"ANALYSIS OF MAJOR FACTORS THAT AFFECT PROJECT MANAGEMENT: A CASE OF KENYA RAILWAYS PROJECTS."

BY

DAVID N. MWADALI

A MANAGEMENT RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS AND ADMINISTRATION, FACULTY OF COMMERCE, UNIVERSITY OF NAIROBI.

JUNE, 1996

This management project is my original work and has not been presented for a degree in any other university.

Signed:..... Date.....15/11/96

DAVID N. MWADALI

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

Signed:..... Date.....5/12/96

DR. ISAAC M. MBECHE

Lecturer,
Department of management science

Dedicated to my wife ADDAH and to my parents Mr. and Mrs. MWADALI.

CONTENTS.

LIST OF TABLES

LIST OF ABBREVIATIONS

BOD	BOARD OF DIRECTORS
CPM	CRITICAL PATH METHOD
GOK	GOVERNMENT OF KENYA
GERT	GRAPHICAL EVALUATION REVIEW TECHNIQUE
KRC	KENYA RAILWAYS CORPORATION
KURH	KENYA UGANDA RAILWAYS AND HARBOURS
PCE	PROGRAMME OF CAPITAL EXPENDITURE
PERT	PROGRAM EVALUATION REVIEW TECHNIQUE
ROI	RETURN ON INVESTMENT
SAP	STRUCTURAL ADJUSTMENT PROGRAMS
UNIDO	UNITED NATION INDUSTRIAL DEVELOPMENT ORGANIZATION

Acknowledgements

I wish to express my special thanks to my supervisor, Dr. I. M. Mbeche, lecturer, Department of management science for the invaluable guidance and constant advice he gave me from the inception of the project to the final project report. His special interest in my work gave me a lot of encouragement.

I would like to extend my appreciation to all my classmates for being together and assisting one another as brothers and sisters as we went through this MBA programme, more specifically, R. Ndegwa, with whom we studied together most of the time, his company made the programme more enjoyable.

I am greatly indebted to my sponsors the Kenya Railways management for paying my fees towards this course, and also, for allowing me to conduct my research in the organization.

My deepest gratitude, of course is to my wife, Addah and to my parents, Mr. and Mrs. Mwadali for their patience and support through prayers. I felt they were part and parcel in my studies and this gave me a lot of confidence and assurance. Thank you so much.

In conclusion, I would like to acknowledge the plentiful encouragement by my brother in law A. Mwadime and my sincere friend F. Mwandembo in my studies, their constant advice and moral support gave me a lot of strength throughout this course. Lastly, I am grateful to E. Omoto who avail to me the SYSTATW5 package which I used to analyze my data, and who allowed me to use his office computer and printer.
Kisenga I managed to complete the project in time, thank you again.

ABSTRACT

Project management is a discipline which is evolving through research and refinement. Organizations, both private and public, are taking a keen interest on how they manage their projects. Projects are supposedly to be part of the organization undertaking to improve its position in terms of its operations and to position itself.

Project management involves the coordinating and controlling of various activities in a project. The project manager has a task of completing these activities successfully through the effective management of both human and non-human resources. A project exhibits a life cycle and during the project life, the project manager encounters problems which may adversely affect its progress. The project environment has to be conducive enough for the project to be completed at the right time, according to the budget, and expected quality.

The objective of this study was to analyze the factors that affect the management of projects at Kenya Railways. The results obtained show that the factors that affect project management at Kenya Railways are: poor communication, little experience of the project manager, late procurement of equipments, lack of training for project managers, ineffective monitoring and controlling systems, lack of personnel motivation, and slow project selection methods. However, most projects were in line with the organization's mission. Top management support for the projects was 50%, and it was found out that this was not adequate for the efficient management of these projects.

There is need to take projects more seriously, especially for an organization which undertakes projects as a tool to improve its efficiency and productivity. Several factors have been found which can affect the management of projects, starting with the most important. These are:

. Project mission should be in line with the organization goals.
. Selection of personnel should focus on those with qualifications and experience.
. Selection of the technology to be used should reflect the local environment.
. Project monitoring and control systems should be strengthened.

. Top management support should be given to all projects.
. Planning the project should involve those who will manage it.
. Training of project managers and project staff.

. Authority of the project manager should be increased.

. Project staff appraisal should be done and communicated to them.

On project performance, the factors starting from the most important are:

. Selection of the project.

. Non technical start-up problems should be as minimal as possible.

. Schedule and budget control are equally very important.

CHAPTER 1

1 INTRODUCTION

Management is often defined as "getting things done through people". Martino (1969) gave a more complete definition of the concept of management as being: the function of selecting the objectives of the enterprise, judiciously allocating resources to achieve these objectives, and controlling the entire process to ensure optimum return on the resources employed. Martino further stated that the actual function of management involves both art and science - ability and techniques - qualitative and quantitative approaches. This management skills are also applicable in project management.

The term "project" is very heavily used nowadays such that its meaning is often not clearly understood. A project is defined as a specific plan or design; a scheme; an idea; a planned undertaking according to Webster's New collegiate dictionary[1]. Amplifying this definition, a project is a unique, not a repetitive activity. It is, therefore, a group of related activities which are carried out to achieve a specified objective, in order to fulfil predetermined business objectives. These activities must be done in a particular order (they have precedence relationships). Everett and Ronald (1989) puts it in a more simplified version as a one-shot set of activities with a definite beginning and ending point. From this definitions, a project seems to have a definite sequence of events which are temporary and expedient exercises, and expires when the results are achieved.

---

[1] Quoted from Marubeni corporation booklet on project management.

Antony and Dearden (1980) defined a project as a set of activities intended to accomplish a specific end result, of sufficient importance to be of interest to the management. They give an example of repair and overhaul work done on a single ship in a ship yard as consisting of one project. The repair and overhaul work is undertaken by each production shop (electrical, sheet metal, plumbing, and many others). Each shop is responsible in a single repair and overhaul project of the sub-assemblies which accomplishes the building of a single ship. The specific end result is the completion of the ship. Most of this work is repetitive in various shops and there is consistency and uniformity of jobs. Gilbreath (1987)[2] referred to these activities as operations to differentiate them from a project. He also pointed out that in a project, there is only one end product.

Projects start as ideas, which are later put into practice. In several cases these ideas carry with them an objective. If there is no objective, there is no project, Nield (1985). Morris[3] (1972) concurred by stating that a project starts as an incipient idea which is explored for financial and technical feasibility in the prefeasibility/ feasibility stage. Project objectives have three major attributes: product, cost, and time. These are completely interdependent so that a change in one usually has an impact on the others.

---

[2] Cleland and King,"Working with pulses not steams: using projects to capture opportunity," ed. Gilbreath. chapter 1, Pg 6.

[3] Cleland and king,"Managing project interfaces-key points for project success." ed. Morris P. W. G. chapter 2, Pg 19

Projects are perfect responses to change. Gilbreath[4] (1987) compares projects with "waves"- forces and bundles of energy moving through time- each with its own identity, culture, methods of conversion and contrived cohesion. He further states that upon accomplishment of the project goal, this contrived cohesion no longer serves to bind the project together; instead it, dissolves the project dissipating the project waves upon the beach of success. This he termed the direction of change in which the project can expand; shrink; bend; accelerate and slow down; change shape and direction; and escape the burdens of capitalization, process addiction, and hardness.

The management of every project can therefore be looked at in two ways:

. by the management techniques employed to control the work, and

. by the practical phases through which the work passes from inception to completion.

The project manager needs to employ effective management techniques when managing each stage of the project. The project manager is required to think a head, by formulating strategic plans, and organization for effective and efficient accomplishment of the project. It is crucial, therefore, to understand the principles involved and how they interrelate. This allows the nature of the project activities to be better understood, problems to be seen in perspective, and needs to be assessed ahead of time.

Morris[5] states that project management teaches that to achieve the desired project objectives one must go through a specific process. The process is known as the project "life cycle." A project exhibits a life cycle which is defined by several phases: project

---

[4] Cleland and King ed. Gilbreath. chapter 1, Pg 9.

[5] Cleland and King ed. Morris. chapter 2, Pg 19

conceptualization, planning, execution, and termination. According to Morris[6], each of the four phases is dramatically different from the others in mission, size, technology, and scale and rate of change. He noted that these differences create distinctive characteristics of work, personal behavior, and direction and control. Thus the management style of each of the phases also is dramatically different.

Cleland and King (1988) presented various life cycle concepts and showed how the life cycle places demands on organizations. They asserted that the life cycle of a project is an important factor in determining the need for any value of a project management approach. They warned that due to the variability of various input and output measures in different stages of the life cycle, project management should focus on critical generic project dimensions, these dimensions are time, cost, and performance.

It is this variability in the stages of the project life that requires different approaches of management. The project manager has to combine the human and nonhuman resources to achieve the project objective successfully. Therefore, he is in charge of solving specific problems which are of human and nonhuman nature during the project life. Stuckenbruck[7] noted that these problems are numerous, extremely complex, very much interrelated, and often deeply hidden. He stressed on project integration as a means of ensuring that the pieces of the project come together as a "whole", at the right time and that the project functions as an integrated unit according to plan. This, he noted, can be achieved by maintaining

---

[6] Kelley, A. J."Project organization: structures for managing change." ed. Morris, P. W. G. chapter 14 pp 155.

[7] Cleland and King,"Integration: The essential function of project management." ed. Stuckenbruck. chapter 3, Pg 56.

communication links across organizational interfaces and between all members of the project team.

Project management field is growing rapidly especially in the developing world, where there is need to study the management techniques which are suitable and are applicable in this part of the world in relation to identification of projects which are likely to improve the welfare of the people, and improve efficiency and productivity.

There are many typical national large scale projects which have been undertaken and completed successfully in Kenya. Typical examples are: constructing stadiums, bridges, hydro-electric dams, airports; managing R and D projects(on drugs; agro-based research); running of political campaigns, advertising campaigns; management of international games (4^{th} all Africa games). Despite this success, problems do exist especially relating to the project life cycle and the project manager has to identify and overcome them.

The word success here has been borrowed from Baker, Murphy, and Fisher[8]. On their research on "Factors affecting project success", success is defined as, 'If the project meets the technical performance specifications and/or mission to be performed, and if there is a high level of satisfaction concerning the project outcome among key people in the parent organization, key people in the client organization, key people on the project team, and key users or clientele of the project effort, the project is considered an overall success.'

[8] Cleland and King. chapter 35, Pg 903.

1.1 BACKGROUND OF RAILWAYS PROJECTS

The world bank lending to railways through the early 1980s, which totalled over 130 projects and over US$ 5 billion, often failed to generate the expected improvement in railway performance. This prompted the world bank to establish a set of minimum criteria for bank financing in the 1980s and beyond, aimed at realizing structural change and more efficient operations. The criteria were: a well-defined economic role for the railways (to be reflected in a realistic traffic forecast); agreement with the government that the objective of financing is to attain a more efficient operation of the railway, in competition with other modes of transportation. As a start on improved functioning of transport markets (through reduced regulation and more appropriate taxation of competing modes), closure of uneconomic lines and/or increased managerial freedom; a start on internal reforms (management, planning, marketing, and costing); definition of an investment plan, free of significant uneconomic investments; and substantially completed engineering designs and operational action plans covering key problems were recommended.[9]

Kenya Railways has had a "stream of projects" which have been undertaken to improve its productivity, efficiency, and to keep pace with its environment in terms of technology. Most of this projects are donor funded and some are funded by the organization itself through its own surplus funds or by obtaining a commercial loan from local banks.

---

[9] Galenson and Thompson,"world bank lending in the 1980s." 1994.

Kenya Railways has undertaken several projects over the years and these project according to its corporate plan (1992/93-1996/97:pp 53) are: projects to support the traffic projections; projects to enhance operational efficiency; projects to enhance safety of operations; projects to enhance availability and reliability of locomotives and rolling stock; projects to improve the railway infrastructure; projects to enhance manpower training facilities and welfare.

All these projects mean a lot in terms of financial investment on the Kenya Railways Capital assets. The corporate plan (1995/96-1999/2000:pp 44) and Programme of capital expenditure for the financial year 1996/97 shows that an amount of Ksh. 5 billion is envisaged for the intended projects as shown in appendix 2 attached at the back. This reflects that the Railways is growing, Galenson and Thompson (1994) states that a dynamically growing railway faces entirely different challenges than one which is stagnant or shrinking. Growth, they assumed is rooted in valid economic projections and a reasonable role for the railway, leads to a focus on capacity, investment and asset productivity.

The demand for rail services has been on the rise, leading to Kenya Railways to look for viable future projects which can take rail development into the areas where it is most needed, and where such development can bring out the maximum benefits to the nation as a whole[10]. Each financial year, the railway board approves a capital budget for projects which are regarded as essential to future development of the railway. During the year 1995/96, the board approved a capital budget of Ksh. 320 million spread over about 70

[10] Kenya Railways: development overview.

projects, most of which were small and only a few were large[11]. This number of projects is quite large, but shows the magnitude and emphasis Kenya Railways has put on projects.

1.2 STATEMENT OF THE PROBLEM

According to figures obtained from the corporate plan (1995/96-1999/2000:pp 54) appended in appendix 2 attached at the back, the Kenya Railways corporation will spend a lot of money in its endeavor to replace most of its obsolete assets in the next five years. Therefore, it has identified these projects which need to be undertaken and has also set a budget for them which amounts to Ksh. 4.768 billion. In the previous corporate plan (1992/93-1996/97:pp 55), a total of Ksh 2.0941 billion was budgeted for capital investment.

Kenya Railways has more often emphasized on undertaking projects since 1988 and has committed a lot of funds to these projects. For example, in Programme of Capital Expenditure (PCE: 1996/97) it was noted that most of the Railways Capital assets are obsolete and have outlived their useful economic life and, therefore, require replacement through projects. There is need, therefore, to study the factors which affect project management at this organization with a view to identifying the areas of weakness and what should be done to remove these weaknesses.

Roman (1986) argues that there is need to determine the following: What did we learn from the past projects? How can we transfer what we learned on the projects to other

[11] Programme of capital expenditure for the financial year 1996/97 (PCE).

projects? Also, Galenson and Thompson (1994) point out that by analyzing what went wrong in the past, this exercise can help identify measures needed to improve the management of future projects. This is important in order to minimize recurrence of similar problems. Factors which affect the management of projects need to be identified with a view of improving the management of these projects at the Kenya Railways.

There is no universal formula for successful project management regardless of the prevailing circumstances. No one can specify a series of steps that, if followed, will result in a successful project. But it is possible to identify the main ingredients; those aspects which, if ignored, will almost certainly result in failure, Nield (1985). Project managers need to understand these aspects which could lead to the failure of the projects and on the same token, they need to understand the key areas which can influence the outcome of a project so that the impact they make in those areas is maximized. This study will try to identify the areas where the management of the Railways Projects require attention of the corporation and the project managers.

Most large scale projects begin with some kind of feasibility study to determine whether it is worthwhile to undertake the project, and if so, the best approach to use to undertake the project. If the project has been passed as viable and resources are available, then the question arises, why do these projects delay, or why are they abandoned in the course of time, or why should more resources be given in order to complete the project? In most developing countries where resources are scarce, one finds such projects uncompleted and are normally referred to as "white elephants". These are projects which were undertaken with wrong objectives and/or were poorly managed.

Kayongo (1981) found out that the major elements which coursed delay of UNIDO projects in Uganda was attributed to lack of technical planning and that not much effort was spent on planning the project, which resulted in the project evolving as a mass of uncoordinated tasks. Kayongo, in the same study, noted that the project managers ability was also hampered by other assignments making coordination and control of activities difficulty.

This study will look at the management of large scale projects at Kenya railways. The identification and selection procedures, planning and scheduling methods, and implementation and control are key issues which will be examined. The problems being faced by project managers from initiation stages up to completion will be studied to assist in making recommendations and suggestions on how the management of projects will be improved. Although this study is a case study of the Kenya Railways projects, the results obtained should be useful to others who are involved in the management of large scale projects.

1.3 OBJECTIVES OF THE STUDY

1) To identify significant factors which affect the management of large scale projects.

2) To determine the extent of using project management techniques in the management of the Kenya Railways projects and find out the reasons for this.

3) To make recommendations on how the management of large scale projects at the Kenya Railways should be improved.

1.4 IMPORTANCE OF THIS STUDY

1) This study is expected to provide the project manager with a diagnostic and learning tool. After completion of the project, the project manager will be in a position to know the areas which were overlooked, identify the problems he encountered and how he can avoid or correct them. The project manager will take remedial measures to prevent the same problems from recurring when planning for new projects. Also, knowledge and experience can be transferred to the management of future projects.

2) The study will also be important to the top management in that it will provide them with a clear picture of the type of problems which the project managers encounter during the project life cycle. They will in future assist to implement changes which will bring positive results in the management of projects.

3) The successful completion of the project will enable the management of an organization to solicit for loans from Donors and/or financial institutions. This study tries to identify the factors which influence the successful completion of projects.

CHAPTER 2

2 LITERATURE REVIEW

2.0. HISTORY OF KENYA RAILWAYS[12]

The history of Kenya Railways dates back to 1896 when the first railway line was built in East Africa. The first line was laid down at Kilindini, Mombasa, on 30th May, 1986. The construction of the Railway line was undertaken by the Imperial British East Africa Company and the line was known as the **Uganda Railways**. It took five years for the railway line to reach Port Florence (now Kisumu) on the shores of Lake Victoria on 30th December, 1901, from where direct communication with Uganda (at Port Bell) by boat was achieved. In 1926 the railway line was extended to Uganda by a new line which branched at Nakuru via Eldoret, Malaba, Tororo to Kampala.

Other branch lines were also constructed. The Magadi line was completed in 1915; the Voi-Taveta line was completed in 1924; the Rongai-Solai line was completed in 1926; the Leseru-Kitale line was completed in 1926; the Gilgil-Nyahururu line was completed in 1929; the Nairobi-Nanyuki line was completed in 1930 and the Kisumu-Butere line was completed in 1931.

The construction of the Railway line has seen various managements with different names. On 3rd February 1926, the **Uganda Railways** name officially Changed to **Kenya**

---

[12] Kenya Railways corporation: employee handbook (1989); Kenya Railways: development overview; The Royal visit to Kenya 1983.

Uganda Railways. On 20th December, 1927, the control and management of the Railways and Ports were taken over by the British High commission and the original name changed to **Kenya Uganda Railways and Harbours (KURH)**. On 1st May, 1948 the **KURH** was amalgamated with Tanganyika Railways and Ports services to form **The East African Railways and Harbours.** After the independence of the East African countries, the British High commission which was in charge of the Railways was replaced by **East African Common Services Organization**, whose title later changed to **East African Community**, and the Railway name changed to **East African Railways Corporation** in June 1969.

The East African Community broke up in August 1976. This incident gave birth to **Kenya Railways Corporation (KRC)** in January 1977, and on 20th January 1978, through an act of parliament cap. 397 of the laws of Kenya, **KRC** was legalised. **KRC** inherited a network of railways stretching over 2650 kilometers.

2.1 KENYA RAILWAYS PROJECTS

The projects of Kenya Railways do not arise in a vacuum, they are a response to perceived needs. Once these needs are identified, the details of selecting, planning, and executing are applied, Roman (1986). The identified projects are the building blocks of an investment plan, Little and Mirrlees (1976). Kenya Railways investment plan, as laid down in the corporate plan, identifies these perceived needs and shows the potential projects to be carried out over the planned period.

The corporate plan (1986/87-1990/91:pp 13) states: "if we are to expand further during the 1990's, as we must; if we are to contribute fully to Kenya's likely future growth in transport needs, further investment will be essential to consolidate KRC's position and equipments for a long-term future."

The corporate plan (1992/93-1996/97:pp 53) states: "KRC will need to complete projects which have already commenced or which are firmly committed." Some of these projects appeared in the last corporate plan (1986/87-1990/91) which were planned for and have not been completed. These are designated as on-going projects in the corporate plan (1992/93-1996/97), see appendix 2 at the back.

The corporate plan (1995/96-1999/2000:pp 44) states: "in order to achieve the planned traffic projections, both capacity and efficiency will have to be improved system-wide, through the implementation of certain important Capital Investments." These Capital Investments are the planned projects. From the three corporate plans, there is a lot of emphasis about projects and this means Kenya Railways is keen to change its obsolete capital assets and replace them with more efficient and productive ones. This is also necessary and coincides with the recent introduction of structural adjustment programs (SAPs). New technology is imperative if an organization has to cope with SAPs which were introduced by world bank, with the aim to enhance efficiency and productivity so that organizations can realize some profits.

2.1.1 The corporate plan

The act of identifying the corporation's needs and appraising the resources available with a view of formulating a developed strategy is referred to as the corporate planning process.

It should be noted that a corporate plan in KRC is a five year plan for KRC organization. Among the issues in the corporate plan, is the Investment plan, which is about projects to be undertaken for a planned period of five years and a review of uncompleted projects. This also goes with the allocation of funds.

2.2 PROJECT MANAGEMENT

A project is any plan, scheme or task. Naturally, the management and accomplishment of that task is termed 'project management', Stallworthy and Kharbanda (1983). A project consists of activities, when all the activities have been carried out, the project is completed. In a very real sense, therefore, project management is the management of all activities which comprise the project, Lock (1987). The execution of the project is entrusted to an individual who heads the project team. Such an individual is called the project manager or project coordinator. The project manager and his team forms the project organization. The project organization has the responsibility of accomplishing the specific project in the most economical, efficient and effective manner, within the constraints of time, budget, and performance. Hence, project management.

According to Rolefson (1978), project management helps to complete systems and programming projects on time, within budgets, and up to quality standards. He warns that the project managers should satisfactorily accomplish six steps, these are: (1) determining the degree of management required for a particular project, (2) communicating the project objectives, (3) selecting the project leader, (4) defining the detail task, (5) handling changes to plan, and (6) evaluating the project. He further state that to accomplish these steps the project manager needs to examine five environmental requirements for a successful project, these are; (1) Top management commitment, (2) active user involvement, (3) defined procedures, (4) a long-range plan, and (5) management skills. One of the main reasons for the appointment of a project manager by his employer is the wish of top management to delegate the responsibility for monitoring, coordinating, supervising or managing the project from start to finish to the project manager, Lock (1987).

Kerzner and serpentine (1981) states that project management is today the most significant development in organization systems management. They contended that project management is an organizational structuring concept, designed to obtain more effective and efficient utilization of the company's resources of manpower, money, information/technology, equipment facilities and materials. They also note that in a project environment, interpersonal skills are of paramount importance, most specifically communication. There is need to have a proper balance of communication for the successful completion of the project.

Cleland and king (1988) states that project management involves the coordination of group activity wherein the manager plans, organizes, staffs, directs, and controls, to achieve

an objective with constraints on time, cost, and performance of the end product. He further note that this can only be achieved by using human and nonhuman resources and therefore, it is a blend of art and science: the art of getting things done through and with the people in formally organized groups; and the science of handling large amounts of data to plan and control so that project duration and cost are balanced, and also, the excessive and disruptive demand on scarce resources are avoided.

Kerzner (1981) noted that the growth and acceptance of project management techniques was astounding. More and more industries came to accept project management as the tool of the future in order to make more efficient and effective utilization of corporate resources. He noted that, today, project management exists in construction, aerospace, defense, banks, hospitals, government agencies, accounting, law, R and D, manufacturing and electronics industries. He further states that if growth continues as it has in the past twenty years, we can expect to see major changes through technological developments. Project management will be widely implemented and accepted only when it clearly proves that increased profits may be realized.

Project management is the most effective approach to the management of projects in many organizational situations, especially in rapidly changing environments, where technology used in organizations determines the quality of product or service offered by the organization. This has led to organizations to adjust themselves by undertaking certain projects in order to cope with the environment. Therefore, the project management field is a rapidly growing one. Even experienced project managers will always find something new to learn. However, project management is not a panacea for every organization encountering

problems in projects, but it is the best in monitoring budget and standards.

Although project management has come of age as a discipline, in its own right, it is still evolving through research and refinements. Many of the tools and techniques of project management will undergo drastic changes in the next decade. This is because of the new capabilities made available through emerging computer technology which allows processing speeds, capacities, and graphic innovations of considerable importance to project planning and control, Kelley (1982).

Project management, like any other discipline, has its own problematic areas. For example, there is a need for a conducive project environment to be established between the project manager and the top management, and between the project manager and the project team. Problems occur during the project life cycle and these develop, for example, because of poor management support, unclear communication channels, unclear responsibilities, unclear channels of authority, unclear overall project goals, and unclear personal objectives. Other problems relate to team spirit, work distribution, mistrust, power struggle, conflict, poor leadership and poor decision making. Lock (1989), argues that no matter how experienced, competent, enthusiastic and intelligent the person (project manager) chosen for the job, he cannot expect to operate efficiently without adequate support and cooperation. This support includes support from higher management, acceptance and cooperation from all key staff, the provision of essential facilities and equipment, and the availability of suitable supporting clerical or other staff.

These problems revolve around the human aspect of project management. A satisfactory human relation system is essential for the successful execution of the project. Without such a system, the other systems of project management, however sound they may be, are not likely to work well, Chandra (1991). Technical problems can be solved easily with additional investment of resources, but peoples problems need to be handled carefully. The project manager must successfully handle problems and challenges relating to: authority, orientation, motivation, and group functioning.

These human aspects of project management are well articulated through the soft systems paradigm in Operations Research/Management science. In the past, the contribution of Operations Research/Management science to the discipline of project management was mainly the development and application of hard systems methods such as Critical Path Method (CPM), Project Evaluation and Review Techniques (PERT) especially in the project scheduling.

There is now a growing realization that the application of the hard systems methods of Operation Research/Management science to the exclusion of soft systems issues will not necessarily lead to successful project management, Mbeche (1993).

The literature shows that an important area of research in project management is how both the hard systems and soft systems ideas should be used to improve the management of projects.

2.3 PROJECTS CHARACTERISTICS

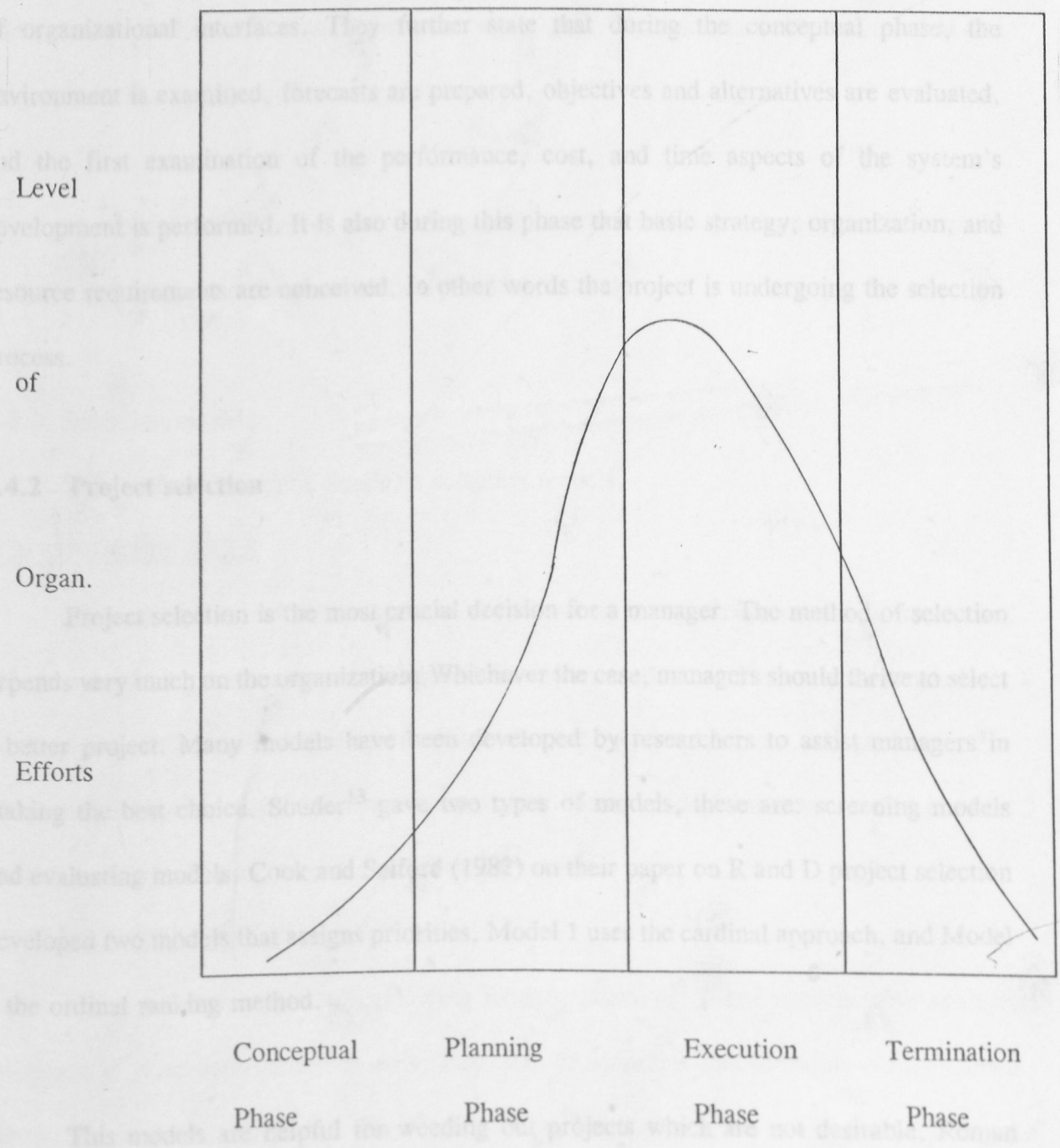
Most projects have been found to have the following common characteristics, Cleland and King (1987): a defined beginning and end (time criterion); a specific purpose or goals (effectiveness criterion); a limited budget (monetary criterion); and a series of complex or interrelated activities. Other characteristics of projects as noted by Chandra (1987) are: it is a non routine, non repetitive undertaking plagued with uncertainties; it involves coordination of the efforts of persons drawn from different departments and contributions of outside agencies; and the relationships in a project setting are dynamic, temporary, and flexible. Chandra contends that owing to these characteristics, the management of projects is very different from other management of operations. He states that there is need for a different form of organization, sharper tools of planning and control, and improved ways of coping with human problems in a project setting.

A temporary organization is normally formed to undertake this task to completion on behalf of the organization. There are about four phases of a project in its life cycle namely: project conceptualization, planning, execution, and termination. These phases renders a different kind of management needed on the project because of its variability.

2.4 PROJECT LIFE CYCLE

The project life cycle concept is very useful to project managers, not only in terms of distinguishing among stages in the project's life, but also through indicating likely resource requirements to be expected at each stage.

Table 2.1 The project life cycle.



2.4.1 Conceptual phase

This is the first phase of a project, where ideas develop into concepts and concepts can be translated into objectives, Roman (1986). Cleland and King (1987) noted that these

ideas can evolve from: research, current organizational problems, or from the observation of organizational interfaces. They further state that during the conceptual phase, the environment is examined, forecasts are prepared, objectives and alternatives are evaluated, and the first examination of the performance, cost, and time aspects of the system's development is performed. It is also during this phase that basic strategy, organization, and resource requirements are conceived. In other words the project is undergoing the selection process.

2.4.2 Project selection

Project selection is the most crucial decision for a manager. The method of selection depends very much on the organization. Whichever the case, managers should thrive to select a better project. Many models have been developed by researchers to assist managers in making the best choice. Souder[13] gave two types of models, these are: screening models and evaluating models; Cook and Seiford (1982) on their paper on R and D project selection developed two models that assigns priorities. Model 1 uses the cardinal approach, and Model 2 the ordinal ranking method.

This models are helpful for weeding out projects which are not desirable. Roman (1986) argues that projects are selected under a great variety of circumstances. Sometimes selection is undertaken systematically, and sometimes in an ad hoc fashion. Sometimes quantitative techniques serve as the basis for project selection; sometimes qualitative

---

[13] Cleland and King,"Selecting projects that maximize profits." ed. Souder. chapter 7. pp 140.

approaches dominate. Sometimes project selection is made in a top-down fashion, whereas on other occasions selection occurs at grass roots level. The formula to bear in mind is that project selection equals future commitment.

However, the choice of one project over another will depend on the nature of the projects being assessed and the decision problem at hand.

2.4.3 Selecting models

It is useful to examine Souder's selection models.

SCREENING MODELS

They are quick and inexpensive to use, they can economize on the total evaluation efforts by reducing the number of projects to be further evaluated. They require a relatively small amount of input data, and can be used where the projects are not well understood or where a minimum amount of data are available. These models include: profile models; checklist models; scoring models; and frontier models.

EVALUATION MODELS

There are three types of evaluating models: economic index models; risk analysis models; and value-contribution models. Examples of economic index models will be shown below: These models are useful when the decision maker need to have a more detailed and in depth analysis than screening models.

ECONOMIC INDEX MODELS

An index models is simply a ratio between two variables, and the index is their quotient. Changing the values of the variables changes the value of the quotient, or the index.

An example of a commonly used index model is the return on investment (ROI) index model.

$$ROI\ Index = \frac{\sum_i \frac{R_i}{(1+r)^i}}{\sum_i \frac{I_i}{(1+r)^i}}$$

Where R_i is the net shillings returns expected from the project in the i^{th} year, I_i is the investment expected to be made in the i^{th} year, and r is an interest rate. The numerator is the present worth of all future revenues generated by the project, and the denominator is the present worth cost of all future investments.

Other examples of index models are:

Ansoff's index model uses both shilling values and index numbers as input data. Index number T and B are judgements.

$$Project\ figure\ of\ Merit = \frac{rdp(T+B)E}{Total\ Investment}$$

Olsen's index models is a variation on Ansoff's index that uses all the shilling input data.

$$Project\ value\ index = \frac{rdpSPn}{Project\ Cost}$$

Viller's index is a kind of return on investment model, discounted by the compound likelihood of project success.

$$Project\ index = rdp\left(\frac{E-R}{Total\ Investment}\right)$$

Disman's index looks at the expected earnings over and above the cost to complete the

project.

$$Project\ Return = rp(E - R)$$

Key: r = the probability of research success,

d = the probability of development success,

p = the probability of market success,

T and B are respective indexes of technical and business merit,

E = the present worth of all future earnings from the project,

S = annual sales volume in units,

P = unit profit,

n = number of years of product life,

R = present worth cost of research and development activities to complete the project.

2.4.4 Project planning

Kelley (1982) argues that to cope with the complexities, project managers and their teams will have to plan, plan again, and then plan some more. This he states, is necessary in order to have good initial baseline planning and continual replanning as the project moves along its various phases because new information is being acquired and changes both expected and unexpected comes by as the project moves ahead.

The purpose of any planning process is to define objectives and then define strategy and tactics to achieve these objectives. In project planning process, one determines: What is to be done; how it is to be done; who will do it; when it will be done; and how much it will cost. According to Miller (1978), a project manager without a plan is like a football team without a play book, inventing plans during a game.

According to Knutson and Scotto (1978), the plan is the heart of project management - the work on the project, therefore, must be coordinated by someone who understands, not only what has to be done, but some sequence it must be done in, when it must be done and for what cost. The job of the project manager is to ensure that the end product comes up to the specifications determined by management.

Project planning therefore includes all activities that result in developing a course of action about a specific project. Goals for the project, including resources to be committed, completion times, and results, must be set and their priorities established. Actual work responsibilities must be identified and assigned. Time estimates and resources required to perform the work activities must be forecast and budgeted. Moder[14] puts it in a more simplified version, that planning is the process for the commitment of resources in the most economic fashion.

[14] Cleland and King. pp 324.

2.4.5 Project scheduling

Vossen (1979) argues that before any estimating and control activities can occur, the analyst must have knowledge of the steps involved in implementing a system. He further states that any project estimation and control technique requires judgement on the part of the estimator. A general understanding of the project is therefore, crucial in order to reasonably estimate the activities.

Scheduling establishes times for the various phases of the project. In project scheduling, the manager considers the many activities of an overall project and the tasks that must be accomplished and relates them coherently to one another and to the calendar, Ulysses and Ernest (1978). There are several project scheduling models that are useful in project management, these are: the milestone chart, the Gantt chart, the critical path method (CPM), the program evaluation and review techniques (PERT), and the graphical evaluation and review techniques (GERT).

The rapid development of computer soft-ware packages are now used for project management for simplifying the process of implementing and execution of project management programs.

2.4.6 Project execution

This stage involves the actual work, of the project. Materials and resources are procured, the project is produced, and performance capabilities are verified. This is where

project management and the project manager begin to play their part in earnest, Stallworhty and Kharbanda (1983).

2.4.7 Project control

Project control is concerned on major questions like: is the project going to be finished by the scheduled completion date? is the completed work going to meet the specifications that were contemplated when the project was approved? and is the work going to be done within the estimated cost?, Anthony and Dearden (1980). This three questions monitor the project in terms of time, cost, and performance and therefore, a project control system should be structured in terms of these dimensions.

Woodridge (1976) argued that a project control system is a collection of interrelated techniques for keeping a project on schedule and ensuring the quality of the work produced. She noted that this techniques provides the project manager with a standardized set of methods for planning work, monitoring progress and quality, and detecting potential problems in time to take effective action. She further states that like any other system, it can be thought of as having inputs and outputs, with a logical set of rules for processing the inputs in order to create the output. And also like any other system, it has logic bugs or performance bugs, the results will be inaccurate or useless, or will be achieved only with an unnecessary amount of work.

In summary, project control involves a regular comparison of performance against targets, a search for the causes of deviation, and a commitment to check adverse variances,

Chandra (1991). There are four essential elements involved in control, Cleland and King (1988) gave these elements as: setting objectives, reporting, evaluating, and corrective action.

2.4.8 Project termination

Termination phase signals the end of a project and can determine whether a project was a success or a failure. Roman (1986) argues that the project can be concluded because the project objectives were met, the project can be terminated for convenience, or the project may be terminated for default or failure.

Project completion: represents a phasing-out process, it involves the scaling down and dismantling of the organization. The completion phase also involves the reassignment of project personnel and, where possible, the transfer of resources to other projects. Completion should be anticipated and planned for to enable an orderly and effective transition.

Termination for convenience: termination for convenience can result because organizational resources are constrained and other projects are perceived as having higher priority for available resources. It is also possible that the project may have a high organizational priority but is stopped because of insufficient resources. Other reasons are: new technology may make the project not feasible; the initial project cost expectations have been exceeded; the potential market has changed and the sales prospects, in line with costs, do not appear encouraging; competitive forces are such as to discourage project continuation; the internal or external political environment may shift, with a subsequent diminishment of interest and support for the project; questionable probability of technical success; legal implications; and other investment opportunities promise better returns for the allocated resources.

Termination for default: default is often related to unsatisfactory technical performance.

Termination for default can also result because of cost overruns, delivery deficiencies, quality discrepancies, legal violations, unsatisfactory material and other substitutions, inadequate project planning, customer (internal or external) dissatisfaction, poor project management, insufficient internal or external management support, or lack of quality resources allocated to the project.

2.5 PROJECT TEAM

The team which manages and executes the project or task is called the project team or the task force, Stallworthy and Kharbanda (1983). Kerzner and serpentine (1981) states that project management is an attempt to put together the best possible teams in order to achieve a common objective within time, cost, and performance. They described a project team as a group of people who have never worked together before, but must meet, work as a team, make their contributions and perhaps never meet again.

According to Thamhain[15], team building is the process of taking a collection of individuals with different needs, backgrounds, and expertise and transforming them into an integrated, effective work unit. In this transformation process, the goals and energies of individual contributors merge and support the objectives of the team.

Project teams are not permanent because there is a definitive end to the project, when this end has been reached, the project is over and the team can return to previous

---

[15] Cleland and King,"Team building in project management", ed. Thamhain. chapter 32. pp 823.

assignments. The team is drawn together to accomplish certain tasks within a predetermined budget and within a specified time frame, Ryan (1979).

2.6 PROJECT MANAGEMENT TOOLS

2.6.1 Gantt charts

Gantt chart is bar chart, developed by Henry L. Gantt (1861-1919) (an American engineer and pioneer in scientific management) at about 1915. Gantt chart shows the relationship of activities over time. Gantt chart is primarily designed to control the time element of a program.

The activities are listed in the vertical direction, and elapsed time is recorded horizontally.

Table 2.2 Gantt chart symbols[16]

SYMBOL	SYMBOL MEANING
[	Start of an activity
]	End of an activity
———	Schedule worktime
[ ]	Actual progress of the activity
V	Point in time where the project is now
M	Delay caused by materials
R	Delay caused by repairs
T	Delay caused by tool trouble
A	Operator absent

Gantt chart shows the start time, completion time, estimated duration of each task can be read off easily. Overlap between tasks can be shown, as well as the end of one task and the coincidental beginning of another. The chart does not show which tasks must be finished before others can begin, nor will it show the effects on the target date of delays in completing various tasks.

[16] Adam, E. E. Jr,"Production and operation management," pp 307.

2.6.2 Network analysis

Network analysis attempts to overcome the disadvantages of other models. Networks are known by the acronyms as CPM (critical path method), PERT (program evaluation and review technique), and GERT (graphical evaluation and review technique).

CPM

This is a computer-based scheduling system on network and was introduced in the late 1950s to aid scheduling of large engineering projects. The CPM was developed by DU Pont and Remington Rand. CPM is a deterministic system that uses the best estimate of the time to complete a task.

CPM is an arrow network diagram which shows a chronological sequence in which events must be completed in order to complete the whole project. The chief elements of the diagram are:

1) An activity:- a time consuming effort that is required to perform part of a project. An activity is shown on an arrow diagram by a line with an arrowhead pointing in the direction of progress in completion of the project.

2) An event:- the end of one activity and the beginning of another. An event is a point of accomplishment and/or decision. A cycle is used to designate an event.

It should be noted that the critical path is the longest time through that network. These are events which have identical earliest and latest times. An event that is not critical is said to have slack. Slack is the calculated time span within which the event must occur. The term slack is used only in referring to events.

The concept of float is of greatest importance because this is the time available for an activity in addition to its duration. Non-critical activities have float. There are different kinds of float, and their measure has the form:

Float = End time - Start time - duration

Since both the start and end events of an activity have earliest and latest times, there are four kinds of float possible. In practice only three are used, namely:

Total float

This is the time by which an activity may be delayed or extended without affecting the total project duration.

Total float = latest end - earliest start - duration

Free float

This is the time by which an activity may be delayed or extended without delaying the start of any succeeding activity.

Free float = earliest end - earliest start - duration

Independent float

This is the time by which an activity may be delayed or extended without affecting preceding or succeeding activities in any way.

Independent float = earliest end - latest start - duration

PERT

PERT uses the same idea as CPM; but instead of using just the most likely time estimates, it uses a probabilistic estimate time for completion of an activity.

The three estimates are:

1) optimistic time (a)

2) most likely time (m), and

3) pessimistic time (b)

The time estimates are assumed to follow a beta frequency of distribution that gives the expected time as :

$$t_e = \frac{a + 4m + b}{6}$$

In PERT the expected time is computed for each activity, and expected times are used to determine the critical path as for the CPM technique. t_e, expected time has a standard deviation which describes its scatter, given by

$$\sigma = \frac{b - a}{6}$$

Standard deviation along a path in the PERT network is the square root of the sum of the individual variances for the separate activities along the path[17].

$$\sigma_{path} = \sqrt{\Sigma\sigma^2}$$

[17] Deiter, G. E."Engineering design," pp 374.

CHAPTER 3

3 RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

This study uses the case study design. The case study design was adopted because of the resources and time scale constraints which the researcher faced. Ideally, it would have been more appropriate to use a survey design where large scale projects would have been studied from different organizations and environments in order to arrive at more generalised conclusions.

Nevertheless, although the case study approach is used for the study, several projects of different types, within the Railways corporation were used. The number of projects studied and the methods of analysis used should permit the findings obtained to be extended to the management of similar projects in other organizations.

3.2 POPULATION

This study was conducted at the Kenya railways. It is a study that examined the use of project management techniques throughout the projects life cycles ie. from their inception to completion. All the problems and how they were solved to ensure the successful completion of the project will be studied. More emphasis was focused on the product, cost, and time.

The population is the list of all the projects which are classified as large projects by the Kenya Railways and more specifically engineering oriented projects. Bent[18] states that the project size is dependent on the size of the company, therefore, " a large project" will be in the context of Kenya Railways classification of projects for this particular study. The Kenya Railways organization defines a large project as that involving an expenditure of more than Ksh. 10 million. This definition was adopted in this study.

The population of large projects is convenient to the study in that a large project involves a lot of activities in terms of time, cost, staff and materials both within and without the project. Moreover, the interactions between the project organization and its environments will be very significant and clearly spelt out in a large project than a small project, and that is why the study focusses on the large projects.

3.3 SAMPLING

All large projects were selected and analyzed for the period between 1988 to 1996. This period had been chosen because the researcher was likely to find those who participated directly in the project and are still working there. Also the period was considered enough to find a reasonable number of projects for this study.

A list of projects both small and large is attached at the back as appendix 2. A sample frame of 45 large projects was listed. A judgmental sample of 40 projects was selected.

---

[18] Cleland and King,"project control: Scope recognition," ed. Bent. chapter 24, Pg 597.

Personal judgement was used to ensure that the sample reflects the executed in different departments. Also, additional projects which were known to the relevant departments and executed in the same pe list constituted the sample frame for all large projects.

3.4 DATA COLLECTION METHOD

Primary data was collected through questionnaires and interviews from project managers of the sample projects. The questionnaire was personally administered by the researcher to the respondents. The researcher went to the project manager and explained the purpose of the visit after which arrangements were made on the time to collect the questionnaire and to hold the interviews. The interviews were extended to other project staff comprising engineers, supervisors, and support staff. This information was important in understanding the project management techniques used during the project process and specifically on the human aspect.

The questionnaire was divided into two parts. A sample questionnaire is attached at the back as appendix 1 with Part A of the questionnaire having 11 questions. These questions captured information about the general experiences of the manager, extent of managers participation in the projects, awareness of the project management tools and techniques used by the project manager.

Part B of the questionnaire had 40 questions to capture information about the environment and 11 questions to capture information about the project performance. The first

40 questions investigated 8 dimensions of project environment.

. Project mission

. Top management support

. Planning and scheduling

. Personnel

. Technology

. Monitoring and feedback

. Communication

. Problem solving

The second 11 questions investigated 4 dimensions.

. On schedule and on budget

. Intention of the project and benefits

. Satisfaction of project manager

. Productivity and performance improvement of the use of the project.

Part B questions employed a 5-scale likert type, ranging from "strongly disagree" to "Strongly agree".

Secondary data was also used in this study. Official records of the project were examined as a source of secondary data. This included going through relevant files to capture information about how the project was conceptualized, progress reports, and any other information pertaining to the project during the project life cycle such as the cost, contracted activities, planning methods, project scheduling, project control and utilization of labour. This information was a good follow up to the questionnaire and was used to assist in making conclusions and recommendations.

3.5 ANALYSIS OF DATA

The data collected from part A of the questionnaire was analyzed by the use of descriptive statistics such as proportions, frequency and percentages. This explained the experiences, and participation of the project manager on projects, and also gauged the awareness of managers on project management tools and techniques used in managing projects.

Part B of the questionnaire was analyzed using factor analysis. The factors that are considered important are highlighted in order of importance. These factors are the internal and external environment of the project which can affect the project process. Factor analysis method was used to determine those factors which can affect the project during the project life cycle. The primary goal of factor analysis is to reproduce as accurately as possible original intercorrelation matrix from a small number of hypothetical factors to which original variables are linearly related. Varimax rotation was employed on the initial factor matrix to improve in the interpretability of the data. The most common procedure in factor analysis is to single out for each factor those variables having the highest loadings in absolute value.

To perform factor analysis the SYSTATW5 (window based) package was used.

3.5.1 Overview of factor analysis

Factor analysis is a procedure that takes a large number of variables or objects and searches to see whether they have a small number of factors in common which account for

their intercorrelation, Kinnear and Taylor (1991). They gave a number of possible application of factor analysis as: data reduction, structure identification, scaling, and data transformation. Churchill (1983) noted that factor analysis can be put to use in life styles and psychographic research problems.

3.5.2 Steps of factor analysis

There are three steps in factor analysis solution:

1. to identify a set of correlations between all combinations of the variables of interest. Intervally scaled input variables,

2. to extract a set of initial factors from the correlation matrix developed in the first step, and

3. to "rotate" the initial factors to find a final solution.

CHAPTER 4

4 DATA ANALYSIS AND FINDINGS

A total of 32 questionnaires were sent out, only 31 were received, and one was not fully answered. Therefore, the researcher analyzed only 30 completed questionnaires. Part A of the questionnaire is summarized and presented in terms of proportions and frequency, and Part B of the questionnaire is represented using factor analysis.

4.1 ANALYSIS OF RESPONSES ON PROJECT ENVIRONMENTS

The results of Part A are summarized in the tables below:

Table 4.1 Manager's experience.

	Frequency	Percentage
With experience	14	46.67
With no experience	16	53.33
Total	30	100

Table 4.2 Number of projects managed by project managers.

	0	1	2	More than 3	Total
Number of projects	14	1	4	11	30
Percentage	46.67	3.33	13.33	36.67	100

Table 4.1 and 4.2 indicate that some projects were handled by some project managers for their first time to be 46.67%. While 53.33% of the project managers had some experience in at least more than one project. On interviewing the project managers, the researcher found out that most of them had not been trained on project management prior to their appointment hence relied on the experience of their first projects. Those who had no experience just did their work as part of their duties, since appointments were purely done by their departmental heads. Projects should not be used as a testing ground, since they involve a lot of money and this should be considered when appointing managers on projects. Also time and performance of the project is equally important.

Table 4.3 Managers working full time on projects.

	Frequency	Percentage
Working full time	18	60
Not working full time	12	40
Total	30	100

Table 4.3 above indicate that managers who worked full time on the projects after their appointments was about 60.00%. This means that they started the projects from inception to completion. On the other hand 40% of the projects were undertaken by managers who were still doing their normal office work. An interview with the managers confirmed that to some extent, the divided commitment affected their work at the project site. This resulted in poor supervision and eventual delay of the projects. There is need to have managers working on full time, this will ensure good supervision and also problems will be solved at the right time when they arise.

Table 4.4 Involvement of Project Managers in entire life cycle of a project.

	Frequency	Percentage
Complete involvement	24	80
Partial involvement	6	20
Total	30	100

From table 4.4 above indicate that 80% of managers were involved in the projects from their inception to their completion. 20% of the projects were however, handled by different project managers. In an interview with the managers, the reasons for changes were attributed to promotions, transfers, job termination and retirements. These changes led to project delays. The projects had to be handed over to another manager. The organization should endeavour to promote people while still on the project, the changing over can create new style of management which also can cause delays. The new manager will have to learn how the project has been approached before embarking on it. The project staff will have to get used to the new manager. A lot of time here will be wasted in the process.

Table 4.5 Projects which started on schedule.

	Frequency	Percentage
Starting on schedule	17	56.67
Not starting on schedule	13	43.33
Total	30	100

From table 4.5 above, 56.67% of the projects were started on schedule while 43.33% were started late. Most managers attributed the late start due to financial availability and administrative problems. Others mentioned the late arrival of consultants and procurement of equipments which were needed for startup. Also, other project managers attributed the late start due to the revision of prices, bad weather conditions, especially for civil engineering projects.

Table 4.6 Projects completed on schedule.

	Frequency	Percentage
Completed on schedule	8	26.67
Not completed on schedule	22	73.33
Total	30	100

From table 4.6 above most of the projects were not completed as scheduled and this accounted for 73.33% of the projects. Only 26.67% of the projects were completed as scheduled. Most project manager's attributed the non completion according to schedule on : 1) slow process in decision making, 2) consultants falling sick and no immediate replacement, 3) under estimation of time required by the activities, 4) delays in the procurement of equipments, 5) lack of cooperation within the departments, 6) incorrect design drawings, 7) major changes/variations of the design when the project was still in the process, and 8) lack of morale among staff.

Table 4.7 Project given special support.

	Frequency	Percentage
Given special support	15	50
No special support	15	50
Total	30	100

From table 4.7 above indicates that 50% of the projects were given special support and 50% were not. On interviewing the project managers, the reasons for special support included lack of cooperation among the various departments involved in implementing a project. When departments fail to cooperate, support from the top became necessary in order to proceed.

Table 4.8 Awareness of the tools used in project management.

	Frequency	Percentage
Milestone	8	26.67
Bar chart	18	60
CPM	14	46.67
PERT	7	23.33
GERT	0	0
Project duration charts	19	63.33
Project life cycles charts	2	6.67
Pie charts	4	13.33
Others	0	0

From table 4.8 above, the bar chart and the project duration charts are the most well known tools in project management at Kenya Railways. The proportion of awareness for these tools are 60% and 63.33% respectively. It may be recalled from table 4.1 that 53.33%

of the project managers did not have an experience in project management. It is difficulty, therefore, to expect these managers to be aware of how tools such as CPM, PERT and GERT are applied in the management of projects without some training.

Table 4.9 Project management techniques used.

	MI	%	N	%	LI	%	Total
Control of quality	19	63.33	8	26.67	3	10	30
Control of Programme (time)	17	56.67	10	33.33	3	10	30
Control of variations (staff, materials)	10	33.33	15	50	5	16.67	30
Control of cost	16	53.33	8	26.67	6	20	30
Total	62		41		17		

MI = most important N = neutral LI = least important

From table 4.9 above, control of project quality , control of time, and control of cost were the techniques which were mostly used by the project manager. It can also be seen that many of the project managers did not put a lot of emphasis on the control of variations in staff and materials. This agrees very well with the traditionally emphasized project management objectives as being quality, time and cost. Yet control of staff and materials will affect all the three objectives.

4.2 FACTOR ANALYSIS

Factor analysis was performed on part B of the questionnaire to determine the factors that significantly affect project management. Part B of the questionnaire had 40 questions on project environment and 11 questions on project performance. The first 40 questions investigates 4 dimensions, as given on page 43, a sample of the questionnaire is attached at the back as appendix 1.

A statistical package known as SYSTATW5 (window based) was used to analyze this data. Two analysis were done, one for the responses of project managers, and the second on project performance and the results are presented below.

Table 4.10 correlation matrix for project managers response.

	1	2	3	4	5	6	7	8	9	10
1	1									
2	.952	1								
3	.964	.844	1							
4	.982	.960	.927	1						
5	.994	.975	.931	.992	1					
6	.576	.635	.418	.546	.614	1				
7	.525	.456	.483	.415	.507	.866	1			
8	.597	.364	.715	.477	.523	.447	.775	1		
9	.597	.364	.715	.477	.523	.447	.775	1	1	
10	.675	.662	.601	.565	.662	.853	.933	.683	.683	1
11	-.418	-.368	-.507	-.452	-.388	.480	.478	.030	.030	.250
12	.499	.504	.385	.439	.518	.972	.946	.580	.580	.876
13	.658	.722	.504	.611	.688	.980	.870	.472	.472	.921
14	.188	.272	.029	.138	.227	.904	.820	.289	.289	.742
15	-.114	-.135	-.184	-.113	-.083	.619	.578	.264	.264	.296
16	.916	.932	.857	.868	.907	.497	.459	.444	.444	.714
17	.997	.949	.962	.992	.994	.556	.487	.573	.573	.630
18	-.437	-.359	-.474	-.266	-.373	-.416	-.721	-.682	-.682	-.822
19	.943	.847	.946	.867	.910	.619	.714	.791	.791	.826
20	-.110	-.188	-.045	.032	-.088	-.377	-.522	-.202	-.202	-.677
21	.608	.649	.462	.574	.641	.998	.884	.498	.498	.867
22	.731	.761	.604	.671	.748	.959	.896	.572	.572	.951
23	.679	.858	.463	.709	.746	.770	.445	.031	.031	.641
24	.826	.948	.663	.821	.864	.710	.492	.218	.218	.728
25	.583	.581	.486	.492	.586	.938	.972	.645	.645	.968
26	.506	.559	.356	.456	.537	.990	.903	.466	.466	.880
27	.954	.953	.860	.962	.975	.752	.601	.518	.518	.707
28	.936	.949	.829	.956	.964	.756	.572	.466	.466	.674
29	.550	.724	.323	.564	.619	.898	.600	.085	.085	.713
30	.300	.220	.263	.358	.331	.575	.459	.395	.395	.222
31	-.321	-.380	-.323	-.242	-.288	.142	.055	0	0	-.272
32	.472	.559	.289	.509	.538	.928	.663	.237	.237	.603
33	-.779	-.923	-.618	-.786	-.818	-.567	-.327	-.085	.085	-.611
34	.651	.514	.731	.501	.576	.335	.645	.800	.800	.763
35	.322	.186	.341	.207	.287	.714	.943	.822	.822	.770
36	-.269	-.159	-.423	-.266	-.211	.624	.480	-.062	-.062	.299
37	.572	.571	.464	.503	.584	.971	.961	.620	.620	.922
38	.858	.834	.769	.820	.868	.902	.845	.669	.669	.880
39	.642	.760	.485	.574	.664	.780	.682	.296	.296	.882
40	.931	.939	.864	.875	.923	.613	.585	.524	.524	.804

	11	12	13	14	15	16	17	18	19	20
11	1									
12	.576	1								
13	.359	.943	1							
14	.787	.925	.856	1						
15	.874	.701	.462	.761	1					
16	-.465	.404	.639	.171	-.343	1				
17	-.438	.473	.630	.157	-.111	.893	1			
18	-.055	-.508	-.544	-.394	.065	-.601	-.374	1		
19	-.265	.611	.711	.304	-.028	.890	.922	-.686	1	
20	-.260	-.414	-.500	-.506	.071	-.419	-.041	.836	-.320	1
21	.455	.977	.980	.887	.613	.517	.588	-.438	.657	-.364
22	.278	.933	.991	.801	.409	.701	.702	-.608	.796	-.495
23	0	.609	.823	.560	.083	.733	.670	-.233	.561	-.338
24	-.193	.569	.807	.440	-.096	.902	.809	-.427	.746	-.416
25	.446	.968	.957	.870	.522	.561	.545	-.694	.726	-.580
26	.552	.986	.974	.942	.639	.456	.478	-.492	.590	-.472
27	-.194	.659	.791	.398	.127	.823	.957	-.321	.873	-.070
28	-.180	.652	.786	.404	.147	.801	.942	-.260	.836	-.031
29	.300	.778	.912	.781	.356	.576	.535	-.262	.490	-.399
30	.398	.593	.426	.456	.792	-.070	.334	.245	.250	.480
31	.576	.202	-.057	.244	.802	-.651	-.280	.577	-.356	.627
32	.492	.863	.853	.822	.708	.304	.477	-.049	.417	-.053
33	.325	-.403	-.684	-.293	.267	-.901	-.764	.367	-.668	.399
34	-.237	.409	.472	.173	-.211	.740	.603	-.930	.843	-.607
35	.581	.856	.677	.738	.698	.189	.289	-.623	.553	-.369
36	.955	.656	.502	.859	.883	-.331	-.280	.038	.196	-.209
37	.496	.994	.962	.895	.621	.496	.542	-.577	.686	-.460
38	.108	.872	.923	.650	.369	.739	.844	-.510	.882	-.267
39	.100	.706	.883	.659	.045	.801	.599	-.681	.690	-.741
40	-.339	.536	.739	.303	-.201	.988	.906	-.650	.930	-.450

	21	22	23	24	25	26	27	28	29	30
21	1									
22	.966	1								
23	.754	.793	1							
24	.708	.814	.954	1						
25	.947	.966	.633	.656	1					
26	.987	.952	.715	.660	.963	1				
27	.774	.831	.799	.864	.683	.676	1			
28	.774	.818	.818	.863	.662	.674	.997	1		
29	.877	.863	.953	.858	.764	.867	.729	.749	1	
30	.591	.420	.198	.086	.408	.516	.491	.516	.334	1
31	.140	-.104	-.265	-.460	-.036	.118	-.117	-.079	-.071	.802
32	.919	.807	.743	.602	.748	.885	.709	.737	.869	.750
33	-.561	-.690	-.926	-.981	-.509	-.512	-.787	-.788	-.786	.067
34	.374	.572	.219	.472	.602	.373	.483	.420	.169	-.158
35	.739	.708	.143	.189	.845	.766	.394	.362	.347	.541
36	.592	.405	.252	.022	.507	.665	0	.029	.524	.490
37	.979	.962	.641	.630	.987	.983	.706	.694	.786	.539
38	.922	.957	.743	.795	.890	.865	.934	.922	.772	.553
39	.772	.880	.860	.904	.818	.784	.685	.670	.857	-.033
40	.633	.798	.761	.917	.677	.578	.872	.845	.645	.038

	31	32	33	34	35	36	37	38	39	40
31	1									
32	.401	1								
33	.571	-.468	1							
34	-.592	0	-.423	1						
35	.270	.541	0	.548	1					
36	.105	.833	.105	-.310	.510	1				
37	-.026	.794	.472	.496	.849	.577	1			
38	-.026	.794	-.699	.578	.681	.245	.906	1		
39	-.500	.586	-.857	.858	.405	.236	.760	.759	1	
40	-.564	.415	-.886	.763	.326	-.207	.621	.827	.846	1

Table 4.10 above shows the correlation matrix of the forty variables which were contained in the questionnaire of part B. This is the basis of generating factors and shows the intercorrelation among variables. For example, question 2 is highly correlated with question 1 by 0.952. For high correlation the number should be either close to 1 or -1. Zero indicate no correlation while between 0.7 and -0.7 indicate weak correlation. Variable 28 is highly

correlated to variables 1, 2, 3, 4, 5, 6, 16, 17, 19, 22, 23, 24, and 27. Some variables are negatively highly correlated, for example, variable 33 is negatively highly correlated to variables 2, 4, 5, 16, 23, and 24.

Table 4.11 Initial output of variable, communality and eigen values (I).

Variable	1	2	3	4	5, . . .,40
Communality	1	1	1	1	1, . . . ,1
Eigen values	24.0	8.3	4.0	3.6	0, . . . ,0
% variance	60.0	20.8	10.1	9.0	0, . . . ,0

Table 4.11 above shows the initial output of the variables, communality and eigen values of the initial factor matrix. The communality is the proportion of the variables's variation to the total variation that is involved in the factors. All variables have a good contribution to the factors, this is indicated by 1 or 100%.

A quick glance at the eigen values shows that there are four main factors. The four factors are indicated by eigen values more than 1. Factor 1 explains 60% of the variation, factor 2 explains 20.8% of the variation, factor 3 explains 10.1% of the variation and factor 4 explains 9% of the variation.

Table 4.12 Initial factor matrix (I).

	Factor 1	Factor 2	Factor 3	Factor 4
1	.841	-.472	.125	.233
2	.848	-.445	.287	-.028
3	.735	-.543	-.033	.405
4	.787	-.478	.304	.246
5	.851	-.439	.222	.184
6	.908	.391	.128	-.080
7	.854	.368	-.351	.108
8	.622	-.010	-.526	.580
9	.622	-.010	-.526	.580
10	.935	.092	-.322	-.116
11	.111	.974	-.116	-.157
12	.871	.487	-.060	-.020
13	.956	.238	.045	-.167
14	.683	.684	-.034	-.253
15	.294	.916	.106	.250
16	.796	-.592	-.031	-.125
17	.817	-.478	.182	.269
18	-.607	.131	.765	.170
19	.883	-.357	-.188	.240
20	-.427	-.034	.613	.663
21	.923	.369	.104	-.030
22	.984	.157	-.021	-.086
23	.796	-.105	.436	-.406
24	.856	-.319	.247	-.323
25	.922	.316	-.215	-.065
26	.886	.447	-.012	-.127
27	.905	-.237	.298	.188
28	.889	-.214	.363	.176
29	.819	.193	.363	-.399
30	.409	.513	.417	.629
31	-.169	.740	.374	.532
32	.756	.474	.451	.061
33	-.744	.451	-.279	.406
34	.635	-.381	-.666	.088
35	.655	.518	-.453	.313
36	.246	.931	.138	-.231
37	.914	.394	-.098	.007
38	.983	.034	.072	.166
39	.863	-.085	-.082	-.491
40	.877	-.469	-.053	-.092

From table 4.12 above shows the initial factor matrix. The coefficients shows the correlation between the factors and the variables. For example, variables 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 16, 17, 19, 21, 22, 23, 24, 25, 26, 27, 28, 29, 32, 33, 35, 37, 38, 39, and 40 loads heavily on factor 1; variables 11, 14, 15, 31, and 36 loads heavily on factor 2; factor 3 is loaded heavily by 18 and 34, and factor 4 is loaded by 20 and 30. There is need to rotate the initial factor matrix.

Table 4.13 Final output of variable, communality and eigen values (I).

Variable	1	2	3	4	5, . . . ,40
Communality	1	1	1	1	1, . . . ,1
Eigen values	15.4	13.6	6.3	4.7	0, . . . ,0
% variance	38.5	34.0	15.8	11.7	0, . . . ,0

From table 4.13 above shows the final output of the variables, communality and eigen values of the rotated factor matrix.

A quick glance at the eigen values of the rotated factor matrix indicate four factors, that is the eigen values are more than 1. Factor 1 explains 38.5% of the variation, factor 2 explains 34% of the variation, factor 3 explains 15.8% of the variation and factor 4 explains

11.7% of variation.

Table 4.14 Final rotated factor matrix for respondents.

	Factor 1	Factor 2	Factor 3	Factor 4
1	.929	.091	.358	.028
2	.970	.187	-.086	.129
3	.838	-.076	.541	-.009
4	.970	.063	.220	-.088
5	.955	.140	.262	.003
6	.471	.867	.166	.013
7	.256	.743	.603	.136
8	.261	.195	.944	-.048
9	.261	.195	.944	-.048
10	.467	.633	.483	.385
11	-.529	.843	-.001	-.094
12	.318	.883	.344	.007
13	.551	.792	.194	.179
14	.067	.988	.089	.110
15	-.249	.827	.153	-.048
16	.876	.045	.240	.416
17	.941	.068	.331	-.032
18	-.171	-.251	-.658	-.689
19	.762	.183	.597	.169
20	.019	-.397	-.183	-.899
21	.487	.845	.219	-.002
22	.594	.723	.302	.183
23	.781	.514	-.277	.222
24	.870	.354	.066	.338
25	.379	.792	.427	.217
26	.372	.899	.210	.093
27	.912	.332	.223	-.095
28	.914	.347	.163	-.132
29	.598	.751	-.222	.170
30	.215	.518	.212	-.800
31	-.346	.369	-.024	-.862
32	.458	.839	-.063	.288
33	-.873	-.207	.174	-.406
34	.389	.022	.761	.518
35	0	.686	.727	-.040
36	-.307	.923	-.178	-.145
37	.384	.838	.382	.072
38	.717	.576	.391	-.022
39	.594	.556	.064	.578
40	.857	.179	.301	.378

From table 4.14 above shows the rotated matrix of the initial factor matrix. Varimax rotation was performed on the initial factor matrix, varimax is an orthogonal type of rotation. It attempts to simplify the columns of factor matrix by making all values close to either 0 or 1. This final matrix represents the terminal solution and it stands for both a pattern and a structure matrix with the coefficients representing both regression weights and correlation coefficients. The loading in a given row represents regression coefficients of factors that describe a given variable.

In the final varimax rotated matrix factor 1 is loaded heavily by variables 1, 2, 3, 4, 5, 16, 17, 19, 23, 24, 27, 28, 33, 38, 39, and 40. Factor 2 is loaded heavily by variables 6, 7 ,10, 11, 12, 13, 14, 15 ,21, 22, 25, 26, 29, 32, 36, and 37. Factor 3 is loaded heavily by variables 8, 9, 34, and 35. Factor 4 is loaded heavily by variables 18, 20, 30, and 31. This are as shown in the table below.

Table 4.15 The factors identified(I).

Factor 1.: Project mission, preparation and control.

1. The goals of the project were in line with the general goals of the organization.
2. The goals were made clear to the project team.
3. The project results are beneficial to the organization.
4. The project was successful.
5. I can identify the benefits of the success of the project.
16. Project team personnel understood their role in the project team.
17. There was sufficient manpower to complete the project.
19. Project team had adequate technical training.
23. The technology which was used to support the project worked well.
24. The technology which was selected for the project was appropriate.
27. Regular meetings to monitor project progress and to improve the feedback to the project team were conducted.
28. Actual progress was regularly compared with the project schedule.
33. When the budget or schedule was revised, the changes were communicated to all members of the project team.
38. In case of project difficulties, project team members knew exactly where to go for

assistance.
39. All problems that arose were solved completely and confidently.
40. Immediate action was taken when problems came to project team's attention.

Factor 2.: Top management support.

6. Top management was responsive to request of additional resources whenever need arose .
7. Top management shared responsibility with the project team.
10. Top management supported my/our decisions concerning the project.
11. Some activities which had slack time or resources were utilized for emergencies(extras).
12. There was a detailed plan (including time schedules, milestones, manpower requirements, etc) for the completion of the project.
13. There was a detailed budget for the project.
14. Key personnel needs were specified in the project plan.
15. Effective control system was in place to make sure the project did not go off the schedule or budget.
21. Specific project tasks were well managed.
22. The project people were well competent.
25. The people who implemented the project understood its development stage.
26. All important aspects of the project were monitored, including measures that provided a complete picture of the project's progress.
29. The results of project reviews were regularly shared with all project personnel who had impact upon budget and schedule.
32. Individual/group supplying input received feedback on the acceptance or rejection of the input.
36. In the event of problems, the reporting system was time sensitive.
37. Brainstorming sessions were used to solve problems.

Factor 3.: Adequate authority to the project.

8. Top management gave me enough authority for project.
9. Top management supported me during crisis.
34. The reasons for the changes of policies/procedures were explained to members of the project team, other groups affected by the changes, and Top management.
35. All groups affected by the project knew how to make problems known to the project team.

Factor 4.: Staff appraisal.

18. The personnel on the project team performance was evaluated.
20. The project team had been issued with a job description.
30. When the budget or schedule required revision, input was solicited from the project team.
31. The results (decision made, information received, etc.) of planning meetings were published and distributed to project team.

Table 4.16 Project performance correlation matrix.

	1	2	3	4	5	6	7	8	9	10	11
1	1										
2	.786	1									
3	-.579	-.214	1								
4	-.424	-.030	.981	1							
5	-.376	.100	.841	.892	1						
6	-.733	-.372	.966	.918	.849	1					
7	.127	.293	.604	.661	.334	.379	1				
8	.125	.228	.682	.752	.480	.485	.936	1			
9	0	.331	.740	.805	.560	.544	.959	.905	1		
10	-.661	-.342	.987	.939	.756	.963	.585	.644	.699	1	
11	-.738	-.357	.975	.924	.825	.995	.435	.507	.595	.978	1

Table 4.16 above shows the intercorrelation matrix of eleven variables of project performance. Variable 4 is highly correlated to 3. Variable 5 to 3 and 4 and so on.

Table 4.17 Initial output of variable, communality and eigen values (II).

Variable	1	2	3	4	5	6	7	8	9	10	11
Communality	.786	.786	.987	.981	.892	.995	.959	.936	.959	.987	.995
Eigen values	7.32	2.7	.78	.19	0	0	0	0	0	0	0
% variance	66.5	24.7	7.13	1.67	0	0	0	0	0	0	0

Table 4.17 above shows the initial output of the variables, communality and eigen values. All variables have a good contribution to the factors. For example, variable 1 contributes about 78.6% to the factors and so on. The eigen values of the initial factor matrix shows two factors, factor 1 explains 66.5% of variation.

Table 4.18 Initial factor matrix (II).

	Factor 1	Factor 2	Factor 3	Factor 4
1	-.521	.821	.102	.211
2	-.153	.845	.472	-.170
3	.996	-.080	.020	.016
4	.987	.082	.127	.049
5	.830	-.022	.551	.088
6	.941	-.320	.105	.041
7	.666	.647	-.357	-.098
8	.733	.589	-.248	.233
9	.793	.567	-.125	-.184
10	.980	-.167	-.110	-.011
11	.955	-.288	.054	-.043

Table 4.18 above shows the initial factor matrix of project performance. The variable 1 and 2 loads heavily on factor 2. The rest loads heavily on factor 1.

Table 4.19 Final output of variable, communality and eigen values (II).

Variable	1	2	3	4	5	6	7	8	9	10	11
Communality	1	.989	1	1	1	1	1	1	1	1	1
Eigen values	5.04	3.56	2.17	.22	0	0	0	0	0	0	0
% variance	45.9	32.4	19.7	2.0	0	0	0	0	0	0	0

Table 4.19 above shows the final output of variables, communality and eigen values of the rotated factor matrix. Communality is shown as 1 indicating good contribution of variables to the factors. The eigen values indicates that there are three factors. Factor 1 explains 45.9% of variation , factor 2 explains 32.4% of variation and factor 3 explains 19.7% of variation.

Table 4.20 Final rotated factor matrix (II).

	Factor 1	Factor 2	Factor 3	Factor 4
1	-.528	.158	.778	-.301
2	-.061	.193	.969	.101
3	.826	.494	-.271	.035
4	.844	.530	-.083	.090
5	.979	.145	.139	-.036
6	.884	.265	-.385	.030
7	.183	.975	.113	.062
8	.332	.902	.104	-.256
9	.424	.873	.176	.166
10	.758	.502	-.412	.066
11	.854	.324	-.391	-.111

From table 4.20 above shows the rotated matrix of the initial factor matrix (II) of project performance. In the final Varimax rotated matrix factor 1 is loaded heavily by variables 3, 4, 5, 6, 10, and 11. Factor 2 is loaded heavily by variables 7, 8, and 9. Factor 3 is loaded heavily by variables 1 and 2.

Table 4.21 The factors identified on project performance.

Factor 1.: Project benefits to the organization.

3. This project that was developed worked.
4. The project was used as intended by Kenya railways.
5. This project had direct benefits to Kenya railways.
6. Given the problem for which it was developed, this project seems to do the best job of solving that problems ie. it was the best choice among the set of alternatives.
10. This project has a positive impact on productivity at Kenya railways.
11. The results of this project had a definite improvement in the performance compared to the previous system.

Factor 2.: Project implementation process.

7. We were confident that non technical start-up problems were minimal.
8. I was satisfied with the process by which this project was completed.
9. Use of project has directly improved decision making or performance at Kenya railways.

Factor 3.: Control schedule and budget.

1. This project had come on schedule.
2. This project had come on budget.

CHAPTER 5

5 SUMMARY AND CONCLUSIONS

The objective of this study was to explore the factors that affect project management, a case study of Kenya Railways Corporation.

The findings reveal that most projects were in line with the organization goals. This was attributed to the lengthy process of the selection procedure used, which starts from the departments before going to the board of directors (BOD) for recommendations. That is, the departments receive the ideas from their sections, this ideas are then developed within the department to become projects. This projects relates to enhancing efficiency and improving productivity within the department, hence overall KRC objective. If accepted, the cost estimates are done and justification of the project is witten down, these are then forwarded to the BOD as investment plan. This procedure can be referred to as the bottom-up approach method to project selection.

The findings also reveal that most project managers need to be trained for them to appreciate the tools and techniques of managing a project. There was poor monitoring and control systems, poor planning and scheduling methods. Most projects actually ran late. There is need to train potential managers so that they can be equipped with the necessary skills of project management which involve the coordination of both human and non human resources. The managers did not plan for contingencies such procurement of equipments with some of them coming from as far as overseas.

It was also found that most of the project managers were engineers, who were more concerned with the quality of the project, and had very little for the personnel in terms of sharing and discussing problems. Conflicts which arose were solved elsewhere and were not immediately resolved. There was little to do with performance appraisal of project staff. It was also found that the project staff were not given job description on their appointment to the project hence evaluation was not always possible.

The study reveals that there is poor communication and poor problem solving techniques within the project organizations. This had been characterized by there being no integration of the project organization with the parent organization. There is need to train managers on the importance of integration to enhance communication and problem solving. Top management concern and attention would also assist in bringing about the required integration.

There is good evidence that most projects undertaken were in line with the organization goals and, therefore, have improved decision making and productivity. But the support given by the top management was not enough. There is need to improve this so that projects can be seen by all in the organization as being important to the organization well being. This will also give project staff some morale and will enhance cooperation of other departments which are not directly involved. The authority to proceed with the implementation of the projects were not given quickly enough, this can dilute the purpose of the project mission, especially if it involves projects which have direct impact on positioning the organisation which is facing a tough competitor in business.

From this study some projects did not start at the right time. A project should be started at the right time otherwise it might be overtaken by events rendering it useless for the intended purpose. In connection with the aforesaid, the selection procedure used is far too long that it takes more than two to three years before the project is implemented. A lot of changes are likely to take place in the intervening time such that the initial project planning done will be found ineffective.

The results of the factor analysis shows that the most important factor that affects project management is the project mission. Projects selected should be in line with the organizational goals and beneficial to the organization. The selection of personnel is also important in that they should be trained and should be conversant with solving of the project problems. The selection of the technology is equally important. Poor selection of the technology to use can delay the project and can make control of time and cost difficulty. Project control system is also very crucial in monitoring the progress of the project.

The second factor is the top management support. The responsibility and decisions made by the project manager and his staff should be supported by the top management. Also planning of the project is important in order to effectively control the time and cost. The personnel selected to the project should be of high calibre for ease execution of the project. There is need to train project managers and project staff so that the project management tools and techniques can be of use during the project process.

The third factor is the authority of the project manager. He should be given enough authority to run the project so that he can effectively do his work. With enough authority he will be able to solve problems of staff, make changes at the site of the project, and effect the necessary policies/procedures which will assist him in the execution of the project.

The fourth factor is the project staff appraisal. It is important for the project staff to be issued with job descriptions. This will facilitate evaluation of staff on the project. Also, there is need to involve the project team in making decision especially when it concerns time and cost. The project staff will be in a position to know how they are doing and what is required of them.

The results of analysis of project performance after final varimax rotation shows the most important factor as being the selection of the project, in that the project should work as intended by solving the problems which were there before and more so it should improve productivity and efficiency in the work environment. This will improve the overall performance of the organization.

The second factor is the project implementation process, such that non technical start-up problems are as minimal as possible. This will ensure satisfaction both on the project team and the organization itself.

The third factor is project control system. This will ensure that the quality of the project itself, the time (schedule) and budget (cost) are well taken care off.

5.1 LIMITATION OF THE STUDY

A major limitation of this study was the reluctancy of some project managers' to participate in this exercise, some took the questionnaire before they could make up their mind and some returned the questionnaire unfilled. This made the study to use 32 projects instead of the anticipated 40 projects. Due to the time and resource constraints, the study used a case study design instead of using a survey design which should have examined projects from many organizations.

5.2 SUGGESTIONS FOR FURTHER RESEARCH

Many investments are made, which work as they were designed to do, being well managed, but are yet very poor investments because they produce the wrong things or satisfy only low priority needs, Little and Mirrlees (1976). This is an area which needs to be researched on, on how these projects should be managed to meet their intended purposes.

APPENDIX 1

UNIVERSITY OF NAIROBI
FACULTY OF COMMERCE

Telephone: 732160 Ext. 215
Telegrams: "Varsity", Nairobi
Telex: 22095 Varsity

P.O. Box 30197
Nairobi, Kenya

April 26th 1996

INTRODUCTORY LETTER: MR. MWADALI, D. N

Mr. Mwadali, D. L. is a Masters student in the Faculty of Commerce, University of Nairobi. In partial fulfilment of the requirements of the Masters in Business and Administration (MBA) degree, he is conducting a study on "_ "ANALYSIS OF MAJOR FACTORS THAT AFFECT PROJECT MANAGEMENT: A CASE OF KENYA RAILWAYS PROJECTS".

Your organization/firm has been selected to form part of this study. To this end, we kindly request your assistance in completing the questionnaire which forms an integral part of the research project. Mr. Mwadali will be responsible for the administration of the questionnaire. Any additional information you might feel necessary for this study is welcome.

The information and data required is needed for academic purposes and will be treated in strict confidence. A copy of the research project will be made available to your organization/firm upon request.

Your cooperation will be highly appreciated.

Thank you.

Yours sincerely,

DR. P. O. K'OBONYO
Dean, Faculty of Commerce

cc: MBA Co-ordinator
Dr. I. M. Mbeche - Supervisor

David. N. Mwadali,
UNIVERSITY OF NAIROBI,
Faculty of commerce,
P. O. Box 30197,
NAIROBI.

Dear respondent,

I am a postgraduate student at the University of Nairobi. In fulfilment of the requirements of Master of Business and Administration (MBA) course, I am undertaking a research in the analysis of major factors that affect the management of projects at Kenya railways.

I kindly request for your assistance in completing the attached questionnaire. I would like to ensure that any comments made to the undersigned will be treated in confidence and used entirely for academic purposes.

Thanking you in advance for your cooperation.

Yours faithfully

D. N. Mwadali
MBA student.

Dr. I. M. Mbeche
Supervisor.

QUESTIONNAIRE

PART A

Project name:_____

1) Year the project was undertaken _____

2) Number of project staff (approx.) _____

3) Briefly describe the project, giving the specific goals:_____

_____

_____

_____

_____

_____

_____

Please tick in the box provided.

4) Was this your first project to manage?

YES [ ]

NO [ ]

If NO, please give the number of project you have managed. _____

5) Were you working on the project on a full time basis?

YES [ ]

NO [ ]

If NO, please give a brief explanation on whether this other assignment had strained your ability to manage the project.

6) Did you start off the project?

YES [ ]

NO [ ]

If NO, how many mangers were there before you._____

7) Was the project started as scheduled?

YES [ ]

NO [ ]

If NO, briefly state the problems of your response above.

8) Was the time frame covered as planned?

YES [ ]

NO [ ]

If NO, briefly state the reasons for the delay of the project?

9) Can you say the project was given special treatment by other departments ie. the bureaucracy was minimal.

YES [ ]

NO [ ]

10) Please tick any of these project management tools which you used during the project.

i) Milestone chart [ ]

ii) Bar chart (Gantt chart) [ ]

iii) Critical path analysis (CPM) [ ]

iv) Program evaluation review techniques (PERT) [ ]

v) Graphic evaluation review techniques (GERT) [ ]

vi) Project duration charts [ ]

vii) Project life cycles charts [ ]

viii) Pie charts [ ]

ix) others (specify) _____

x) others (specify) _____

11) To what extent did you use this project management techniques, please state the degree of improtance in each case.

	more important	neutral	less important
i) control of project quality	[ ]	[ ]	[ ]
ii) control of programme (time)	[ ]	[ ]	[ ]
iii) control of variations (staff,materials)	[ ]	[ ]	[ ]
iv) control of cost	[ ]	[ ]	[ ]

PART B

Please circle the number that indicate the extent to which you agree or disagree with the following statements as they relate to the project which you participated in.

	strongly disagree		neutral		strongly agree
1.The goals of the project were in line with the general goals of the organization.	1	2	3	4	5
2.The goals were made clear to the project team.	1	2	3	4	5
3.The project results are beneficial to the organization.	1	2	3	4	5
4.The project was successful.	1	2	3	4	5
5.I can identify the benefits of the success of the project.	1	2	3	4	5
6.Top management was responsive to request of additional resources whenever need arose.	1	2	3	4	5
7.Top management shared responsibility with the project team.	1	2	3	4	5
8.Top management gave me enough authority for the project.	1	2	3	4	5
9.Top management supported me during crisis.	1	2	3	4	5
10.Top management supported my/our decisions concerning the project.	1	2	3	4	5

	strongly disagree		neutral		strongly agree
11.Some activities which had slack time or resources were utilised for emergencies.(extras)	1	2	3	4	5
12.There was a detailed plan (including time schedules, milestones, manpower requirements,etc.) for the completion of the project.	1	2	3	4	5
13.There was a detailed budget for the project.	1	2	3	4	5
14.Key personnel needs were specified in the project plan.	1	2	3	4	5
15.Effective control system was in place to make sure the project did not go off the schedule or budget.	1	2	3	4	5
16.Project team personnel understood their role in the project team.	1	2	3	4	5
17.There was sufficient manpower to complete the project.	1	2	3	4	5
18.The personnel on the project team performance was evaluated.	1	2	3	4	5
19.Project team had adequate technical training.	1	2	3	4	5
20.The project team had been issued with a job description.	1	2	3	4	5

	strongly disagree		neutral		strongly agree
21. Specific project tasks were well managed.	1	2	3	4	5
22. The project people were well competent.	1	2	3	4	5
23. The technology which was used to support the project worked well.	1	2	3	4	5
24. The technology which was selected for the project was appropriate.	1	2	3	4	5
25. The people who implemented the project understood its development stage.	1	2	3	4	5
26. All important aspects of the project were monitored, including measures that provided a complete picture of the project's progress.	1	2	3	4	5
27. Regular meetings to monitor project progress and to improve the feedback to the project team were conducted.	1	2	3	4	5
28. Actual progress was regularly compared with the project schedule.	1	2	3	4	5
29. The results of project reviews were regularly shared with all project personnel who had impact upon budget and schedule.	1	2	3	4	5
30. When the budget or schedule required revision, input was solicited from the project team.	1	2	3	4	5

	strongly disagree		neutral		strongly agree
31.The results (decision made, information received, etc.) of planning meetings were published and distributed to project team.	1	2	3	4	5
32.Individual/group supplying input received feedback on the acceptance or rejection of the input.	1	2	3	4	5
33.When the budget or schedule was revised, the changes and the reasons for the changes were communicated to all members of the project team.	1	2	3	4	5
34.The reasons for the changes of policies/procedures were explained to members of the project team, other groups affected by the changes, and Top management.	1	2	3	4	5
35. All groups affected by the project knew how to make problems known to the project team.	1	2	3	4	5
36.In the event of problems, the reporting system was time sensitive.	1	2	3	4	5
37.Brainstorming sessions were used to solve problems.	1	2	3	4	5
38.In case of project difficulties, project team members knew exactly where to go for assistance.	1	2	3	4	5
39.All problems that arose were solved completely and confidently.	1	2	3	4	5
40.Immediate action was taken when problems came to the project team's attention.	1	2	3	4	5

PROJECT PERFORMANCE	strongly disagree		neutral		strongly agree
1.This project had come on schedule.	1	2	3	4	5
2.This project had come on budget.	1	2	3	4	5
3.This project that was developed worked.	1	2	3	4	5
4.The project was used as intended by Kenya railways.	1	2	3	4	5
5.This project had direct benefits to Kenya railways.	1	2	3	4	5
6.Given the problem for which it was developed, this project seems to do the best job of solving that problem ie. it was the best choice among the set of alternatives.	1	2	3	4	5
7.We were confident that non technical start-up problems were minimal.	1	2	3	4	5
8.I was satisfied with the process by which this project was completed.	1	2	3	4	5
9.Use of project has directly improved decision making or performance at Kenya railways.	1	2	3	4	5
10.This project has a positive impact on productivity at Kenya railways.	1	2	3	4	5
11.The results of this project had a definite improvement in the performance compared to the previous system.	1	2	3	4	5

APPENDIX 2

ANNEX III SUMMARY OF CAPITAL EXPENDITURE RECOMMENDED IN STAP

Project Number	Description of Projects	Objective of Project	Current Prices (KSh million) 1986/87 L	1986/87 F	1987/88 L	1987/88 F	1988/89 L	1988/89 F	1989/90 L	1989/90 F	1990/91 L	1990/91 F
1.	**Provision of additional motive power.**	**Secure a significant increase in line haulage capacity.**										
1.1	Purchase of 10 class 94 locomotives	Provision of additional haulage capacity of 4000 gross tonnes/day NRB-MSA and 4800 gross tonnes/day MSA-NRB		295.2								
1.2	Rehabilitation of 5 Class 87 locomotives and modification and repairs to 10 Class 71 locomotives	Cater for additional traffic west of NRB consequent on the introduction of additional 94 Class locomotives		18.2		28.7		10.2				
2.	**Improve maintenance standards of locomotives**	**Improve availability of main line locomotives**										
2.1	Provide additional and improved facilities at Changamwe diesel depot.	Improve maintenance standards reducing line speed on maintenance operations and increasing depot capacity to accept locomotives for maintenance.	0.5	0.7	2.0	1.4	1.6	0.8				
2.2	Provide additional and improved facilities at Nairobi diesel depot.	Reduce turnround times for locomotives and improve locomotive availability by reducing time taken to position locomotives for service.			3.9	1.7	4.2	2.1				

Project Number	Description of Projects	Objective of Project	Current Prices (KSh million)									
			1986/87		1987/88		1988/89		1989/90		1990/91	
			L	F	L	F	L	F	L	F	L	F
2.3	Provide proper diesel maintenance facilities at Kisumu, and provide turnround services for main line locomotives.	Reduction in time spent in sending locomotives to Nakuru for service, and improvements in turnround times.			4.2		4.5					
2.4	Provide diesel-electric locomotive test stand in NRB workshops	Reduction in time spent by locomotives under repair in workshops			0.4	4.5	0.5					
2.5	Provide diesel-hydraulics locomotive test stand and dynamometer in NRB Workshops	Reduction in time spent in load testing of diesel hydraulic locomotives after overhaul and improvement in locomotive performance.			0.5	7.8	0.6					
2.6	Undertake changes in workshop layout and provide new equipment for NRB Workshops	General reductions in the time spent by locomotives under repair and improved locomotive reliability.	0.5		1.0	2.4	0.7	0.7				
2.7	Provide spare assemblies for NRB workshops and provide unit exchange system for outstation depots.	Operation of a flow line system of locomotive repairs in NRB workshops. Secure reductions in time spent by locomotives in workshops, and improved availability.				26.2						
3.	Reduction of traffic delays attributable to locomotives servicing	Increase time in which locomotives are available for traffic duties, and reduce time lost from train slippage on adverse gradients.										

Project Number	Description of Projects	Objective of Project	Current Prices (KSh million) 1986/87 L	1986/87 F	1987/88 L	1987/88 F	1988/89 L	1988/89 F	1989/90 L	1989/90 F	1990/91 L	1990/91 F
3.1	Provide new fuelling facilities and connection of existing facilities to locomotive fuelling points.	Increase time available for shunting duties (MSA) and reduction in detention of tank wagons (VOI, MRB & ELD).	1.6		1.9	2.6						
3.2	Provide sand drying facilities at Kajiado, Sagana and Eldoret depots.	Reduce train delays due to wheelship and reduce adverse reactions on opposing trains at crossing stations.			1.4		1.5					
4.	**Improvement of air brake testing.**	**Improve punctuality of train departures**										
4.1	Replace obsolete air compressors at Makadara diesel depot and at Nairobi and Voi carriage and wagon examiners' depots.	Improve standards of air brake maintenance, and facilitate brake charging and testing before attachment of locomotives to trains.				1.6						
5.	**Provision of border facilities**	**Reduce cross border inspection delays**										
5.1	Provide a carriage and wagon examiner's depot at Taveta	Enable inspection of cross-border traffic to be undertaken expeditiously			0.7							
6.	**Provision of rolling stock**	**Enhance railways' ability to meet traffic movement demand requirements.**										
6.1	Provide 30 ballast hopper wagons	Enable ballast to be discharged directly to the track and avoid delays due to manual transfer.				22.3		24.0				

Project Number	Description of Projects	Objective of Project	Current Prices (KSh million)							
			1986/87		1987/88		1988/89		1989/90		1990/91	
			L	F	L	F	L	F	L	F	L	F
6.2	Provide 20 new tallow tank wagons and provide 10 further tallow tank wagons using existing materials.	Provide specialised rolling stock to meet additional traffic demand from a major customer.			1.0	10.1		11.0				
7.	**Projects for Chief Traffic Manager's Department**	**Improve effectiveness of ancillary activities**										
7.1	Renew refrigeration plant, cold room and laundry equipment in Nairobi catering services depot.	Enable railway to continue to provide these services, and save costs of contract laundry.			0.1	5.9	0.2	6.2				
7.2	Replace 11 life-expired road vehicles for Nanyuki road depot.	Enable railway to continue to provide road services and regain traffic			0.5	13.1	0.6	14.1				
7.3	Construct running rooms at Mtito Andei.	Enable cessation of caboose working Mombasa-Nairobi				4.0						
8.	**Railway infrastructure projects.**	**Maintain and improve track infrastructure.**										
8.1	Provide mobile flash-butt welding machine.	Enable relaying programme of continuous welded rail to proceed.				6.7						
8.2	Resurvey of Mau viaducts.	Establish the nature and extent of works required to enable viaducts to accept higher axle-load locomotives.	2.4			2.6						
9.	Improvement of railway communications.	Improve the total telecommunications network to improve rolling stock utilisation and increase traffic.										

Project Number	Description of Projects	Objective of Project	Current Prices (KSh million)									
			1986/87		1987/88		1988/89		1989/90		1990/91	
			L	F	L	F	L	F	L	F	L	F
9.1	Provide UHF Radio system on shunting locomotives NRB, NRO, CGW, MSA, KLI.	Improve yard control of shunting locomotives to meet timetable requirements.	0.5			4.2						
9.2	Provide traffic control telephone system, with associated bearer systems, to main line west of NRB, and to KSM.	Redress present failure of communications in these areas and hence achieve significant improvements in overall train running and timekeeping.			6.7	15.5	27.0	72.5	31.3	78.1	8.4	21.1
9.3	Complete railway automatic dialling administrative telephone network in MLB, KSM, ELD, SGW stations and Nairobi Training Centre.	Complete effective management communication throughout major centres in the system.				0.6		1.6		1.7		0.5
9.4	Provide telecommunications project engineer (consultant).	Ensure efficient and effective completion of all telecommunications investment.				1.2		2.6		2.8		0.7
10.	**Rationalisation of signalling**	**Achieve significant reductions in train running times.**										
10.1	Provide route relay interlocking signalling with tokenless block in the Nairobi-Embakasi area.	Improve train running between Nairobi and Embakasi			0.7	26.7	0.3	14.4				

Project Number	Description of Projects	Objective of Project	Current Prices (KSh million)							
			1986/87		1987/88		1988/89		1989/90		1990/91	
			L	F	L	F	L	F	L	F	L	F
11.	**Improvement of Railway Training School facilities.**	**Provide the physical facilities required to implement the recommendations of the Training requirements study.**										
11.1	Construct Management Training Centre and Training Facilities Centre.	Provide the physical facilities necessary to implement effective management training courses.			5.4	0.5	8.3		8.9	3.7	9.2	
11.2	Rehabilitate workshop and upgrade existing accommodation.	Provide the physical facilities necessary to implement effective training of KR workforce.										
			2.6	317.0	34.4	186.3	50.0	169.1	35.0	91.8	8.4	22.3

Note: Figures may not add up due to rounding.

Table 8.1: Capital Investment Programme (Kshs. M 1991/92 Prices)

Project Name	1992/93	1993/94	1994/95	1995/96	1996/97
On-going Projects	200				
Re- engining of 20 shunting locomotives		4	30	21.5	
Purchase of 20 type 8 mainline locomotives			42	42	
Purchase of 300 wagons of various types		50.4	50.4	285.6	285.6
Voi station signalling		7.4	30.6		
Track circuiting Mombasa -Nakuru	4	4	4	4	4
Emergency radio project west of Nairobi.		5.9	33.3		
Telecommunication services west of Nairobi				10	
Enhancement of communication capacity in the Nairobi-Mombasa cable line		6	6		
Purchase of new mainframe computer, auxiliary attachments and 1 No. standby power supply for the computer room and the Headquarters	32	20			
Strengthening of bridges Makadara-Thika line			15		
Provision of new PABXs	6	6			
Track rehabilitation	50	50	100	100	100

Projects Name	1992/93	1993/94	1994/95	1995/96	1996/97
Purchase of yaw suspension adopters to CLBL and CLBW wagons.		7.7	43.3		
Purchase of locomotive and rolling stock spares to build up stock to minimum level	120	60	60		
Purchase of two wheel tyre lathe for Central Workshops		8.2	46		
Provision of assorted equipment and plant for locomotives and wagons running depots.		15	15	20	
Feasibility Study on Realignment of several sections of mainline Mombasa - Malaba				5	
Provision of training equipment at Railway Training Institute		4.7	26.5		
Provision of staff housing of various classes at Railway Centres	13	10.0	10.0	10.0	10.0
TOTAL	425	259.3	512.1	498.1	399.6

CLBL = Covered long bogie, large wagon

CLBW = Covered long bogie, wide wagon.

PROGRAMME OF CAPITAL EXPENDITURE, 1996/97 (SHILLINGS MILLIONS)

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE (CE)	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
		FUNDED PROJECTS (EXTERNAL SOURCES)							
1.		Purchase of 6 No. Personnel carriers cum inspection trolleys plus rail rehabilitation equipment		177.18		132.00	12.96	8.10	24.12
2.		Feasibility study on the Realignment of the mainline, Mombasa-Malaba		10.50	0.50		10.00		
3.		Consulting on Project Management and relational Data base management system	6.00	6.00	-	6.00			
4.		Passenger reservation system	3.88	3.88	-	3.88			
5.		Purchase of a new distributed computer system auxillary attachments and one standby power supply for computer room at HQs		46.38	11.59	34.79			
6		Contingencies (5%)	0.49	11.60		8.83	1.15	0.41	1.21
		Total (items 1-6)	10.37	255.54	12.09	185.50	24.11	8.51	25.33

Notes

Estimated Amount (EA) = Authorised Estimate
Current Estimate (CE) =Authorised estimate or original estimate at 1995/96 prices
Previous expenditure(PE) =Expenditure incurred to date including expenditure upto 30th June,1996
(A) Projects kept in abeyance.
(M) Materials already purchased under the IBRD project (19th KR)
Ff 1 = Kshs. 11.27

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE (CE)	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
		FUNDED PROJECTS (MAINLY INTERNAL SOURCES)							
1.	30930	CED/ELD/MLB: Relaying and recoallasting track stage (M)	74.22	230.80	50.00	50.00	50.00	50.00	30.80
2.	30929	LED/MBARUK/LANET: Relaying and recoallasting track (M)	13.48	14.30	6.20	8.10	-	-	
3.	32078	CCE-MRS Station: Proposed alterations to 3rd class waiting room and booking office	0.46	1.40		1.40			
4.	32083	System -wide ICL-Provision and installation of Communication cables etc. connecting computer terminals in the district offices to the main frame at HQs	0.88	0.90	0.90	-	-	-	
5.	32222 32303 32304	Provision of power points, false floor tiles and air conditioning units in the computer room at the Headquarters, at DTS (MRS) Nairobi yard, Mombasa, Changamwe, Eldoret and Kisumu	0.33	0.90	0.90	-	-		
6.	30952	Thika Kenya Canners: Relaying and recoallasting Track	1.80	9.74	4.20	5.54			
7.	32088	MRS Workshops: Supply of one semi-automatic Helical spring coiling machine (AFDB-CS/KR/TR/80/012)	4.30	13.35	4.15	1.72	3.50	3.99	
8.	32117	Systemwide: Provision of fencing to station buildings, depots and staff quarters	4.26	4.26	3.14	0.52	0.60		
9	32197	System-wide conversion of bucket latrines to water borne sanitation (Phases 1 to IV)	6.70	13.00	4.40	1.00	3.00	2.00	2.60
10	32199	MRS HQS: Purchase of Theodolite for District Surveyor, Mombasa	0.16	0.20	-	0.20	-	-	-
11	32228	MED Nairobi Yard: Provision of Office near the water column	0.18	0.50	0.04	0.46			

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
12	32281	Renew refrigeration plant, cold room and Laundry equipment in Nairobi-Catering Services Depot	13.60	8.02	8.93	1.09			
13	32314	Improvement of the RTI infrastructure Phase 1 (building works)	37.90	262.50		50.00	50.00	50.00	112.50
14		Provision and Replacement of motor vehicles	684.56	684.56	129.92	50.00	50.00	50.00	404.64
15		Provision of pavilions at Kisumu and Kabarnet show grounds		3.00	2.00	1.00			
16		Provision of Cells at Mombasa (Railway Police)		1.30		1.30			
17		Voi Station Signalling		12.00	-	6.00	6.00		
18		Telecommunications Project West of Nairobi:							
		(a) V.H.F enhancement (Extension to cover 50 more stations)		90.00	70.00	20.00	-	-	-
19		Provision of New PABXs at Changamwe, MSA district HQS central workshops and KR Police HQs		20.00	6.00	4.00	10.00		
20		Contingencies (5%)	42.13	54.10		10.12	8.66	7.80	27.52
		Total (items 1-20)	884.72	1424.63	288.78	212.44	181.76	163.79	577.86

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE (CE)	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
21		Purchase of one wheel tyre lathe machine for Central Workshops		113.80		113.80		-	-
22		Strengthening of bridges Makadara-Thika line		31.50	4.50	10.00	17.00		
23		Provision of assorted equipment and plant for locomotives and wagons running depots		104.90		10.00	10.00	26.50	58.40
24		Overhauling of 29 No.82 Locos		523.00			227.90	207.10	88.00
25		Provision of staff housing of various classes at Railway Centres*		78.00	31.00	13.00	13.00	13.00	8.00
26		Systemwide electrification project		58.80	10.00	10.00	15.00	15.00	8.80
27	32285	Renewal of telecommunications equipment on M.V. Uhuru		2.70	1.70	1.00			
28	30985	Provision of telecommunications equipment on M.V. Tilapia		1.50	0.20	1.30			
29	32244	Security lighting Makadara sorting grid		0.50		0.50			
		Conversion of Nairobi Marshalling Yard flood lighting to gas-discharge type		1.60		1.60			
30		Conversion of Yard flood lighting to gas discharge type at Nakuru, Eldoret and Kisumu	5.00	5.00		5.00			
31		Rehabilitation and reinforcement of II KV power distribution system in Nairobi	7.50	7.50	7.50	-			
32		Personal Computer (C.S.O)	1.75	1.75	1.75				

NOTE: * Muthurua Housing Project Phase III:
Construction of 3 blocks of 24 class v flats
(est. no. 32328, sanctioned amount Ksh. 26.8M)

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE (CE)	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
33		Security Lighting System, in the central Workshops (Phase I)	7.00	12.20		3.00	4.00	5.20	
34		Ambulance for Central Workshops	2.50	2.50		2.50			
35		Rank Zerox Photocoping Machines (2 No.)	2.80	2.80	-	2.80			
36		Software development based applications plus networks components and operating software (DPM,FC,CPM)	2.60	3.50	1.70	1.80	-	-	-
37		Provision of toilet block at the Railways Police commandant's office and Makindu		0.60	0.30	0.30			
38		Upgrading of rail tracker network	2.50	2.50	-	2.50			
39		Upgrading of 144 stores (file saver conversion to ethernet	2.50	2.50	-	2.50			
40		Provision of culverts on the Mombasa- Nairobi line	455.00	455.00	8.00	13.00	20.00	237.00	177.00
41		Provision of concrete sleeper plant	105.00	105.00	-		105.00		
42		Provision of a siding at ICD Eldoret	10.94	17.44	0.57	16.87			
43		Electrical type heating equipment	5.20	5.95		5.95			
44		Contingencies(5%)	30.25	73.37		10.57	20.80	25.19	17.01
		Sub Total Items 21-44	640.54	1813.91	67.22	227.99	432.50	528.99	357.21

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE (CE)	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
KNU RAILWAY PROJECT (SH MILLIONS)(UNFUNDED PROJECTS)									
		Locomotives							
45		Overhauling 50 No. type 9 locomotives		561.42		100.00	112.32	112.32	236.78
46		Re-engining 18 No. type 8 locomotives		174.42		4.00	65.00	29.07	76.35
47		Re-engining 2 No. type 71 locomotives		19.62			9.81	9.81	
48		Re-engining 5 No. type 72 locomotives		48.69			9.81	9.81	29.07
49		Re-engining 22 No. type 46 locomotives		145.17	8.19		20.61	20.61	95.76
50		Re-engining 23 No. type 47 locomotives		157.50		34.94	20.61	20.61	81.34
		Sub total items 45- 50		1106.82	8.19	138.94	238.16	202.23	519.30
		Signalling and Communications:							
51		Track Circuiting		161.50			60.00	70.00	31.50
52		Telecommunications Project West of Nairobi:							
		(a) Comprehensive fibre optic solution		500.00			70.00	50.00	380.00
53		Enhancement of communication capacity in Nairobi - Mombasa cable line		41.00	-		25.00	16.00	
54		Purchase of road vehicles and 2 motor trolleys		20.50	-	-	20.50		
		Sub-total (items 51 - 54)		723.00			175.50	136.00	411.50

ITEM NO.	ESTIMATE NO.	DESCRIPTION	ESTIMATED AMOUNT (EA)	CURRENT ESTIMATE (CE)	PREVIOUS EXPENDITURE (PE)	1996/97	1997/98	1998/99	1999/2000
		Track Rehabilitation:							
55		Rehabilitation of sleeper press		34.47			14.47	10.00	10.00
56		Purchase of road vehicles lorries 3 pickups)		22.41			22.41		
57		Procurement and installation of lubricators		20.81			6.75	6.75	7.11
58		Repair and recommissioning of track recorder car		5.00			5.00		
		sub-total (Items 55 - 58)		82.49			48.63	16.75	17.11
59		Technical Assistance and Training (systemwide)		123.12			61.56	61.56	
60		Provision of training equipment at RTI		44.73			44.73		
61		Renovations at RTI		11.16			11.16		
62		Physical		116.85			34.78	24.99	56.88
63		Price		77.77			23.18	16.66	37.92
		Total (Items 59-63)		373.43			175.42	103.21	94.80
Total 3rd. Railway Project Items 45 - 63				2285.74			637.71	458.19	1042.74

Note: Exchange Rate US $ 1 = Kshs.58

SUMMARY (in Shillings Millions)

	PREVIOUS EXP.	1996/97	1997/98	1998/99	1999/2000	TOTAL
Funded Projects(External sources)						
Items 1-8	12.09	185.50	24.11	8.51	25.33	255.54
Unfunded Projects(Mainly internal sources)						
Items 1-44	356.00	440.44	814.26	692.78	935.07	3038.55
3rd Railway Project - Unfunded (Items 45 - 83)	8.19	138.94	637.71	458.19	1042.71	2285.74
Grand Total	376.28	764.88	1276.08	1159.48	2003.11	5579.83
Percentage %	6.74	13.71	22.87	20.78	35.90	100.00

100.00

Capital investment plan, 1995/96 - 1999/200

		TOTAL (Sh.Million)
1.	On-going projects	530
2.	3rd Railway Project	
	a. Locomotives-overhaul re/re-engining	1,107
	b. Signalling and telecom-munications	465
	c. Track rehabilitation	235
	d. Technical assistance and training	123
	e. Provision of training equipment at R.T.I	45
	f. Renovations at R.T.I	11
	g. Purchase a new distributed computer system	68
	h. Contingency	592
	Sub-total	2,646
3.	Other Projects	1,592
	Total	4,768

Exchange rate $ 1 = Kshs. 45/=

REFERENCES

Anthony and Dearden,
"**Management control systems**", fourth edition, Richard D. Irwin. Inc. 1980

Chandra, P.
"**Projects: preparation, appraisal, budgeting and implementation.**" third edition, Tata McGraw-Hill publishing company limited, New Delhi. 1991.

Churchill, G. A, Jr.
"**Marketing research: methodological foundations.**" third edition, Holt-saunders International Editions, 1983.

Cleland D. I, and King W. R.
"**Project management handbook**" van nostrand reinhold, New York. 1988.

Deiter, G.
"**Engineering design: A materials and processing approach.**" McGraw-Hill series in materials science and engineering.

Everett E. A,Jr. and Ronald J. E.
"**Production and operations management**", fourth edition, A division of Simon and Schuster, Englewood cliffs, New Jersey. 1989.

Kayongo,
"**UNIDO projects.**" MBA project, University of Nairobi. Unpublished. 1981.

Kelley, A. J.
"**New dimensions of project management.**" An Arthur D. Little book, D. C. Heath and company, Toronto. 1982.

Kinnear, T. C. and Taylor, J. R.
"**Marketing research: An applied approach.**" fourth edition, Mcgraw-Hill international, marketing series. 1991.

Little, I. M. D. and Mirrlees, J. A.
"**Project appraisal and planning for developing countries.**" A Heinmann Educational Books London. 1976.

Lock, D.
"Project management Handbook," Gower publishing company limited, Gower house, England. 1987.

Lock, D.
"Project management" fourth edition, Gower publishing company limited, Gower house, England. 1989.

Martino R. L.
"Resources management", Martino and company, Inc. 1969.

Mbeche I. M.
"Strategic management of Kenya agricultural development projects: Options for the effective involvement of operational research/management science methodology." unpublished PhD. Thesis, University of Lancaster, U.K. 1993.

Nield, B. J.
"British rail project management handbook", Director, project, 1985.

Roman, D. D.
"Managing projects: A system approach." Elsevier science publishing Co., Inc. 1986.

Stallworthy, E. A. and Kharbanda, O. P.
"Total project management: from concept to completion." published by Gower publishing company limited, Aldershot, hants, England. 1983.

Ulysses, S. K,Jr. and Ernest, W. S,
"Management science for management decisions", Allyn and Bacon, Inc. 470 Atlantic Avenue, Boston. 1978.

Wooldridge, S.
"Project management in data processing", first edition, Petrocelli, Charter New York 1976.

JOURNALS

Cook and Sieford."**Research and development projects selection in multidimensional environment: a practical approach.**" The journal of operation research society, Volume 33 Number 5 May 1982. pp 397-405.

Galenson, A. and Thompson, L. S."**The evolution of the World Bank's Railway lending.**" World bank discussion papers, Number 269 1994. pp 5-13.

Kerzner, H."**Project management in the year 2000.**" The journal of systems management, Volume 32 number 1 October 1981. pp 26-31.

Kerzner, H. and Serpentine, P."**Designing project control forms.**" The journal of systems management, published by associated of system management, Volume 32 number 1 March 1981. pp 27-33.

Knutson, J. and Scotto, M."**Developing a project plan.**" The journal of systems management, Volume 29 number 10 October 1978. pp 36-41.

Rolefson, J. F."**Project management: Six critical steps.**" The journal of systems management, Volume 29 April 1978. pp 10-17.

Ryan, J. E."**Hospital project manager.**" The journal of systems management, Volume 30 number 1 April 1979. pp 38-41.

Vossen, J. F."**Project estimation and control.**" The journal of systems management, Volume 30 number 1 May 1979. pp 6-13.

BOOKLETS

Kenya Railways Acts Cap. 397. 20th January 1978.

Kenya Railways Corporate plan 1986/87-1990/91.

Kenya Railways Corporate plan 1992/93-1996/97.

Kenya Railways Corporate plan 1995/96-1999/2000.

Kenya Railways Corporation, employee handbook 1989.

Kenya Railways: development overview.

Kenya Railways programme of capital expenditure for the financial year 1996/97.

Marubeni corporation,"Project management", Tokyo, Japan.

The Royal visit to Kenya 1983.