A SURVEY ON THE CRITICAL SUCCESS FACTORS IN POWER SECTOR PROJECTS IN KENYA

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DECLARATION

This management research project is my original work and has not been presented for the award of any degree in this or any other university

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This management project has been submitted for the examination with my approval as the university supervisor.

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DEDICATION

This Research Project is dedicated to my parents who sacrificed their comfort and resources to make sure I attended school and be what I am today. Special dedication to my wife Florence, my sons Carlton and Kyle for encouraging me all the way, sometimes at the expense of their quality time.

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A special word of blessing goes to my dear wife Florence for her understanding and encouragement when the going got tough. It is always helpful to have someone who has travelled the same road.

It gives me great feeling to have gone through the whole MBA Course and I thank God for it.

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ABSTRACT

The critical success factors are those fundamental issues inherent in the project, which must be maintained in order for team working to take place in an efficient and effective manner. They require day to day attention and operate through the life of the project." It is interesting to find out whether project managers in the power sector are aware of the critical success factors and how the factors under their control impact on the outcomes. The objectives of this study were to establish critical success factors in power sector projects in Kenya and also to establish the contribution of critical success factors to project success.

The study used descriptive survey research design. The population of study involved the organization top managers, project managers, project engineers, consultants, procurement and accountants who are involved in construction projects in the power sector. A census of 60 respondents involved in projects from the companies was carried out. The primary data was collected by use of self administered survey questionnaire. Data analysis was done by use of descriptive statistics such as frequencies, percentages, mean scores and standard deviation.

From the findings, the study found that all the factors in the critical success factors grouped into five categories i.e. project success factors, project manager success factors, team members success factors, organizational success factors and environmental success factors are very critical to the projects success in the power sector. These factors also contribute to success of projects in the power sector.

CHAPTER ONE: INTRODUCTION

1.1 Background

The dynamic nature of the environment and increasing competitiveness is forcing many profit and nonprofit organizations to rethink on how to remain competitive. Developing countries are also looking into ways to realize a higher and sustainable growth of the economy in a more equitable environment. In order to create business value, more organizations/public sector are turning to project management to help them move beyond positions of competitive disadvantage or parity. Chase et al (2003) defines project as "a series of related jobs usually directed towards some major output and requiring a significant period of time.

Project success is a topic frequently discussed and yet rarely agreed upon. The views of project success have changed over the years from the definitions that were limited to the implementation phase to definitions that reflect an appreciation of success over the project and product life cycle. The traditional project success has viewed narrowly as the achievement of intended outcomes in terms of specification (quality), time and budget i.e. the 'Iron triangle', Atkinson (1999). Dvir et al (2006) say this tends to give the project manager an "operational mindset". The definitions of project management success have since become more inclusive and emphasize the importance of working with stakeholders to define needs, expectations, and project tasks. Turner (2004) suggests that project managers should be measured on a wider set of objectives and not just the achievement of time, cost and functionality goals.

Baccarini (1999) brings out the idea of two concepts of project success. Project management success focuses upon project process and in particular the successful accomplishment of cost, time and quality objectives. It also considers the manner in which the management process was conducted. Project success deals with the effects of the final product. There is need for the power sector project stakeholders to understand what constitutes project success in view of the many capital intensive projects they implement.

Rowlinson (1999) states “the critical success factors are those fundamental issues inherent in the project, which must be maintained in order for team working to take place in an efficient and effective manner. They require day to day attention and operate through the life of the project.” It is interesting to find out whether project managers in the power sector are aware of the critical success factors and how the factors under their control impact on the outcomes.

Development projects recommended under vision 2030 and overall economic growth will increase the demand on Kenya electricity supply. Kenya must therefore generate, transmit and distribute enough energy and improve efficiency. The power sector will therefore have to plan and implement various projects as scheduled in the Updated Least Cost Power Development Plan (ULCPDP) 2008/2028 (GOK 2007). The challenges facing the implementation of projects in this sector include: the long lead times, high costs in the development of energy infrastructure and inadequate specialized skills and tools required for planning and forecasting energy needs. There is need for a radical rethink of the process of project planning and implementation to increase the chances of successful project implementation. This study is focused on establishing the critical success factors, their impact in the power sector construction projects and also determines the project management techniques used in the projects.

The power sector in Kenya is currently unbundled into Generation, Transmission and Distribution. Generation comprises of Kenya Generating Company (Kengen) and Independent Power Producers (IPPs) which are involved in electrical energy production. Transmission and distribution is done by Kenya Power and Lighting Company (KPLC) and involves transportation of the electrical energy from the generating stations to the load centers and retailing it to the customers. There are future plans of unbundling transmission and distribution to enhance competition at the distribution level. The installed generation capacity in the country is approximately 1300 MW with effective capacity of 1259 MW. The IPP’s contribute 295 MW to the national grid. The bulk of the installed capacity is hydro based (60%) while the rest is thermal and geothermal (KPLC

2008). The transmission network comprises of 1323 km of 220 KV lines, 2085 km of 132 KV lines and 632 km of 66 KM lines. The distribution network comprises of 12,633 km of 33 KV lines 23,573 km of 11 KV lines (KPLC 2008).

The current national access to electricity in Kenya is estimated at 15% with rural penetration of 4 % (GOK 2008). Demand for Electricity in Kenya is projected to grow from 6,203 GWh (FY 2006/07) to 30,999 GWh (FY 2029/30) representing an annual growth rate of 6.5 %.This translates to peak demand of 5,282 MW (FY2029/30) from 1,082MW (FY2006/07) (GOK 2007). There is urgent need to invest in new projects in generation, transmission and distribution.

The Ministry of Energy (MoE) and Kenya Power and Lighting Company have come up with Updated Least Cost Power Development Plan (ULCPDP) 2008/2028. The plan shows the incoming generation projects and retirement of old ones to give a capacity of 4,871 MW by year 2028 at estimated cost of 5.1 billion US dollars (GOK 2007). Similarly the transmission plan intends to construct approximately 5000km of transmission lines and other substation project at estimated cost of 538.6 million US dollars (GOK 2007).

Bonyo, (Daily Nation, May 9, 2009) reports that World Bank will give a soft loan of Kenya shilling 6.2 billion to improve household connectivity to the national grid. The same paper highlights loan of 5.8 billion shillings to construct a 400kv transmission line from Mombasa to Nairobi, Obiero (Nation Daily, May 11, 2009). Odhiambo, (Business Daily,3rd June,2009) says in order to stem the looming energy crisis Kengen, Lake Turkana Wind Power (LTWP) and KPLC will borrow Ksh 140 billion to implement power generating projects in the next three years . This will include 300 MW coal fired power station in Coast, 300 MW wind farm in Turkana district and 80 MW diesel power stations in Athi River. The Managing Director of Kengen, Mr. Eddie Njoroge, says that the country require 35 billion each over the next 10 years for Kengen to meet the electricity needs as envisioned in the Vision 2030 (Business Daily,3rd June,2009).

It is imperative for the power sector stakeholders to ensure that the success rate of these power projects is increased given the high cost and long implementation time for power projects. It is important to increase efficiency and effectiveness of the energy development process at all levels including planning, contracting and construction. This should be done while enhancing the local content (materials and services) and also human resources.

1.2 Statement of the Problem

Power sector has continuously updated its least cost development plan and yet the country still experiences power shortages, high cost of power and project delays. Kagiri (2005) carried a case study on time and cost overrun of four power sector project in Kengen namely Kipevu 1 diesel plant, Olkaria II geothermal plant, Gitaru unit 1 and Sondu Miriu phase 1 hydro plant. All the projects had cost overruns ranging from 13% to 29 % and time overruns ranging from 12.5% to 53.4 %. In the case of Sondu Miriu phase 2 project was five year behind the scheduled time!

Turkwel power station was estimated to cost French Francs 1 billion but the signed contract was French Francs 1.8 billion (Auriol et al, 2007). In 2000 economy growth shrank from 2.0% the previous year to 0.6%, (Sambu, Business daily, August 2009). This was attributed to power rationing. In the same article, it indicates that Kenya Power and Lighting Company has started load management programme due to inadequate generation. The full economic impact is yet to be quantified. There is need to improve the success of project in the power sector.

There has been a scarcity of empirical studies on critical success factors in African construction projects in the public sector. Musa (1999), Karimi (1998) Talukha (1998), studies were mainly on variables of time and cost overruns in the various ministries/ parastatals. The general findings from the studies were government bureaucracies, poor / inadequate resource planning, improper project preparation, tendering methods, variations, works definition, timeliness. Isensi (2006) on the hand delved into the factors that lead to failure of building construction projects in Kenya. He identified poor design,

poor construction methods, inadequate contractor especially underestimation of project duration and poor project cost estimation.

Karani (2007) carried a study focusing on factors impacting delivery reliability of road projects. He identified the critical factors as contractors and clients cash flow problems, delayed payment to contractors, under estimation of project duration, unqualified staff of the contractor's project team, inadequate supervision of work and increase in scope of works. He concluded that these inputs and transformational process factors are attributable to the core stakeholders in any project.

In the developing world, Pheng et al (2005) looked at the working environment as playing a key role in ensuring the success of projects and examines how it affects the performance of the project managers. Nguyen et al (2004) carried a study on project success factors in large construction projects in Vietnam. He identifies the critical success factors as: competent project manager, adequate funding until project completion, multidisciplinary /competent project team, commitment and communication. Iyer et al (2006) did a study on critical factors affecting schedule performance in Indian construction projects. He found out that three factors: commitment of the project participants; owner's competency; conflict among participants posses capability to enhance project performance while others: project manager's ignorance and lack of knowledge; hostile socioeconomic environment and indecisiveness of project participants tend to retain the schedule performance at its existing level.

Pillai (2001) did a study on time and cost overrun of 16 projects in Kerala state in India. Three of the projects namely Idukki stage I and II (390MW) and Idamalayar (75MW) power plant had cost overrun ranging from 115% to 285% while time overruns ranged from 2 years to nine (9) years!

In the developed world project success has been frequently studied. In the old literature success is limited to the variables of time, cost and quality (the "iron triangle"). Project management then provides a tactical (operational) value rather than strategic value. This definition encourages project management to optimize efficiency. Belout (1998), states

that efficiency looks at optimizing output for a given level of input, and effectiveness means achieving the goals or objectives: both are goal oriented practices related to achieving success. Are we are doing things right or the right things?

In recent studies the developed world has done more studies on larger and more complex nuclear power projects. Taylor (2008) research found out that on study of nuclear power projects the mean project duration time was 239% of the planned time and measured mean cost was 338% of the original estimate.

From the above discussion, previous studies in Kenya have focused on the reasons of project failure in various sectors rather than project success. The studies have also concentrated on time and cost overruns. The studies have assumed that if a project completion time exceeds its due date, or expenses overran the budget then the project is a failure. They have concentrated on project management success. In this study a project success took the holistic view of both project management success and product success. The research arose from the desire for a deeper understanding of project success, especially the critical success factors in Kenya power sector and how project managers can use them to increase the project success rate. It was also important to find out whether the critical success factors found in similar studies done in the developed countries apply to Kenya power sector projects.

1.3 Objectives of the Study

The objectives of this study were:

(a) To establish critical success factors in power sector projects in Kenya.
(b) To establish the contribution of critical success factors to project success.

1.4 Importance of the Study

The results of this study would significantly contribute in:

Project Managers gaining knowledge on critical success factors, project management techniques, how they affect the project success and hence use them to increase the chances of project success.

Create awareness within the Power Sector stakeholders i.e. Kengen, KPLC, IPP's and MOEs who are the primary stakeholders on the impact of the critical success factors on project success and their role in improving the project managers overall performance. It is hoped that this will lead to increase of successful projects resulting to lower electricity cost and improved quality of supply to customers.

Other scholars and researchers can use the results of this study as a source of reference and basis for further research on critical success factors in this or other sectors.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The construction industry is considered to be one of the most important industries in the economy. The intrinsic complexity and uncertainty posses great challenges to project Managers. Chan et al (2004), states that the construction environment has become more dynamic due to increasing uncertainties in technology, budget and development processes. A diversified understanding of success is therefore necessary for project Managers, top management and other stakeholders.

According to Jugdev et al (2005), the evolving understanding of project success can be grouped into four periods. Period one (1960s-1980s) project success was concerned with project implementation and handover part of the project life cycle and hence use of simple metrics such as cost, time and specifications were adequate. During the 1980s and 1990s planning became more critical to project success and with it the emergence of list of Critical Success Factors (CSF's) as measure of project success. It took into account the organization and stakeholders perspectives. More recently, CSF's frameworks were developed on the basis that success is stakeholder-dependent and involves project supplier and recipient. The increasing turbulent business environment has necessitated project success to include benefits to the organization and preparations for the future (innovations) to remain competitive .Project success currently is viewed from the conceptual stages of the project life cycle to close down of the project's product cycle. It is referred to as the strategic project management period.

2.2 Project Success Criteria

Defining the concept of project success is elusive and a difficult task. Liu et al (1998) remarked "Project success is a topic that is frequently discussed and yet rarely agreed upon. The concept of project success is ambiguously defined. It is a concept which can mean so much to so many people because of varying perceptions and that leads to disagreements about whether a project is successful or not." Freeman et al (1992) provides an interesting example of different points of view of people: "An architect may consider success in terms of aesthetic appearance, an engineer in terms of technical competence, an accountant in terms of dollars spent under budget, a human resource officer in terms of employee satisfaction and chief executive officers rate their success in the stock market." The project managers are

constantly trying to define and manage project success in both subjective and objective ways. A basic understanding of the concepts and issues relating to success is therefore essential for project managers.

Traditionally project success has been viewed as achievement of intended outcomes in terms of specification (quality), time and budget otherwise known as the ' iron triangle", Atkinson (1999).These measures are internal to the project and do not indicate preference to the end user. This view encouraged project managers to see their job as successfully completed when they finish the project on time, within budget and to specification. Dvir et al (2006) asserts that this tends to give the project manager an "operational mindset". The project manager concentrates on "getting the job done". Atkinson (1999) concludes that any of these measures even when taken together are incomplete and misleading. They may count as successful projects that met time, specification and budget constraints but did not meet the customer's needs. Jugdev et al (2006) states that if project success is limited to the variables of time, cost and scope and links to the product/service value are missing the project management is perceived to offer tactical (operational) value and not strategic value.

Munns et al (1996) sees the concept of project success as involving a combination of progress during the implementation phase, perceived values and client satisfaction. Implementation success deals with the effectiveness of project management. The concept of project management success is the traditional view with focus on successful accomplishment of cost, time, and quality objectives and the quality of the project management process or work. He argues that these matters are regarded as the responsibilities of the project manager and a successful outcome in these would be considered a project management success. Anton (1988) remarked that a project is considered an overall success if it meets the technical specification and/or mission to be performed, and if there is a high level of satisfaction concerning the project among key people in the parent organization, key people in the project team and key users or clients of the project effort.

Jugdev et al (2005) adds that project management should be applied on projects to optimize efficiency and effectiveness. However, the emphasis in the literature has been on project management's value to optimize efficiency, and this entrenches it as an operational concept. Efficiency looks at maximizing output for a given level of input, and effectiveness means

achieving the goals or objectives; both are goal oriented practices related to achieving success, Belout (1998)

Shenhar et al (1997) highlights that conceptually, the determination of project management success disregards product success. It means that a project has been managed efficiently but eventually did not meet customer or organizational expectation. They propose a multidimensional universal framework to assess project success. They group project success into four distinct groups: project efficiency, impact on customer, direct and business success and preparing for the future. The four dimensions are also time dependent.

Baccarini (1999) brings out the idea of two concepts of project success i.e. two distinct components of success. Project management success focuses upon project and in particular the successful accomplishment of cost, time and quality objectives. It also considers the manner in which the management process was conducted. Project success deals with the effects of the final product. He argues that it is common for project management literature to confusingly intertwine these two separate components of project success and present them as a single homogeneous group. He uses logical framework model - which is a hierarchy of project objectives including goal, purpose, outputs, and inputs. He further argues that project management team is responsible for producing an output, but the determination of the project purpose is beyond its responsibility. An analogy to this is the common phrase used by doctors that "the operation was a success, but the patient died."

Cookes- Davies (2002) takes the same line and distinguishes between project success -which can be measured against overall objectives of the project while project management success is measured against the widespread and traditional measures of performance against cost, time and quality.

Determining whether project is a success or failure is intricate and ambiguous. Bellassi et al (1996) attributes this to lack of clarity on how to measure project success since project stakeholders perceive project success or failure differently. The lists of success or failure factors vary in numerous previous studies. Turner (2004) suggests that project managers should be measured on a wider set of objectives and not just the achievement of time, cost and functionality goals.

Despite raging debate on project success, the research will regard the overall project success as the broader concept, which deals with the wider and longer term impact of the project i.e. both project management success and the product success. The reason is that the research aims to disseminate general success factors to project managers in Kenya and other similar developing countries where the body of knowledge project management is not high.

2.3 Critical Success Factors (CSF)

In business context, a success factor is defined as any knowledge, skill, trait, motive, attitude, value or other personal characteristic that is essential to perform the job or role and that differentiates solid from superior performance, PEPDS (2004). Pheng et al (2006) states that, the identification of project success factors can be used to analyze the reasons for project success and failure.

The concept of "critical success factors" (CSF was developed by Rokart and the Sloan School of management with the phrase first used in the context of information systems and project management, Rokart (1982).He further states that Critical Success Factors(CSFs) are those features which have been identified as necessary to be achieved in order to create excellent results: if the critical factors are not present or taken into consideration, one can largely expect that problems will be experienced which act as barriers to the overall successful outcomes. Rowlinson (1999) defines Critical Success Factors as those fundamental issues inherent in the project, which must be maintained in order for a team working to take place in an efficient and effective manner. They require day to day attention and operate throughout the life of the project. Kerzner (1987) looks at CSFs as the elements required to create an environment where projects are managed consistently with excellence. Cookes-Davies (2002) takes a very proactive definition of CSFs calling them "those inputs to the management system that lead directly to success of the project." Given the unique nature of each individual project, it is expected that focusing management's attention to Critical Success Factors will benefit project success.

Might et al (1985) investigated the structural factors assumed to affect project success. They found weak relationship between organizational structure and project success and no relationship between project size and success. Delegation of authority on the other hand was found to be positively related to all internal measures of success. Kerzner (1987) lists CSFs as

corporate understanding of project management by everyone involved, executive commitment to project management, organizational adaptability, project manager selection criteria, project management leadership style, and a commitment to planning and control.

The famous Project Implementation Profile (PIP) was a set of factors developed by Pinto et al (1987).They came up with 10 CSFs to assist in identifying and measuring successful projects. These are project mission (clarity of goals and general direction), top management support (ability and willingness to provide resources, authority and influence), project schedule (a detailed specification and schedules for project implementation), client consultation (adequate communication, consultation and active listening to and with the client), personnel (recruitment, selection and training),technical tasks (availability of required technology and expertise), client acceptance (final project was sold to end users), monitoring and feedback (provision of comprehensive information at each implementation stage), communication and trouble shooting (ability to handle crisis and deviation from plan).In a later study Pinto et al (1990) showed that the relative importance of the several CSFs changes significantly based on the life cycle stages. Pinto et al (1995) highlighted, that CSFs identification will help the project teams minimize firefighting, intuitive and adhoc approach in managing uncertainties and changes encountered during project implementation.

Cookes- Davies (2002) notes that decades of individual and collective efforts by project management researchers since 1960's have not led to definitive set of factors leading to project success. He argued in order to identify the CSFs one must answer three questions. What factors lead to project management success? What factors lead to successful project? And what factors lead to consistently successful projects? He came up with a list of 12 factors. Later in a paper he presented at PMI congress proceedings (2004), he grouped them in to three levels. The project manager and team looked at time, cost, quality, technical, performance, scope and safety criteria and possible CSFs were clear and doable goals, well selected, capable and effective project team, adequate resourcing, clarity about technical performance, effective planning and good risk. The client looked at benefits realized (stakeholders satisfaction) and the possible CSFs were clear and doable goals, stakeholders commitment and attitude, effective benefits management and realization processes and appropriate project strategy. The Top management, shareholders and portfolio managers on the other hand looked for overall project success of all project taken, overall level of project management and effectiveness in implementing business strategy and hence possible CSF

were continuous improvement of business, project and efficient and effective portfolio and resource management processes.

Belassi et al (1996) presented a holistic framework that included within the firm and industry factors. Unlike earlier authors he classified them and hence enabling readers to see clearly see what categories certain CSFs belong to, and also allow for an examination of the CSFs interrelationships. The four categories are factors related to the project, factors related to the project manager and team, factors related to the organization, and factor related to the environment. The study shows that CSFs vary with industry and that top management is vital. The groups help the project manager understand the intra-relationships between the factors in different groups. They support their arguments for grouping by giving an example of resources which is considered as a CSF in other literature while they suggest that it is a systems response to organizational, environmental and project managers related factors such as top management support, project manager's negotiation skills and general economic situation. It is different from the other works as it integrates project dimensions with the organizational and environmental factors.

Andersen (2006) uses slightly different framework using CSFs based on a stepwise structure, reflecting progression through the project. It takes into account both the hard (technically focused) and soft (behavioral issues). These are scope (project mission and goals, terms of reference) planning (planning global level, planning detail level), organization (formal organization, informal organization), Execution (activities, decisions) and Control (financial and technical control, internal and external communications).He identifies nine CSFs : rich project communications, stakeholders endorsements of project plans, well structured and formal project approach, strong project commitment, early stakeholder influence, understood accepted project purpose, clear project constraints, project execution flexibility and influence over on going project process.

Chan et al (2004) did a review on project success from seven (7) major journals in the building construction field and developed a conceptual framework on critical success factors (CSFs).He identified five major groups namely project related factors, project procedures, project management actions, human related and external environment as crucial to project success. It interesting to note despite the different naming of the groups the factors are similar to the ones in Bellassi et al (1996) groups. See Fig 2.2

Hyvari (2006) in her research investigated success of project in different organizational structure. She uses the success factors originated from the studies of Belassi et al (1996) and Hyvari (2000;2002) and groups the factor into five categories by separating the factor related to project manager and team into factors related to project manager and factor related to project team members. See Table 1

This study will use the critical success factors first grouped in to four categories by Belassi et al (1996) and later grouped in to five categories by Hyvari (2006) and other factors from the literature review which are not in the list

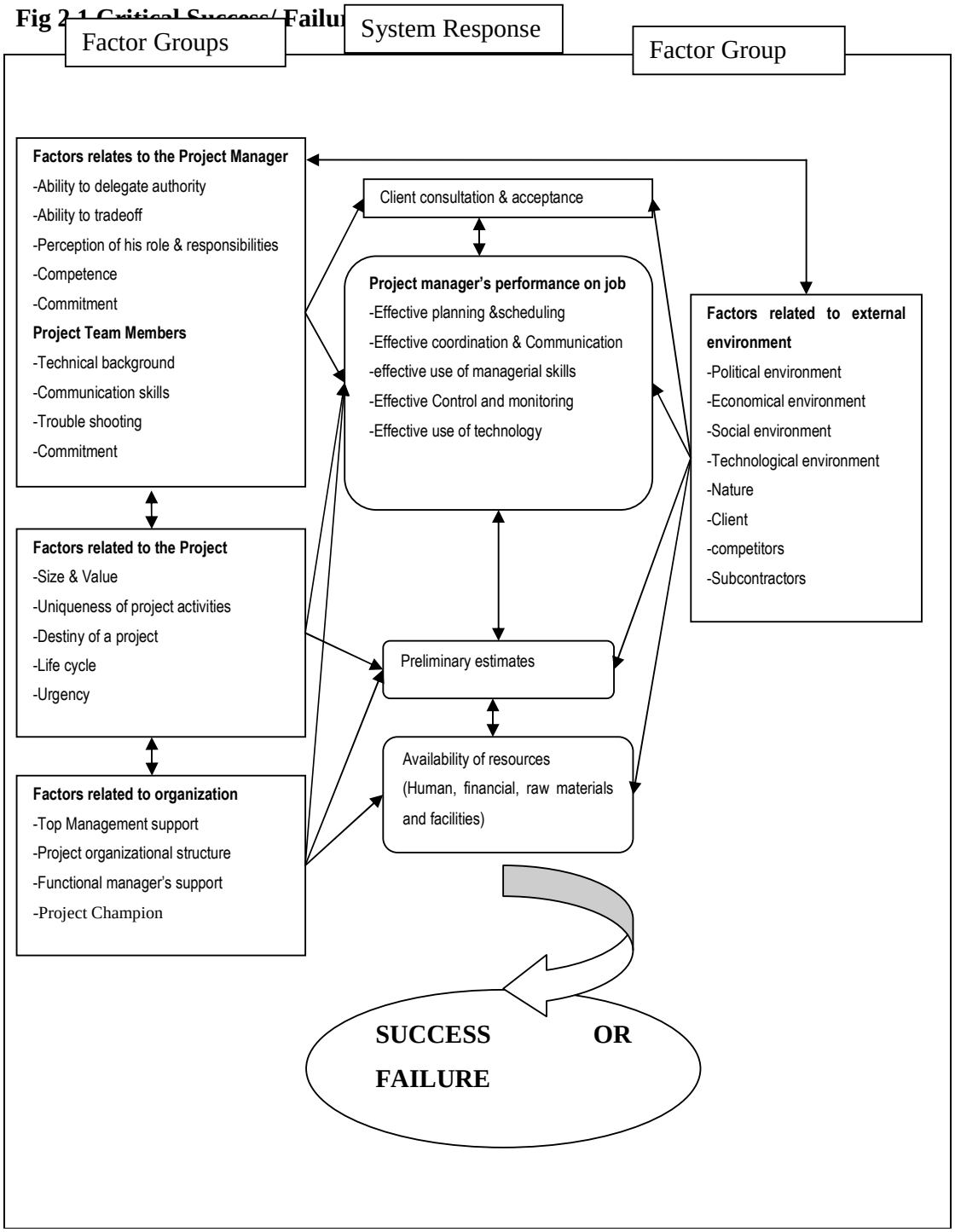
2.3.1 Project Success Factors

The type of project underlines some factors that are critical to its success. Morris et al (1987) identified schedule duration and urgency as critical factors. Belassi et al (1996) lists six characteristic: the size and value of project, the uniqueness of activities (not standardized), the density of a project network, project life cycle and the urgency of the outcome. Tukel et al (1995) concluded that the duration of many large size projects (more than 100 activities) exceed their deadlines. Thus if the project lifespan is used to evaluate project performance, one should be cautious about the size. In addition the more standard the activities the easier it is for the project manager to plan, schedule and monitor their project. They further define density as the ratio number of precedence relationship to the total number of activities. The allocation of resources is affected by density especially man-hours. Due to resource constraints project managers might be forced to use overtime, which jeopardizes budget performance.

2.3.2 Projects Manager Success Factors

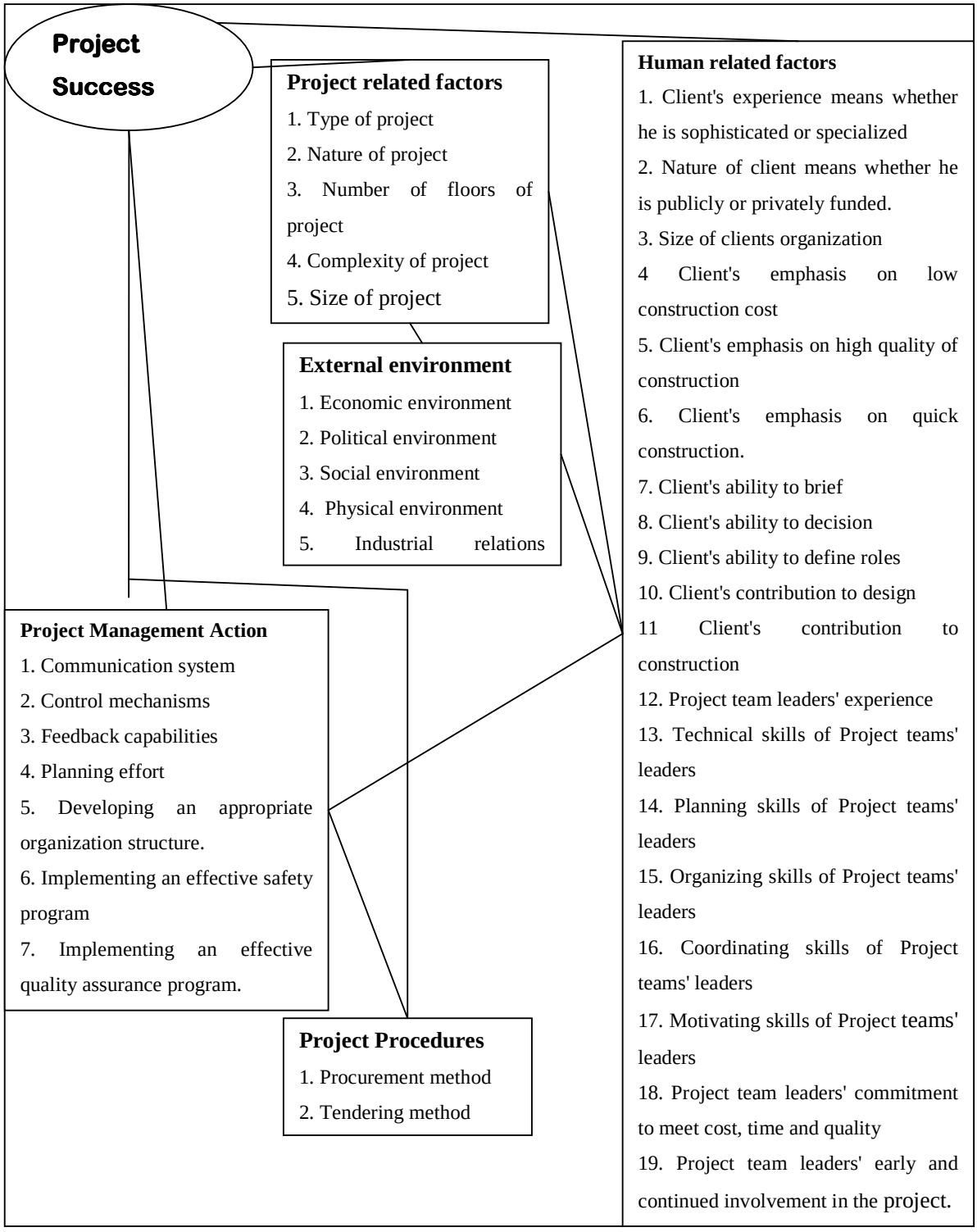
Jeffery (1985) defined project manager “the person who is effectively in charge and has sufficiently authority, personality, and reputation to ensure that everything that needs to be done for the benefit of project is done. Pinto et al (1989) showed that project manager's commitment and competence becomes most critical during the planning and termination stage. A competent manager is expected to have the technical and monitoring capabilities. He should make his team committed for the project through effective leadership.

Fig 2.1 Critical Success/ Failu



Source: Tukel et al (1996),"A new framework for determining critical success/failure in projects", International Journal of Project Management, Vol.14 (3), pp.144

Fig 2.2 New Conceptual Framework for Factors Affecting Project Success



Source: Chan et al, (2004),"Factors affecting the success of a construction project", Journal of Construction Engineering and Management, Vol. 130 (1), pp.154

Table 2.1 Success of Projects in Different Organizational Conditions

1. Factors related to the project
Size and value
Having clear boundary
Urgency
Uniqueness of the project
Density of the project
Project life cycle
End user commitment
Adequate funds and resources
Realistic schedule
Clear goal objectives
2. Factors related to Project manager
Ability to delegate
Ability to trade off
Ability to coordinate
Perception of his or her role and responsibilities
Effective leadership
Effective conflict resolution
Having relevant past experience
Management of changes
Contract management
Situational management
Competence
Commitment
Trust
3. Factors related to team members
Technical background
Communication
Trouble shooting
Effective monitoring and feedback
Commitment
Other scope known by members also
4. Factors related to the organization
Steering committee
Clear organizational / job description
Top management support
Project organizational structure
Functional manager's support and project champion
5. Factors related to environment
Competitors
Political environment
Economic environment
Social environment
Technological environment
Nature
Client
Subcontractors

Source: Hyvari, I. (2006),"Success of projects in different organizational conditions". Project Management Journal Vol.36 No.4 pp.36

Belassi et al (1996) states that well established communication channels between the project manager, the organization and the client are necessary for the acceptance of the project outcome by the client. In most of the literature project manager is key to successful project and hence many factors related to the skills and characteristic of the project manager are proposed for the successful completion of projects.

2.3.3 Team Members Success Factors

Joy (1994) refers to a project team as a total function of an aggressive team of task force consisting of members from various functionalist departments of the project owner led by a multidisciplinary generalist. Parker (1990) on the other hand defines project team as a group of people with a high degree of interdependence, aiming for a goal or completion of a task. Project teams enable multiple perspectives, a variety of experiences, and a broad skill set to be brought to bear on projects. The advantage of project teams is the ability to bring together skills and experiences from multiple disciplines for integration and task completion. Kagiri (2005) states, that the success of a project is largely dependent on the project team. The team's composition, communication, organization structure, competence, clear understanding of the objectives and commitment to the project success are important factors to project success. PMBOK (2004) states that team members should have clear communication channels to access both the "both the functional manager and the project manager within a matrix organization. Effective management of this dual reporting is often a critical success factor for the project.

2.3.4 Organizational Success Factors

From the literature review top management support is a critical factor for successful completion of projects. They control project manager's access to resources which are supervised by functional managers. Belassi (1996) argues that the level of top management support for the project manager will determine the level of support he gets from the functional managers. This is alright for projects which are part of the functional department, but for projects with matrix or pure organizational form acquiring of resources can be a difficult job. It will require negotiating skills and positional power within the organization. In his study Loo (2003) concludes that if project managers and team have strong technical and people's skills but the organizational factors inhibit performance, then there would be poor project performance.

2.3.5 Environmental Success Factors

This consists of factors external to the organization but still have an impact on project success. The environmental factors include political, economic, social, advances in technology and factors related to nature. Pinto et al (1989) found out that most environmental factors affect projects during the planning stage though some like social and nature related affect throughout the project cycle. Sometimes these factors are so influential that they cause major delay or even termination of projects. An example is Sondu Miriu power project whose funding was stopped in 2001 by the Japanese government due environmental disruption and corruption , Environmental news services , (4th June, 2001).These problems caused the project to stall for three years.

Oladapo, Pearce et al (2001, 1994) identified political, socio-cultural, legal, technological / infrastructure, financial/economical, and institutional as being the broad composite factors that impede project success. It is therefore imperative to carry out due diligence of the project environment to ensure viable project objectives.

2.4 Project Management Techniques

Chandra (2002) states that once a project crosses a certain threshold level of size and complexity informal planning has to be substituted by formal planning. Planning is a vital aspect of project management as it provides basis for organizing work, allocating responsibilities, means of communication and coordination, induces people to look ahead and establishes basis for monitoring and control.

2.4.1 Project Schedule

Project schedule ensures that the project team and other stakeholders internalize and understand the scope and duration of the project. It is very important that a great deal of time is used to come up with a realistic project schedule. Gary (2003) indicates that having a realistic and attainable project schedule guarantees successful project delivery. Network techniques have been used to ensure proper planning, scheduling, and control of activities of a project given their interrelationships and constraints on the availability of resources.

Mbeche et al (2000) states that a work breakdown structure is the starting point for planning all the three parameters of project: quality cost and time. The identified project tasks must be

carefully analyzed for their relationships, resource usage and duration. The optimization of the schedule is done using Gantt charts, critical path method (CPM) and the project evaluation and review technique (PERT).

2.4.2 Bromilow's Time-Cost Model (BTC)

Dissanyaka et al (1999) concludes that time and cost are critical to construction clients and given many contributory factors, models of time and cost may help client predict project outcomes at the outset and also different stages of the project life span

Harache et al (2003) on the paper on production and control of project duration assert that a recursive model would be more appropriate for planning and control of project time overrun as opposed to current planning systems such as CPM or PERT.

Bromilow et al (1988) derived an empirical relationship between the average construction time (T), and project cost (C) in building construction industry as follows:

$T=KC^B$

Where

T= Duration of the construction period in days i.e. from the date of possession of site to practical completion

C=Final cost of project in millions of dollars adjusted to constant labor and material prices

K= Constant describing the general level of time performance for a $1 million project

B= Constant representing the sensitivity of time to cost.

Chan et al (2002) have done additional studies to further calibrate the time cost model for use across variety of project types and locations.

2.4.3 Line of Balance Charts

This is a method of showing repetitive work that may exist in a project programme as a single line on a graph rather than a series of single activities on a bar chart. They can be used for any project were there are separate but common activities to undertake or an activity with long duration. Lock (2007) says that line of balance is refinement of the date cursor method that gives a more accurate picture of planned and actual progress on the day measurement.

2.4.4 Q- Scheduling

The Q Scheduling is a new technique, though getting rapid popularity among contracting firms. It is the only scheduling technique that reveals a relation between the sequence of doing a job and the cost to be incurred. The Q schedule is similar to the Line of Balance with some modifications, to allow for a varying volume of repetitive activities at different segments or locations of the construction project, thus the model produced is closer to reality

2.4.5 Milestones Analysis of Cost

This is a simple method which manager can use throughout the project cycle to compare the actual cost and progress experienced with cost the cost and progress planned. Lock (2007) indicates that the method requires modest amount of management to set up and maintain. The cost accounting is less sophisticated than other methods and useful where project schedules are not particularly detailed.

2.4.6 Earned Value Analysis

Lock (2007) refers to earned value analysis as the missing link between cost reporting and cost control. It requires a detailed work breakdown structure, corresponding detailed cost coding system, timely and accurate collection and reporting of cost data and a method of monitoring and quantifying the amount of work done, including work in progress. It aims to compare the cost incurred for an accurately identified amount of work with the cost budgeted for that same work. It uses the results to produce a cost performance index which is 1.0 if everything goes as planned.

2.4.7 Logical Framework Approach

Mbeche et al (2000) defines monitoring as periodic review of the project inputs, activities, and outputs undertaken during implementation, while evaluation is a judgment on the effectiveness of the project. It important therefore for the project manager to have ways of continuously examining the ongoing operations to ensure that the defined objectives are being met.

LFA uses a top down approach to formulate a hierarchy of project objectives such that, at any given level the lower objectives are means to satisfy the next higher level of objectives. The

hierarchy displays a series of cause and effect linkages between one level of objectives and the next higher level and towards a path of ultimate highest objectives, Baccarini (1999).

The LFA uses the "how-why" logic chain that displays the relationship of between the hierarchy of project objectives. The "why" is the ends and the "how' is the means. See Table 2.2.

In practice, even the best project managers can find it difficult to plan major projects without missing important activities and without failing to spot all the significant risks. The LFA helps in identifying comprehensive activities in the project and reinforces this with a rigorous risks and assumption analysis. The project manager must come up with LFA before implementation begins as it offers a top down vision of the project and provides a common understanding of the overall scope for all project participants.

Table 2.2 Basic Format of the Logical Framework

Project Title…….		Total Funding……	
Life of project…….from……to……..		Date prepared……..	
NARRATIVE SUMMARY	**OBJECTIVELY VERIFIABLE INDICATORS**	**MEANS OF VERIFICATION**	**IMPORTANT ASSUMPTION**
Programme or sector goal: The broader objective to which the project contributes	Measures and achievement of goals.	Source of information for goal indicators	Assumptions for achieving goal target
Project purpose: Immediate objective of the project	Measures of purpose achievement	Source of information indicators of project objective	Assumptions for achieving purpose (objective)
Outputs: desired results	Magnitude of outputs	Source of information for indicators of outputs	Assumptions for providing outputs
Inputs: The information, and physical items which enter the system	Implementation targets	Source of information for indicators of inputs	Assumptions for providing outputs

Source: Prof Mbeche et al (2000), "Project planning, Implementation and Evaluation." pp.196

2.5 Previous Studies on Project Success/ Failure Factors

A review of literature reveals that a lot of research on critical success factors has been undertaken in developed countries context and their applicability in the developing countries such as Kenya is yet to be explored. Developing countries in Asian continent have carried some studies on critical success factors while in Kenya the studies have focused on reasons for project failures rather than success. It is imperative to identify critical success factors in power sector construction to ensure project managers are aware of the CSFs and hence play a more proactive role in improving the success rate of their project.

2.5.1 Developed Countries

Ashley et al (1987) did a study on the determinants of construction project success and concludes that project success is repeatable and requires a great deal of work to understand it for achieving cost effectiveness and competitive position. They identify planning effort (construction and design); project team motivation; project manager goal commitment; project manager technical capabilities; control system; and scope and work definition as the CSFs.

Torp et al (2004) carried a study on critical success factors for project performance on assessment of large public projects in Norway. The objective was to ensure quality-at- entry of major government funded project before funding is appropriated. The study involved 14 public civil engineering projects. They identified project organization factors (suitability and adequacy of its structure such that authority and responsibility matches, how clear its relationship with its parent organization is, continuity and capacity in the organization and efficient decision making), number of contracts (number and size of contracts), project planning and control as CSFs in such project. Ireland (1987) did a comparison of U.S, U.K. and Australia management practices with special references to lost time, factors such as increment weather, organization of labor, safety, prices of materials, contract strategy, quality, protection of public, value management and dispute resolution were selected for the study.

Flyberg et al. (2004) investigated causes of cost overruns on transport infrastructure and concluded it was dependent on length of implementation phase, the size of the project, and the type of ownership.

2.5.2 Developing Countries

Iyer et al (2006) carried out an empirical study on critical factors affecting schedule performance in Indian construction projects where over 40% of the construction projects are facing time overrun. He identified seven factors significance influence on the schedule outcome. Three factors: commitment of the project participants; owner's competence; and conflict among project participants were found to posses the capability to enhance performance level while the remaining four factors : coordination among project participants; project managers ignorance and lack of knowledge; hostile socioeconomic environment; and indecisiveness of project participants tend to retain the schedule performance at its existing level.

Chua et al (1999) carried a survey on critical success factors for different project objectives. They found out that project characteristics and contractual arrangements cannot be left out of the success equation. In other words project success is not determined exclusively by the project manager, monitoring, and control efforts. Chen et al (2007) studied critical success factors for construction partnering in Taiwan and concluded that project owners, designers, contractors and other related departments who are directly or indirectly involved in this work all significantly influence the success of the construction partnering.

Chan et al (2004) examined 3 cases studies of key performance indicators for measuring construction success in Hong Kong. He concluded that cost, time and quality were still three most important indicators of success in construction project. Other measures such as safety, functionality and satisfaction are attracting increasing attention. Pheng et al (2007) on the hand carried a study how environmental factors affect the performance of project manager in the construction industry. He identified 13 factors which would affect performance: job related were salary ,job satisfaction, job security ,availability of information ; project related were project environment, project size, time availability, complexity of project, team relationship, materials and supplies and duration of project while organization related were level of authority and type of client.

Nguyen (2004) did a study on project success factors in large construction projects in Vietnam and identified five CSFs which were mostly human related: competent project manager, adequate funding, multidisciplinary/competent project team, commitment.

Mansfield et al. (1996) studied the causes of delay and cost overruns in Nigeria construction projects. They concluded that poor contract management, financing and payment arrangements, material shortages, inaccurate estimates and overall price escalation as the major factors. Aibunu et al (2002) research on effects of construction delays on project delivery showed six effects namely time overrun, cost overrun, dispute, arbitration, total abandonment and litigation.

2.5.3 Developing Countries: Kenya

Karani (2007) carried a study focusing on factors impacting delivery reliability of road projects. He identified the critical factors as contractors and clients cash flow problems, delayed payment to contractors, under estimation of project duration, unqualified staff of the contractor's project team, inadequate supervision of work and increase in scope of works. He concluded that these inputs and transformational process factors are attributable to the core stakeholders in any project.

Isensi (2006) analyzed factors that lead to failure of building construction projects in Kenya and established that poor design, poor construction methods, inadequate contractor experience, underestimation of project duration and poor cost estimation as the factors that caused failure of building construction projects. Kagiri (2005) conducted a case study on time and cost overruns in power project in Kengen and concluded that contractor inabilities, improper project preparation, resource planning, interpretation of requirements , works definition, timeliness ,government bureaucracy and poor risk allocation as the major factors that lead to delay and cost overruns.

Gharashe (1999) concluded in his study on determination of factors influencing water project in Ministry of water that the quality of project management, operating environment, worker motivation, communication, inadequate resources and organization of the project team as factors affecting project implementation in the ministry of water Karimi (1998) on the hand analyzed factors which are critical to cost overruns in the ministry of water and established five factors which contribute are project organization, Environment, project management, project definition and infrastructure. Mwadali (1996) conducted a case study on major factors that affect project management in Kenya Railways. He concluded that inexperienced project

managers, poor communication, poor monitoring and control systems negatively affected the project management efficiency.

The previous studies in Kenya have focused on the reasons for project failure in various sectors rather than project success and have concentrated on time and cost overruns. The studies have assumed that if a project completion time exceeds its due date, or expenses overran the budget, or outcomes did not satisfy a company's predetermined criteria then the project is a failure. It is clear that from the literature review that a project might not meet one of these criteria and yet is regarded as a success. This study will focus on the critical success factors and their impact in power sector construction projects.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

The research was a descriptive survey research and is intended to establish critical factors and their impact on power sector construction projects. Schindler et al (2003), such a study is concerned with finding out who, what, when, and how of the relevant phenomenon. Karani (2007), Isensi (2006) and Kagiri (2005) have used the design in related studies successful.

3.2 The Population

The study involved Kenya Power Lighting Company, Kengen, Independent Power Producers, Rural Electrical Authority (REA), Contractors, Consultants / Specialists and Ministry of Energy employees who are involved in construction projects in the power sector. The population included the organization top managers, project managers, project engineers, consultants, procurement and accountants who are involved in construction projects in the power sector. (See Appendix 1)

3.3 The Sample

A census of the 60 respondents involved in projects from the companies in Appendix 1 was carried out.

3.4 Data Collection

The primary data was done through a self administered survey questionnaire. The preliminary data in the questionnaire was collected through a detailed literature review. The questionnaire was pilot tested using four individuals experts in construction and management of projects in the power sector. One expert was drawn from each of the four groups in Appendix 1. The final form was e-mailed and hand delivered to all the nominated respondents who included project consultants/ managers/ engineers. The data was collected in a period of 4 weeks.

The questionnaire comprises of 3 parts. Part A captured general particulars of the respondents. Part B focused on the factors (independent variables) identified as critical success factors from the literature review. This part gave each respondent an opportunity to identify variables they perceive to be critical success factors by responding on a Likert scale

from 5 (very important) to 1 (not important). Part C was designed to unearth the project management techniques used in the power sector projects.

3.5 Data Analysis

The questionnaire was analyzed using descriptive statistics with the view to summarizing the general response data in terms of proportions, frequencies and percentages. Data obtained in Part B was analyzed using Statistical Package for Social Science (SPSS). Kruskal- Wallis method was used to test the significance of the factors in their groups to the project success. Part C was analyzed using frequencies and mean scores

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATIONS

4.1 Introduction

This chapter provides the data analysis and interpretations. From a sample population of 60 respondents, 40 respondents responded and returned the questionnaires comprising of 66.7% response rate.

4.2 General Information

Table 1: Organization the Respondent Is Working For

	Frequency	Percent
government (fully)	5	12.5
Parastatals	35	87.5
Total	40	100.0

The findings in the above table show the type of the organizations the respondents were working for. From the findings, most of the respondents (87.5%) were working for parastatals, while 12.5% of the respondents were working for government organizations.

Table 2: Current Job Designation

	Frequency	Percent
project manager	4	10.0
project engineer	17	42.5
senior management	6	15.0
construction engineer	10	25.0
project accountant	2	5.0
others	1	2.5
Total	40	100.0

The study also sought to establish the current job designation of the respondents. From the study, most of the respondents were project engineers as shown by 42.5%, 25% were construction engineers, 15% were senior managers, 10% were project managers, 5% were project accountants while a small proportion of respondents as indicated by 2.5% said that they were in other designations e.g. stores officers.

Table 3: Duration of Working in the Power Sector Projects

	Frequency	Percent
between 5-10	8	20.0
between 10-15	12	30.0
between 15-20	17	42.5
Over 20 years	3	7.5
Total	40	100.0

The study also sought to establish the respondents experience in the power sector projects. The respondents were therefore requested to indicate the number of years that they had worked for power sector projects. From the study, most of the respondents reported that they had worked for power sector projects for a period between 15-20 years as shown by 42.5%, 30% had been working for a period between 10-15 years, 20% said between 5-10 years, while 7.5% of the respondents said that they had been working in the power sector projects for more than 20 years. This information shows that the respondents were well versed with the critical success factors in power sector projects and their contributions to project success as they had been working in the power sector for over 5 years.

4.3 Factors That Are Critical To Projects Success in the Power Sector

The study also sought to establish the factors that were critical to projects success in the power sector. These factors were in terms of project success factors, project manager success factors, team members' success factors, organizational success factors and environmental success factors. The respondents were requested to indicate the extent that these factors were critical to the success of the projects in the power sector in a 5-point scale where 1 was no extent at all, 2 was small extent, 3 was medium extent, 4 was great extent and 5 was very large extent. The results of the findings were shown in the tables below.

On project success factors, the study found that all the factors provided in Table 4 were critical in to projects success as all of them had a mean score ranging from 3.5-4.8. The factor that had the lowest mean score of 3.5 was uniqueness (non standard project activities), while the factors that had the highest mean score of 4.8 were adequate funds/resources and clear and realistic project schedule. This implies that all the project success factors were critical to project success in the power sector.

Table 4: Project Success Factors

	Mean	Std. Deviation
Adequate funds/resources	4.8	0.439
Clear and realistic project schedule	4.8	0.439
Well defined goals/objectives	4.5	0.506
Implement projects as soon as possible (urgently)	4.3	0.859
Size and cost of the project	4.2	0.893
Number of precedence relationships in the project activities	4.1	0.709
Commitment of the end user	3.7	0.864
Uniqueness (non standard project activities)	3.5	0.640

Table 5: Project Manager Success Factors

	Mean	Std. Deviation
Good coordination (all stakeholders)	4.7	0.464
Good understanding of contract management	4.7	0.474
Good negotiation/trade off skills	4.6	0.632
Commitment to the project	4.6	0.490
Ability to delegate	4.5	0.504
Clear understanding of his/her role	4.5	0.506
Effective leadership	4.5	0.506
Effective conflict resolution	4.5	0.504
Ability to provide leadership in different situations	4.5	0.504
Good communicator	4.4	0.501
Commitment to the project	4.3	0.452
Ability to handle changes	4.2	0.800
Good technical capability (competence)	4.1	0.677
Past relevant experience	4.0	0.698

On project manager success factors, all the factors provided were important as they had a mean score ranging from 4.0-4.7 which means that the majority of respondents viewed these factors as critical to a great extent to project success in the power sector. The factor that had a

low mean score of 4.0 (great extent) was past relevant experience, while the factors that had the highest mean score of 4.7 (greatest extent) were good coordination (all stakeholders) and good understanding of contract management.

Table 6: Team Members Success Factors

	Mean	Std. Deviation
Clear understanding of the project scope and responsibilities	4.7	0.474
Competence of project team (technical)	4.6	0.496
Effective monitoring and feedback	4.5	0.506
Commitment to the project	4.5	0.506
Clear communication and information channels	4.4	0.628
Ability to handle unexpected crisis and plan deviations	4.4	0.622

On team members success factors, the study established that all the team members provide were critical to the success of projects in the power sector. This is because all the factors had a mean score ranging from 4.4 to 4.7, with clear communication and information channels and ability to handle unexpected crisis and plan deviations having the lowest mean score of 4.4 and clear understanding of the project scope and responsibilities having the highest mean score of 4.7.

On organizational success factors shown in Table 7 below, the study found that good knowledge transfer between projects had the lowest mean score of 3.8, while transparent and competitive procurement process had the highest mean score of 4.9, which clearly implies that all the above factors were critical to the success of the projects in the power sector. This is because their mean score ranged from 3.8 (great extent) - 4.9 (very great extent).

On environmental success factors shown in Table 8 below, the study found that all the provided were critical to projects success. This was because the factors had a mean score ranging from 3.6-4.6. The factor that had the lowest mean score of 3.6 was support of project client, while experienced; qualified and financially capable contractors had the highest mean score of 4.6.

Table 7: Organizational Success Factors

	Mean	Std. Deviation
Transparent and competitive procurement process	4.9	0.362
Delegation of authority to project manager from top management (clear organization/job description)	4.8	0.439
Support from the top management (availability of resources, short lines of communication etc)	4.7	0.464
Good organizational planning	4.4	0.496
Appropriate project organization structure	4.2	0.385
Functional manager's support	4.2	0.385
Good knowledge transfer between projects	3.8	0.405

Table 8: Environmental Success Factors

	Mean	Std. Deviation
Experienced, qualified and financially capable contractors	4.6	0.501
Zero tolerance to corruption and rent seeking	4.2	0.533
National economic factors (inflation, price changes of inputs etc)	4.1	0.709
Good infrastructure	4.1	0.677
Appropriate technology	4.0	0.698
Predictable weather condition	3.9	0.757
Support of project client	3.8	0.405
Clear and little government regulations	3.8	1.010
Political interference	3.7	1.450
Favorable working and social environment	3.6	0.504

On environmental success factors, the study found that all the provided were critical to projects success. This was because the factors had a mean score ranging from 3.6-4.6. The factor that had the lowest mean score of 3.6 was support of project client, while experienced; qualified and financially capable contractors had the highest mean score of 4.6.

4.4 Factors That Contribute To the Success of Projects in the Power Sector

The study also sought to establish the extent that the success factors i.e. project, project manager, team members, organizational and environmental success factors contributed to the success of projects in the power sector. The respondents were given a scale of extent where 1 was no extent at all, 2 was small extent, 3 was medium extent, 4 was great extent and 5 was very large extent. The results were shown in the tables below.

Table 9: Project Success Factors

	Mean	Std. Deviation
Adequate funds/resources	4.7	0.474
Clear and realistic project schedule	4.7	0.464
Well defined goals/objectives	4.2	0.800
Size and cost of the project	4.1	0.971
Uniqueness (non standard project activities)	4.1	1.141
Implement projects as soon as possible (urgently)	4.0	0.716
Number of precedence relationships in the project activities	3.8	0.813
Commitment of the end user	3.7	1.027

On project success factors, the study found that all the factors on project success that were given contributed to the success of projects in the power sector. This is because their mean score ranged from 3.7-4.7. The factor that had the lowest mean score of 3.7 (great extent) was commitment of the end user, while the factors that had the highest mean score of 4.7 (very large extent) were adequate funds/resources and clear and realistic project schedule.

On project manager success factors shown in Table 10 below, all the factors provided in the table greatly contributed to the success of the projects in the power sector as all these factors had a high mean score ranging from 3.9-4.6, where good communicator had the lowest mean score of 3.6 (great extent), while good coordination (all stakeholders) and good understanding of contract management had the highest mean score of 4.6 (very large extent).

On team member success factors, the study found that all the member success factors greatly contributed to the success of projects in the power sector as their mean score ranged from 4.2-4.9, with clear communication and information channels having the lowest mean score of 4.2 (great extent) and competence of project team (technical) and clear understanding of the project scope and responsibilities having the highest mean scores of 4.9 (very large extent).

Table 10: Project Manager Success Factors

	Mean	Std. Deviation
Good coordination (all stakeholders)	4.6	0.496
Good understanding of contract management	4.6	0.496
Effective conflict resolution	4.4	0.490
Ability to handle changes	4.4	0.490
Trustworthy	4.4	0.490
Clear understanding of his/her role	4.3	0.439
Good negotiation/trade off skills	4.2	0.549
Past relevant experience	4.2	0.768
Commitment to the project	4.2	0.770
Ability to delegate	4.1	0.764
Ability to provide leadership in different situations	4.1	0.791
Effective leadership	4.0	0.698
Good technical capability (competence)	4.0	0.698
Good communicator	3.9	0.928

Table 11: Team Members Success Factors

	Mean	Std. Deviation
Competence of project team (technical)	4.9	0.267
Clear understanding of the project scope and responsibilities	4.9	0.362
Effective monitoring and feedback	4.4	0.622
Ability to handle unexpected crisis and plan deviations	4.3	0.608
Clear communication and information channels	4.2	0.405
Commitment to the project	4.2	0.405

Table 12: Organizational Success Factors

	Mean	Std. Deviation
Transparent and competitive procurement process	4.9	0.362
Support from the top management (availability of resources, short lines of communication etc)	4.6	0.496
Good organizational planning	4.4	0.501
Delegation of authority to project manager from top management (clear organization/job description)	4.2	0.823
Appropriate project organization structure	4.2	0.385
Functional manager's support	3.8	0.423
Good knowledge transfer between projects	3.8	0.423

Table 13: Environmental Success Factors

	Mean	Std. Deviation
Experienced, qualified and financially capable contractors	4.4	0.636
Zero tolerance to corruption and rent seeking	4.3	0.723
Appropriate technology	4.1	0.516
Support of project client	4.1	0.516
Good infrastructure	4.1	0.783
National economic factors (inflation, price changes of inputs etc)	3.8	0.405
Favorable working and social environment	3.8	0.439
Clear and little government regulations	3.8	0.439
Political interference	3.7	1.450
Predictable weather condition	3.3	1.032

On organizational success factors shown in Table 12, the study established that all the factors on organizational success factors provided contributed to the success of the projects in the power sector. This was because functional manager's support and good knowledge transfer between projects had the lowest mean score of 3.8 (great extent) and transparent and competitive procurement process with the highest mean score of4.9 (very large extent).

On contribution of the environmental success factors in Table 13, the study found that all the factors provided in the table greatly contributed to the success of projects in the power sector. This was because all the factors had a mean score ranging from 3.7-4.4. The factor that had the lowest mean score of 3.7 was political interference, while experienced; qualified and financially capable contractors had the highest mean score of 4.4, which implies that all these factors contributed to a great extent to the success of the projects in the power sector.

Table 14: Kruskal-Wallis Test

		Mean Rank
Project success factors	Adequate funds	22.03
	Clear and realistic project schedules	27.78
	Well defined goals/objectives	32.29
	Implement projects as soon as possible (urgently)	51.44
	Size and cost of the project	50.03
	Number of precedence relationships in the project activities	34.83
	Commitment of the end user	47.33
	Uniqueness (non standard project activities)	47.17
Project Manager Success Factors	Good coordination (all stakeholders	19.35
	Good understanding of contract management	23.72
	Good negotiation/trade off skills	29.88
	Commitment to the project	48.33
	Ability to delegate	54.83
	Clear understanding of his/her role	48.54
	Effective leadership	21.32
	Effective conflict resolution	29.17
	Ability to provide leadership in different situations	34.58
	Good communicator	41.22
	Commitment to the project	52.24

	Ability to handle changes	36.33
	Good technical capability (competence)	41.21
	Past relevant experience	28.83
Team Members Success Factors	Clear understanding of the project scope and responsibilities	16.79
	Competence of project team (technical)	27.28
	Effective monitoring and feedback	39.04
	Commitment to the project	32.39
	Clear communication and information channels	56.38
	Ability to handle unexpected crisis and plan deviations	48.54
Organizational Success Factors	Transparent and competitive procurement process	22.62
	Delegation of authority to project manager from top management (clear organization/job description)	29.06
	Support from the top management (availability of resources, short lines of communication etc)	29.83
	Good organizational planning	37.17
	Appropriate project organization structure	54.74
	Functional manager's support	28.42
	Good knowledge transfer between projects	37.44
Environmental Success Factors	Experienced, qualified and financially capable contractors	39.08
	Zero tolerance to corruption and rent seeking	39.69
	National economic factors (inflation, price changes of inputs etc)	34.96
	Good infrastructure	45.42
	Appropriate technology	58.56
	Predictable weather condition	31.81
	Support of project client	53.04
	Clear and little government regulations	34.58
	Political interference	40.10
	Favorable working and social environment	43.00
Project	Adequate funds/resources	28.42

Success Factors	Clear and realistic project schedule	37.44
	Well defined goals/objectives	37.83
	Size and cost of the project	64.54
	Uniqueness (non standard project activities)	64.88
	Implement projects as soon as possible (urgently)	47.25
	Number of precedence relationships in the project activities	39.54
	Commitment of the end user	25.54
Project Manager Success Factors)	Good coordination (all stakeholders)	36.83
	Good understanding of contract management	42.83
	Effective conflict resolution	40.42
	Ability to handle changes	50.71
	Trustworthy	39.00
	Clear understanding of his/her role	44.83
	Good negotiation/trade off skills	36.33
	Past relevant experience	41.21
	Commitment to the project	28.83
	Ability to delegate	58.42
	Ability to provide leadership in different situations	51.56
	Effective leadership	33.00
	Good technical capability (competence)	34.83
	Good communicator	47.33
Team Members Success Factors	Competence of project team (technical)	34.58
	Clear understanding of the project scope and responsibilities	40.10
	Effective monitoring and feedback	43.00
	Ability to handle unexpected crisis and plan deviations	48.54
	Clear communication and information channels	54.00
	Commitment to the project	39.69
Organizational	Transparent and competitive procurement process	31.81

Success Factors	Support from the top management (availability of resources, short lines of communication etc)	35.98
	Good organizational planning	49.79
	Delegation of authority to project manager from top management (clear organization/job description)	53.04
	Appropriate project organization structure	58.75
	Functional manager's support	41.21
	Good knowledge transfer between projects	28.83
Environmental Success Factors	Experienced, qualified and financially capable contractors	46.27
	Zero tolerance to corruption and rent seeking	39.62
	Appropriate technology	41.38
	Support of project client	38.75
	Good infrastructure	37.63
	National economic factors (inflation, price changes of inputs etc)	44.83
	Favorable working and social environment	47.25
	Clear and little government regulations	39.54
	Political interference	25.54
	Predictable weather condition	39.69

i) **Null Hypothesis**

H_O: The mean Ranks are identical

H_A: The mean Ranks are different

ii) **Statistical tests**: A Kruskal-Wallis test is one way analysis of variance. It assumes random selection, independence of samples and underlying continuous distribution.

iii) **Significance level**: Let α =0.05

iv) **SPSS:** The value of p= 0.1995.

The test fails to reject the null hypothesis with α =0.05

4.5 Project Management Techniques Used By Project Managers/Engineers in the Power Construction Project Sector

The study also sought to establish the project management techniques used by project

managers/engineers in the power construction project sector. The respondents were therefore required to rank the usage of the listed project management techniques in the power construction sector where 1 was not at all, 2 was not frequent, 3 was frequent, 4 was very frequent and 5 was always. The results were as shown in the table below.

From the results, Gantt chart was always used by project managers/engineers in the power construction project sector in most organizations as shown by a mean score of 4.9. The project management techniques that were very frequent used by project managers/engineers in the power construction project sector were critical path method (CPM) and milestone analysis of cost as shown by a mean score of 4.1 in each case and milestone analysis of cost as shown by a score of 3.9. Further, the project management techniques that were frequently used were logical framework approach (LFA) shown by a mean score of 3.4, line of balance charts shown by a mean score of 3.1 and Bromilow Time Cost Model (BTC), Q-scheduling and earned value analysis as shown by a mean score of 2.9 in each case.

Table 15: Project Management Techniques in the Power Construction Sector

	Mean	Std. Deviation
Gantt chart	4.9	0.362
Critical path method (CPM)	4.1	0.757
Milestone analysis of cost	4.1	0.757
Milestone analysis of cost	3.9	1.081
Logical framework approach (LFA)	3.4	1.427
Line of balance charts	3.1	1.150
Bromilow time cost model (BTC)	2.9	1.057
Q-scheduling	2.9	1.244
Earned value analysis	2.9	1.023

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the findings from chapter four, and also gives conclusions and recommendations of the study based on the objectives of the study. The objectives of this study were to establish critical success factors in the power sector projects in Kenya and also to establish the contribution of critical success factors to project success.

5.2 Summary

The study studied the factors that were critical to projects success in the power sector. These were in terms of the project success factors, project manager success factors, team members' success factors, organizational success factors and environmental success factors.

On project success factors, the study found that the factors that were critical to projects success were size and cost of the project, implementation of projects as soon as possible (urgently), uniqueness (non standard project activities), number of precedence relationships in the project activities, commitment of the end user, adequate funds/resources, clear and realistic project schedule and well defined goals/objectives.

On project manager success factors, the factors that were critical to project success were ability to delegate, good negotiation/trade off skills, good coordination (all stakeholders), clear understanding of his/her role, effective leadership, effective conflict resolution, past relevant experience, ability to handle changes, good understanding of contract management, ability to provide leadership in different situations, good technical capability (competence), commitment to the project, commitment to the project and good communicator.

The team member success factors critical to the success of projects in the power sector were competence of project team (technical), clear communication and information channels, ability to handle unexpected crisis and plan deviations, effective monitoring and feedback, commitment to the project and clear understanding of the project scope and responsibilities.

The organizational success factors that were critical to projects success in the power sector included; delegation of authority to project manager from top management (clear organization/job description), support from the top management (availability of resources,

short lines of communication etc), appropriate project organization structure, good organizational planning, functional manager's support, good knowledge transfer between projects and transparent and competitive procurement process.

The environmental success factors that were critical to project success in the power sector were political interference, national economic factors (inflation, price changes of inputs etc), favourable working and social environment, appropriate technology, predictable weather condition, support of project client, experienced, qualified and financially capable contractors, good infrastructure, clear and little government regulations and zero tolerance to corruption and rent seeking.

All the above listed factors that were critical to projects success in the power sector also contributed greatly to the success of projects in the power sector.

5.3 Conclusions

This study concludes that all the factors in the critical success grouped into five categories i.e. project success factors, project manager success factors, team members success factors, organizational success factors and environmental success factors are very critical to the project's success in the power sector.

Project success factors that are critical to projects success were size and cost of the project, implementation of projects as soon as possible (urgently), uniqueness (non standard project activities), number of precedence relationships in the project activities, commitment of the end user. The project manager success factors that are critical to project success were ability to delegate, good negotiation/trade off skills, good coordination (all stakeholders), clear understanding of his/her role, effective leadership, effective conflict resolution, past relevant experience, ability to handle changes.

The study also concludes that the team member success factors critical to the success of projects in the power sector were competence of project team (technical), clear communication and information channels, ability to handle unexpected crisis and plan deviations, effective monitoring and feedback. The organizational success factors that were critical to projects success in the power sector included; delegation of authority to project manager from top management (clear organization/job description), support from the top management (availability of resources, short lines of communication etc). The environmental

success factors that were critical to project success in the power sector were political interference, national economic factors (inflation, price changes of inputs etc), favorable working and social environment. These factors also greatly contribute to success of projects in the power sector.

From Kruskal –Wallis test the null hypothesis is not rejected, (P = 0.1995) the conclusion is that there all the factors are critical to the success of the project.

5.4 Recommendations

This study therefore recommends that for the success of the projects in the power sector, the critical success factors under the five categories i.e. project success factors, project manager success factors, team members' success factors, organizational success factors and environmental success factors should be considered as they are critical and also they contribute to the success of the projects in the power sector.

5.5 Limitations of the Study

A limitation for the purpose of this research was regarded as a factor that was present and contributed to the researcher getting either inadequate information or responses or if otherwise the response given would have been totally different from what the researcher expected.

Most of the respondents were also very busy individuals; and took several weeks of follow-up before they filled and submitted their questionnaires. The response rate from the contractors was also poor. Some respondents refused to fill in the questionnaires. This reduced the probability of reaching a more conclusive study. However, conclusions were made with this response rate.

The small size of the sample could have limited confidence in the results and this might limit generalizations to other situations.

Several of the respondents called back to get more explanations on the factors given. The projects terms used in defining the factors may have been a hindrance and hence leading to lower response rate.

5.6 Suggestion for Further Studies

The researcher suggests that further study should be done on the effect of the critical success factors on the competitiveness of power sector projects in Kenya. A similar study should also be done in projects in other sectors so as to establish the critical success factors in the various projects so as to provide information on them since each project has a different strategic approach.

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Appendix 1: List of Companies in Power Sector Projects

A. GOVERNMENT MINISTRY AND PARASTATALS

1. Kenya Power & Lighting Company (KPLC)
2. Kenya Electricity Generating Company (KenGen)
3. Ministry of Energy (MoE)
4. Rural Electrification Authority (REA)

B. INDEPENDENT POWER PRODUCERS (IPPs)

5. Tsavo power
6. Orpower 4 Inc.
7. Iber Africa Kenya
8. Mumias Sugar Company

C. CONTRACTORS

9. Kalpataru
10. Associated Transrail Structures Ltd
11. Power Technics Ltd
12. ABB (K) Ltd
13. Siemens(K) Ltd
14. ABB(OY) Finland
15. Gathenge Engineers and Electricals Ltd
16. Powergen International Ltd
17. Areva (India)
18. Empower Installation Contractors

D. CONSULTANTS

19. Norconsult Consulting company
20. Aberdare Engineering Limited
21. Bezalel Engineering Company

Appendix 2: Questionnaire

Part A: General

Please tick the appropriate box

1) What organization are you working for?

Government (fully)☐ Parastatal ☐ Consulting firm☐ Contractor ☐ IPPs ☐

2) Current job designation (Project manager, Project Engineer, Senior Management, Construction Engineer, Project Accountant, Project procurement officer , Consultants/Specialist, Contractor) _____

3) How many years have you worked in the power sector projects

Less than 5 ☐ Between 5-10☐ Between 10-15☐ Between15-20 ☐

More than20 ☐

Part B: (i) To what extent do you think the following factors are critical to projects success in the power sector?

Where the scale of extent:

5. Very large extent **4**. Great extent **3**. Medium extent **2**. Small extent **1**. No extent at all

No	Factors	5	4	3	2	1
	1. Project Success Factors					
1	Size and cost of the project					
2	Implement project as soon as possible (urgency)					
3	Uniqueness (Non standard project activities)					
4	Number of precedence relationships in the project activities					
5	Commitment of the end user					
6	Adequate funds/ resources					
7	Clear and realistic project schedule					
8	Well defined goals/ objectives					
	Other factors					

No	Factors	5	4	3	2	1
	2.Project Manager Success Factors					
9	Ability to delegate					
10	Good negotiation/ trade off skills					
11	Good coordination (all stakeholders)					
12	Clear understanding of his/ her role					
13	Effective leadership					
14	Effective conflict resolution					
15	Past relevant experience					
16	Ability to handle changes					
17	Good understanding of contract management					
18	Ability to provide leadership in different situations					
19	Good technical capability (Competence)					
20	Commitment to the project					
21	Trustworthy					
22	Good communicator					
	Other factors					
	3. Team Members Success Factors					
23	Competence of project team (technical)					
24	Clear communication and information channels					
25	Ability to handle unexpected crises and plan deviations					
26	Effective monitoring and feedback					
27	Commitment to the project					
28	Clear understanding of the project scope and responsibilities					
	Other factors					

No	Factors	5	4	3	2	1
	4. Organizational Success Factors					
29	Delegation of authority to project manager from top management (Clear organization/ job description)					
30	Support from the top management (availability of resources, short lines of communication etc))					
31	Appropriate project organization structure					
32	Good organizational planning					
33	Functional Manager's support					
34	Good Knowledge transfer between projects					
35	Transparent and competitive procurement process					
	Other factors					
	5. Environmental success Factors					
36	Political interference					
37	National economic factors (inflation, price changes of inputs etc)					
38	Favorable working and social environment					
39	Appropriate technology					
40	Predictable weather condition					
41	Support of project client					
42	Experienced, qualified and financially capable contractors					
43	Good infrastructure					
44	Clear and little Government regulations					
45	Zero tolerance to Corruption and rent seeking					
	Other factors					

Part B: (ii) **To what extent do you think the following success factors contribute to success of projects in the power sector?**

Where the scale of extent:

5. Very large extent **4**. Great extent **3**. Medium extent **2**. Small extent **1**. No extent at all

No	Factors	5	4	3	3	1
	1. Project Success Factors					
1	Size and cost of the project					
2	Implement project as soon as possible (urgency)					
3	Uniqueness (Non standard project activities)					
4	Number of precedence relationships in the project activities					
5	Commitment of the end user					
6	Adequate funds/ resources					
7	Clear and realistic project schedule					
8	Well defined goals/ objectives					
	Other factors					
	2.Project Manager Success Factors					
9	Ability to delegate					
10	Good negotiation/ trade off skills					
11	Good coordination (all stakeholders)					
12	Clear understanding of his/ her role					
13	Effective leadership					
14	Effective conflict resolution					
15	Past relevant experience					
16	Ability to handle changes					
	Other factors					

No	Factors	5	4	3	3	1
17	Good understanding of contract management					
18	Ability to provide leadership in different situations					
19	Good technical capability (Competence)					
20	Commitment to the project					
21	Trustworthy					
22	Good communicator					
	Other factors					
	3. Team Members Success Factors					
23	Competence of project team (technical)					
24	Clear communication and information channels					
25	Ability to handle unexpected crises and plan deviations					
26	Effective monitoring and feedback					
27	Commitment to the project					
28	Clear understanding of the project scope and responsibilities					
	Other factors					
	4. Organizational Success Factors					
29	Delegation of authority to project manager from top management (Clear organization/ job description)					
30	Support from the top management (availability of resources, short lines of communication etc))					
31	Appropriate project organization structure					
32	Good organizational planning					
33	Functional Manager's support					
34	Good knowledge transfer between projects					
35	Transparent and competitive procurement process					

No	Factors	5	4	3	3	1
	5. Environmental success Factors					
36	Political interference					
37	National economic factors (inflation, price changes of inputs etc)					
38	Favorable working and social environment					
39	Appropriate technology					
40	Predictable weather condition					
41	Support of project client					
42	Experienced, qualified and financially capable contractors					
43	Good infrastructure					
44	Clear and little government regulation					
45	Zero tolerance to corruption and rent seeking					
	Other factors					

Part C: Project management techniques used by project managers/ Engineers in the power construction project sector.

On a scale of 1-5 rank the usage of the listed project management techniques in the power construction sector.

5. Always **4**. Very frequent **3**. Frequent **2**. Not Frequent 1. Not at all

1. No extent at all

No	Issue	5	4	3	2	1
	Project Management Techniques					
1	Project Evaluation and review techniques (**PERT**)					

No	Issue	5	4	3	2	1
	Project Management Techniques					
2	Critical path Method (CPM)					
3	Gantt chart					
4	Bromilow time cost model (BTC)					
5	Line of balance charts					
6	Q- Scheduling					
7	Milestone Analysis of Cost					
8	Earned Value Analysis					
9	Logical Framework Approach (LFA)					
	Others					
(i)						
(ii)						
(iii)						
(iv)						