.

Using appropriate tools and techniques, a Project Viability Assessment system was developed. The system can be used by IS practitioners and IS users to determine the success potential of a software development project. This system was used to evaluate the Information System Failure model. Some of the questionnaire respondents' data collected from the survey was used in the system for evaluation.

4.2. Evaluation of the Model

Evaluation of systems is usually done over years of practical use and in fact a complete evaluation of a system success requires multiple measures [Klein and Jiang 2001; Jiang, et al 2001], However, this is a complicated undertaking. . The projects with which use of such models are evaluated, are followed through many years to determine their satisfaction.

The proposed IS Failure Model and the prototype Software Project Assessment Viability system however, do not have the privilege of time. Tentative evaluation for the purpose of this report has to be done.

A prototype system was created to evaluate the model. Testing, therefore, involved using the data already collected in the survey in the designed system. This data was not used in the development of the model. It mainly consists of some of the responses from the survey. The prescribed outcome given in the survey (from respondents) was compared with the outcome of the system. Every match was a score for the model.

Out of the reported projects, 70% had a positive match with the output indicated on the questionnaire. That is the software project output indicated on the respondents' questionnaire matched the output prescribed by the prototype system.

CATEGORY	NUMBER & PERCENTAGE
Matching	70%
Not matching	30%
Total	**100%**

Table 4-1: Evaluation Results

Even though, these results may not be as impressive and may not be used widely as the widely referenced Standish Chaos study, they are reasonably remarkable.

The use of the computerized system to calculate the success potential gives a better visual view of how the software project may go.

4.3. Limitations of the study

The accuracy of the interviews and questionnaire results in this entire study, rely on honesty of the participants. It is worth noting that information pertaining to project failure and disillusionment is not openly discussed and eliciting candid responses is not easy. A prototype of the model was evaluated for accuracy and in comparison to the questionnaires' responses was found to be 70% accurate. Even though the **STANDISH CHAOS** study is most often used by researchers and thus

rated highly effective, the IS Prototype system developed from the IS Failure Model in this study does not rate badly as some of its functionalities are crude and can be improved immensely. For example, a more exciting group of questions on the factors and indicators of failure can be used. It is also quick and may need a session of less than half an hour. It can also be used by both technical experts and novice users thus do not need one to be highly trained

It was also a challenge in coming up with the relative importance scores and rules to be used on the system. The rules have discussions to the apparent calculated success potential. These rules were supposed to be as generic as possible as to apply in all situations related to Software development processes.

The other challenge most respondents of the questionnaire were from technical side, especially developers. It can affect the results and analysis of my survey.

The research took a general stance and hence there was no distinction concerning the nature of businesses the organizations are into or whether they were public or private sectors

5. CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

In this chapter, conclusion and recommendations were drawn on the basis of literature review and survey analysis. This chapter is divided into the following parts:

- Conclusion -On the basis of presented research study
- Recommendations for further research-Possible areas for future research

5.1. Conclusions

This research project managed to achieve the objectives set. The main purpose of this research was to find, categorize, illustrate and devise a model for factors and indicators of information system and project failure based on a literature review and survey of organizations in Kenya. From this, it was possible to clearly define factors of IS failure and their related indicators. The study led to the conclusion that some of the factors of IS failure in the Kenyan context can be categorized into the twelve dimensions. The proposed IS-Failure model binds all dimensions and their indicators together.

The model discussed in this project is expected to be used to:

- Provide a basis for ICT personnel to assess their software development processes
- Contribute to the body of knowledge on factors that affect software development process failures

5.2. Recommendations for Further research

This research study, has taken a general stance by making no distinctions concerning the nature of businesses the organizations are into or their being from public or private sectors. Furthermore most of the respondents were IT practitioners especially developers. On this basis, the major failure factors identified and their corresponding recommendations seem to be valid from IT practitioners stand and regardless the type of organizations. This consequently creates future research proposal for further investigation. Thus a study can be done considering these distinctions.

Also to follow up on this research, one would develop more detailed tools (surveys, job aids, and data) for every indicator listed in this model, for validity and reliability purposes.

5.3. REFERENCES

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6. APPENDIX

6.1. Appendix A –User Manual –System Description

The user manual was created to act as a guide to help users operate the system exclusively. The manual consists of description of the various modules of the system, screenshots and flow of operations in a simplified manner.

Logon Process

PVAS presents the user with a friendly logon screen as shown below. The user is invited to specify his/her name and password to access the system. If the user is accessing for the first time, the user is required to set his/her own unique password.

Figure 6-1 Login Screen

Menu

The menu is represented on the left side of the screen. It consists of three menu items. Each menu item is descriptive of the function it offers. Depending on the user rights some of this menu items may be inactive. E.g. Non administrators group may have some of the menu links inactive.

System users' link

Creation of users and their roles are performed from this link. Modification of rights and privileges are also carried out here. The administrator starts by creating users. A default password-p@ssw0rd- is also set automatically. The password must be changed by user at first logon.

The administrator also sets the role of the users here. The role determines the rights the user will have while using the system. The user rights can also be changed by the administrator here.

Figure 6-2 System users

System Parameters

This link is only used by the system administrators. The administrators can change the system questions and relative importance scores of the factors. To use this link proceed as follows:

- Select the option you would like to edit-edit questions or edit relative scores.
- Edit the question or the relative score appropriately.
- Click on set updated values button.
- A message is displayed showing update successful.
- One can only edit one of the options at a time.

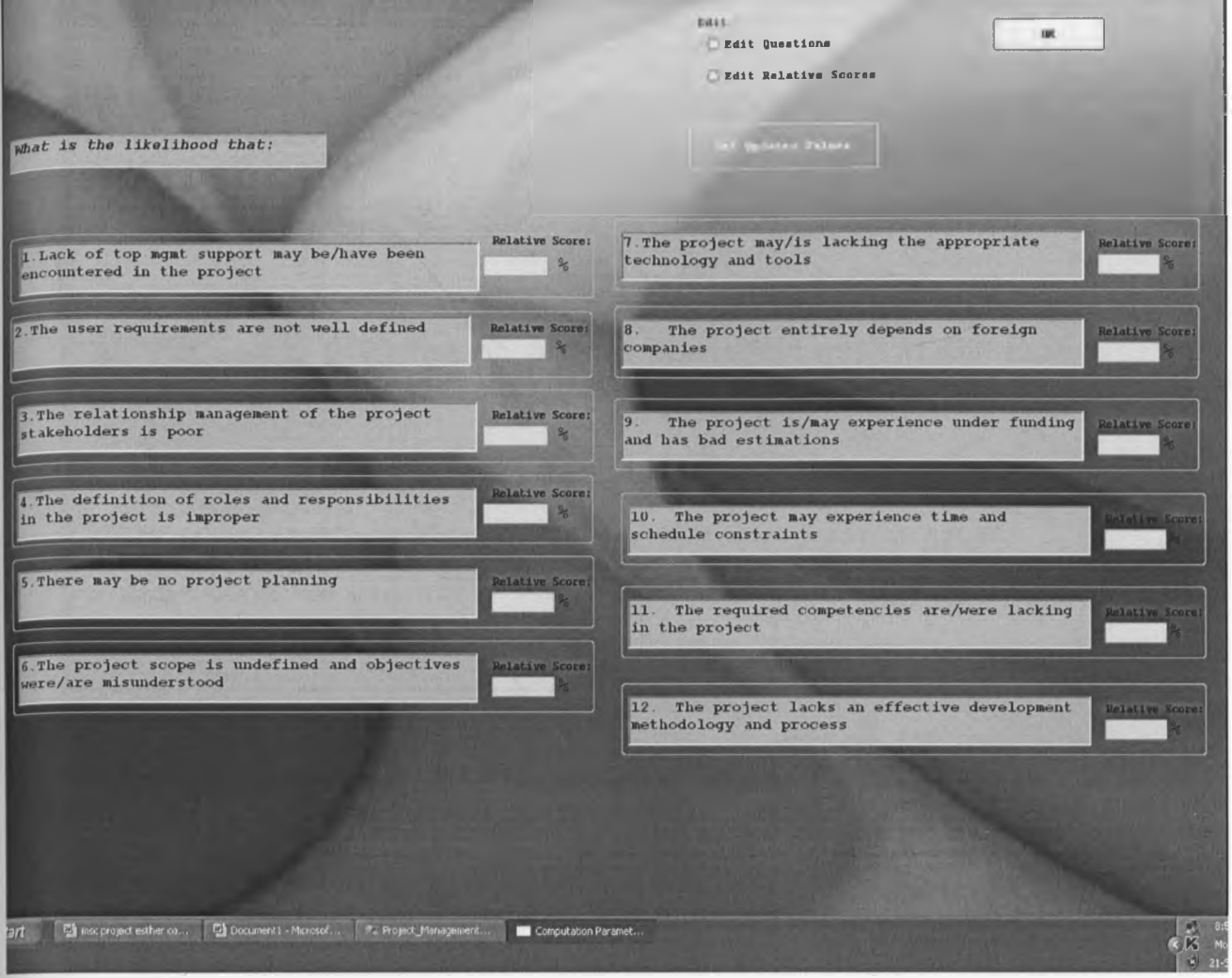

Figure 6-3 Parameters

Compute Project Viability

This button is used by all registered users who want to gauge the success potential of their projects. Once clicked, a set of questions is presented. The user is required to select the answers appropriately from the choices given. A *next button* is used by user to move to the next page for more questions. Once through, the user clicks on the finish button and a report of the success potential calculated is displayed.

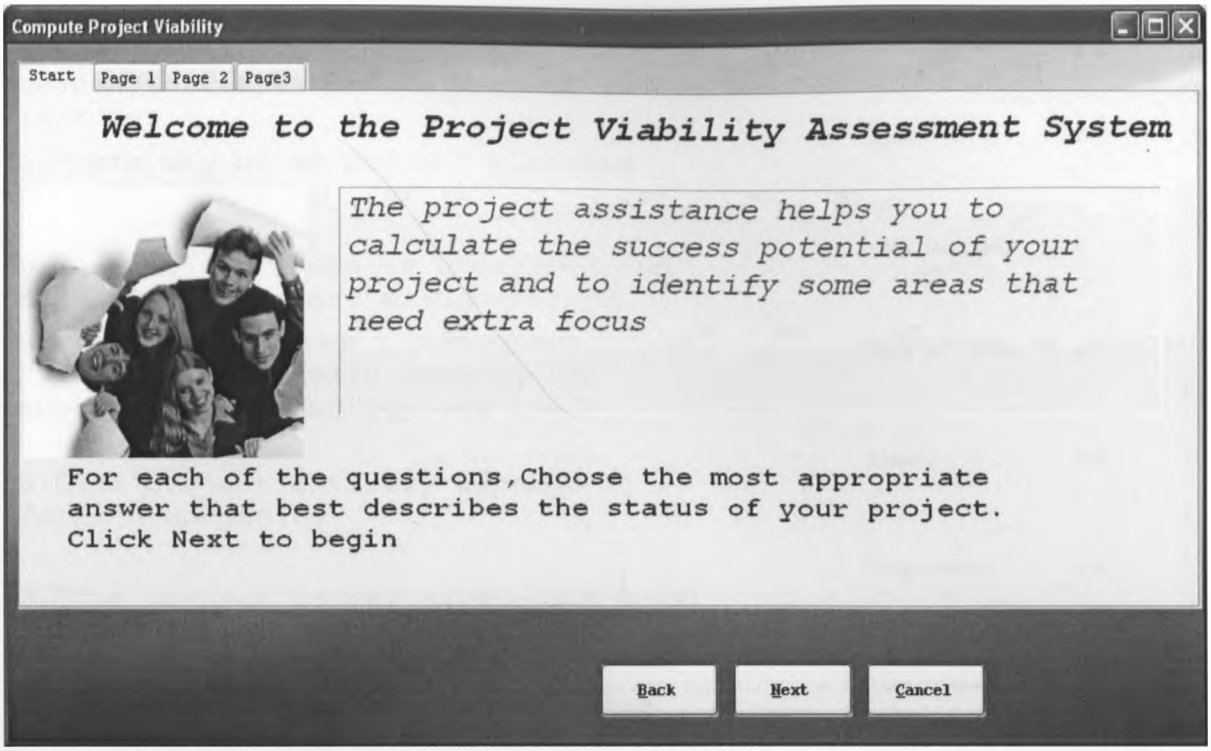

Figure 6-4 Computation welcome screen

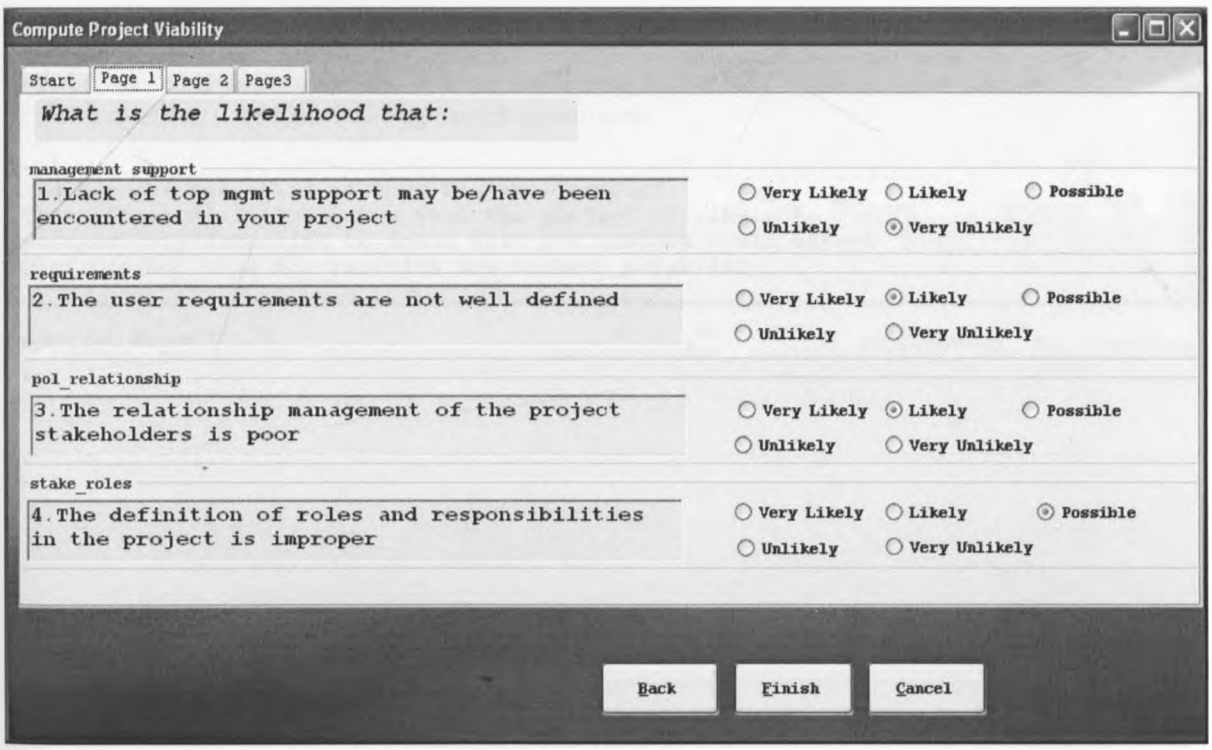

Figure 6-5: Computation

A report is then displayed indicating the success potential of your project (depending on your answers) and some necessary advice you may take.

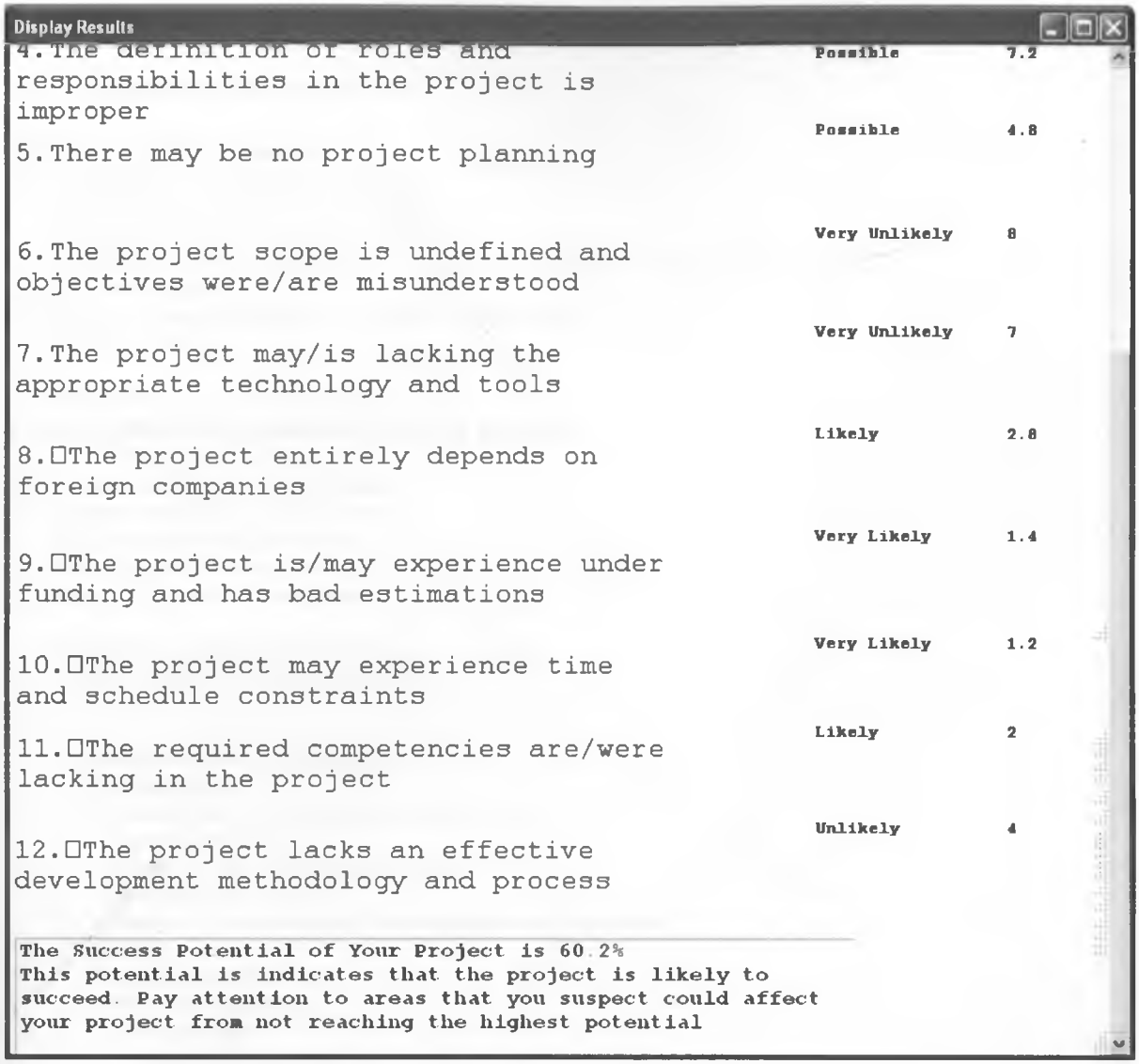

Figure 6-6: Report

6.2. Appendix B- Program Code

Code to connect to database

```
Public Function Connect_string() As String
    Dim conString As String = String.Empty
    conString = "Data Source=.\SQLEXPRESS;"
    conString &= "AttachDbFilename=" & Application.StartupPath &
"\Proj_Man.mdf;"
conString &= "Integrated Security=True;User Instance=True"
    Return conString

  End Function
```

Code to gather the parameters from the database

```
Dim pConnec As String = String.Empty
    Dim pCom As String = String.Empty
    Dim pReader As SqlDataReader
    Dim pcommand As SqlCommand
    Dim pTrans As New Data_Trans

    pConnec = pTrans.Connect_string()
    pCom = "SELECT * FROM paramet"

    Try
      pcommand = New SqlCommand()
      With pcommand
        .Connection = New SqlConnection(pConnec)
        .Connection.Open()
        .CommandType = CommandType.Text
        .CommandText = pCom
        pReader = .ExecuteReader(CommandBehavior.SingleRow)
      End With
      If pReader.HasRows Then
        While pReader.Read
          With pReader
            mgt = CDec(.Item(0))
            mreqs = CDec(.Item(1))
            mcomp = CDec(.Item(2))
            mself = CDec(.Item(3))
            mCon = CInt(.Item(4))
          End With
        End While
      End If
      pReader.Close()
    Catch ex0 As SqlException
      MsgBox("Error: " & ex0.Message & " Occured.", MsgBoxStyle.Critical, "SQL " & Me.Text)
    Catch ex As Exception
      MsgBox("Error: " & ex.Source & " Occured.", MsgBoxStyle.Critical, Me.Text)
    Finally
      pReader = Nothing
      pCom = Nothing
      GC.Collect()
    End Try
  End Sub
```

Code to perform the calculations

```
Public Function Factor(ByVal perc1 As Decimal, ByVal val1 As Integer, ByVal confactor As Integer) As Decimal
    Dim percentile As Decimal = perc1
    Dim answer As Integer = val1
    Dim fact As Integer = confactor
```

```
    Dim Sn As Decimal
    Sn = (perc1 * val1 / confactor)
    Return Sn
  End Function

Private Sub gp_method_Validating(ByVal sender As Object, ByVal e As System.ComponentModel.CancelEventArgs)
Handles gp_method.Validating

If Me.meth1.Checked = True Then
      x12 = 1
      m12 = Me.meth1.Text
    ElseIf Me.meth2.Checked = True Then
      x12 = 2
      m12 = Me.meth2.Text
    ElseIf Me.meth3.Checked = True Then
      x12 = 3
      m12 = Me.meth3.Text
    ElseIf Me.meth4.Checked = True Then
      x12 = 4
      m12 = Me.meth4.Text
    Else
      x12 = 5
      m12 = Me.meth5.Text
    End If
    S12 = Factor(mmeth, x12, mCon)

  End Sub
```

6.3. Appendix C: Questionnaire analysis

Question/Percentage Response	A in %ages	B in %ages
1) Lack of top management commitment to the project		
1a) Lack of top management commitment to the project?	100	0
1b) Inadequate supervision from top managers	66	34
1c) Lack of Consultants support that last right through the project?	77	23
2) Incomplete/Changing Requirements		
2a) Lack of Frozen Requirements	90	10
2b) New and/or Unfamiliar Subject Matter for Both Users and Developers	87	13
2c) Inadequate documentation of user requirements	62	38
3) Poor Relationship Management		
3a) Poor Communication among team members	65	35
3b) Unrealistic user expectations	80	20
3c) Low level of Cooperation from Users	84	16
3d) Growing Sophistication of Users	77	23
3e) Lack of necessary knowledge of the application among the users assigned	70	30
3f) Inappropriate experience of the users	76	24
3g) User resistance during the project implementation	88	12
4) Improper Project Management		
4a) Improper change management	56	44
4b) Lack of effective project management skills	60	40
4c) Lack of Effective project management methodology	67	33
4d) Improper definition of roles and responsibilities	88	12
4e) Poor risk management	84	16
5) Poor Planning		
5a) No Planning or Inadequate Planning	70	30
6) Scope		
6a) Unclear/Misunderstood Scope/Objectives	66	34
6b) Scope Creep	70	30
7) Inappropriate Technology base		
7a) Introduction of New Technology	70	30
7b) Inappropriate technology	65	35
8) External Dependencies-foreign		
8a) Importation of foreign packages	68	32
9) Under Funding and Bad Estimations		
9a) Under Funding of Development projects	66	34
9b) Bad Estimations	64	36
10) Poor Scheduling		
10a) Artificial deadlines	63	37
11) Poor Personnel training/skills		
11a) Lack of Required Knowledge/Skills in the Project Personnel.	70	30
11b) Lack of "People Skills" in Project Leadership	67	33

11c)	Poor Team Relationships	59	41
11d)	Insufficient/Inappropriate Staffing	62	38
11e)	Staffing Volatility	44	56
12) Development process/ methodology			
12a)	Lack of Effective Development Process/Methodology	70	30
12b)	Lack of quality standards	50	50

6.4. Appendix D-Sample Questionnaires

QUESTIONAIRE

Introduction

This questionnaire is prepared and sent to you to enable us gather information relating to ICT development projects in Kenyan organizations. The objective of this study is to gain in-depth understanding of factors affecting success of Information system development projects and out of this, come up with recommendations which could be shared among various users later on. In order for me to achieve this objective, I would be most grateful if you could take a while and respond to this questionnaire. I wish to assure you that the information gathered will be considered strictly confidential and will therefore not be used for any other purpose other than seeking to fulfill academic requirements for award of a degree.

Please feel free to contact me on my email address: e_mukoya@yahoo.com or my phones Tel: 2769000 Cell: 0733918908 or 0721361650 should any of the questions not be clear to you.

1) Which sector is your organization primarily in?

Learning Institution	
Regulatory body	
Transport	
Health	
Agriculture	
Hospitality	
Telecommunication	
Advocacy	
Finance	
Manufacturing and services	

2) How long have you been involved in ICT project development?

Less than one year	1 – 5 years	6 - 10 years	11 - 15 years	Over 15 years

3) On average, how many projects have you undertaken?

None	1 – 5	6- 10	11 - 15	Over 16

4) List some software projects you have undertaken. (Use additional paper if necessary)

No.	Year planned	Organization/ ministry	project name	Scheduled time	Actual time taken	Budgeted cost	Actual cost	Outcome (Did the project succeed or fail? Explain)
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

5) With respect to the failed IS projects, rate the factors below 1 (most frequent) to ten (least frequent) as to why the Organization's IS failure ma occur.

Factor	1	2	3	4	5	6	7	8	9	10
Lack of top management commitment to the project										
Incomplete/Changing Requirements										
Poor Relationship Management										
Improper Project Management										
Poor Planning										
Scope										
Inappropriate Technology base										
External Dependencies-foreign										
Under Funding and Bad Estimations										
Scheduling- artificial deadlines										
Poor Personnel training/skills										
Lack of effective Development process/ methodology										

6) For the IS projects that fail, at what stage do they fail?

Development stage	Yes	No
During problem scoping and inception		
During requirements analysis		
During design		
During coding		
During testing		
During implementation and maintenance		

7) Which of the following system development practices do you carry out during an information system development project?

Practice	Yes	No
Effective development process/methodology		
Risk management e.g. staff turnover		
Adequate planning		
Definition of roles and responsibilities		
use of appropriate technology		
Training of users		
Continuous support when system is in use		

Section two: Causes of Software Project Failures

1) **Top Management Support:**

1a) Lack of top management commitment to the project?

Very likely	Likely	Possible	Unlikely	Very Unlikely

1b) Inadequate supervision from top managers

Very likely	Likely	Possible	Unlikely	Very Unlikely

1c) Lack of Consultants support that last right through the project?

Very likely	Likely	Possible	Unlikely	Very Unlikely

2) **Relationship management**

2a) Unrealistic user expectations

Very likely	Likely	Possible	Unlikely	Very Unlikely

2b) Low level of Cooperation from Users

Very likely	Likely	Possible	Unlikely	Very Unlikely

2c) Growing Sophistication of Users

Very likely	Likely	Possible	Unlikely	Very Unlikely

2d) Lack of necessary knowledge of the application among the users assigned

Very likely	Likely	Possible	Unlikely	Very Unlikely

2e) Inappropriate experience of the users

Very likely	Likely	Possible	Unlikely	Very Unlikely

2f) User resistance during the project implementation

Very likely	Likely	Possible	Unlikely	Very Unlikely

3) Project Planning and Management

3a) The project manager does not have enough skills and expertise in managing the project

Very likely	Likely	Possible	Unlikely	Very Unlikely

3b) Poor project planning

Very likely	Likely	Possible	Unlikely	Very Unlikely

3c) The Project planning process does not include operational resources

Very likely	Likely	Possible	Unlikely	Very Unlikely

4) Requirements and Scope

4a) No user requirements.

Very likely	Likely	Possible	Unlikely	Very Unlikely

4b) 'Unfrozen' user requirements

Very likely	Likely	Possible	Unlikely	Very Unlikely

4c) The scope of the project is not well-defined and understood

Very likely	Likely	Possible	Unlikely	Very Unlikely

5) Funding and Scheduling Estimations

5a) Inadequate funding to support all the phases of the project

Very likely	Likely	Possible	Unlikely	Very Unlikely

5b) No effective tools or structured techniques to properly estimate scope of work.

Very likely	Likely	Possible	Unlikely	Very Unlikely

6) **Development Process**

6a) Lack of a prescribed software development procedure

Very likely	Likely	Possible	Unlikely	Very Unlikely

6b) No follow up to ensure that the system has been accepted and well understood by the end-users

Very likely	Likely	Possible	Unlikely	Very Unlikely

7) **Personnel**

7a) The staff in the team have no skills required to perform their roles

Very likely	Likely	Possible	Unlikely	Very Unlikely

7b) In the projects undertaken, does everyone work together

Very likely	Likely	Possible	Unlikely	Very Unlikely

7c) Losing the key project manager, analysts or technicians at any stage in the project.

Very likely	Likely	Possible	Unlikely	Very Unlikely

8) **Technology**

8a) The technology being used in the project is not familiar to all the stakeholders

Very likely	Likely	Possible	Unlikely	Very Unlikely

8b) The tools/technology inappropriate for the project being undertaken

Very likely	Likely	Possible	Unlikely	Very Unlikely

Project questionnaire for users

a) **Details**

Job title

Reports to

Experience

Department | | Work section | |

Q1: Level of Participation in Application development. Please select one- the most common

Involved in generating requirements	
Involved in designing application	
Involved in developing application	
Involved in deployment, training and support	

Q2: How would you define software project failure? Please select one

According to specification but was not on time	
According to specification but lack some quality aspects	
According to specification but was over budgeted	
Not according to specification but fulfills time, quality and budget requirements	

Q3: Opinions about application systems. Please select one.

Enough control over the look & feel of interface	
Too much time taken away from regular work	
System has become a burden	
Confidence in data has increased	
Able to reduce manpower	
Took a long time to stabilize	
Has been good for the total organization	

Q4: Problems encountered in the recent application systems

Not enough support	
Insufficient testing	
Cannot do job	
Inadequate user skills	
Not up to expectation	
Insufficient training	
Slow performance	
Insufficient budget	

Q5: Probable cause of these problems

Specifications not clear	
Expectations not stated	
Requirements changed	
Insufficient study analysis	
Users not sufficiently involved	
Insufficient assessment of cost	
Revision of budget allocation	