SYSTEMS APPROACH TO BUILDING PROJECT MANAGEMENT: EXPERIENCE FROM KENYA.

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By

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DECLARATION

I, NYAGAH BOORE KITHINJI, hereby declare that this Thesis is my original work and has not been presented for a degree in any other University.

.....
Signed

DECLARATION OF SUPERVISOR

This Thesis has been submitted for examination with my approval as University Supervisor.

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DEDICATION

This work is dedicated to my
late grandfather MR. MBURUGU N. KITHINJI,
my father MR. RWIGI B. KITHINJI
and my mother MRS. JOYCE C. KITHINJI.
They have always been springs of
Wisdom to me.

ABSTRACT

This report is an attempt to impress on managers of building projects the relevance and importance of the systems approach to management in their field. To achieve this aim the report has started by examining some common theoretical models of management and their inherent shortcomings in the management of complex problems such as building projects.

The complexity of building projects is demonstrated through a discussion of their resource markets which are found to be highly differentiated yet interdependent. The building process itself is made up of different activities which often require different skills, materials and facilities. As a consequence, a wide range of participants are involved in building projects. This raises the need to coordinate their inputs.

The systems approach and its concepts which are most relevant to building project management is discussed. Its place in project management is illustrated with parallels drawn from districts which form the case studies for the research.

Among the most important concepts discussed is the environment. It is the framework of forces within which construction activity takes place. The extent of the environment of a project depends on its resources requirements. Various aspects of the environment affect the execution of building projects. The environment is usually turbulent and projects are vulnerable to the turbulence.

The functions of the managerial system of a project are considered in detail. They include the planning, securing and bringing together various inputs in amounts and modes which best suit the requirements of a project. It resolves disputes among project participants and controls the interaction between the project and its environment. In so doing the project is shielded from harmful environmental effects while the environment is protected from the harmful products of a project.

Two case studies reveal that project management in districts is disjointed and suffers from technical, managerial, and logistic problems. There is poor coordination between and among participants and projects. Resources are not adequately planned and controlled. Procedures are constrained by bureaucracy and shortage of facilities.

A major conclusion of the study is that the organization structure within which building projects are managed is not suitable for the tasks involved in building. The inappropriateness is largely the result of lack of channels for speedy communciation within the structure and the rigidity of the structure especially with regard to the expenditure of authority.

The recommendations that are given aim to make the authority structure more flexible to allow a faster rate of discharging duties while at the same time disallowing wasteful operations which result from poor planning and control.

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ABBREVIATIONS

AIE	-	Authority to Incur Expenditure.
AWP	-	Annual Works Programme.
DC	-	District Commissioner.
DDC	-	District Development Committee.
DDO	-	District Development Officer.
DEC	-	District Executive Committee.
DR	-	Department Representative.
DTB	-	District Tender Board.
DSO	-	District Supplies Officer.
DvDC	-	Divisional Development Committee.
DWO	-	District Works Officer.
EEC	-	European Economic Community.
PMEC	-	Provincial Monitoring and Evaluation Committee.
PWO	-	Provincial Works Officer.
RDF	-	Rural Development Fund.

CHAPTER 1

INTRODUCTION

The Construction Industry

The construction industry is a vital part of any economy which seeks growth. This is due to the direct relationship which exists between capital formation and economic growth. The construction industry contributes 45-60% of the gross capital formation of most economies.[1] Its contribution to the Gross Domestic Product (GDP) internationally ranges from 3 to 10 per cent - less in developing countries than in developed countries.[2] The percentage of Gross Domestic Capital Formation (GDCF) attributed to the construction industry in Kenya in the years between 1965 and 1977 ranged from 42 to 56 per cent[3].

Another important characteristic of the construction industry noted by Hillebrandt[4] is the dominance of the government as its client. This implies that large public financial outlays are dedicated to the construction of facilities.

In most developing countries, Kenya included, construction activity is partly financed through foreign borrowing.

Construction and related activity employs 4 to 6 per cent[5] of all wage earners in Kenya, thus contributing to the alleviation of the unemployment problem in the country.

In view of the important role of the construction industry throughout the economy, it is necessary to employ good management in the industry so that its activities are not disrupted, because a disruption would bite deep into several other aspects of the economy. For example, funds used on a project which does not succeed place a burden on other sectors of the economy to repay any loans which

were part of the expenditure on the project. This is inspite of the fact that the unsuccessful project does not give the intended benefits to the economy.

The Problem Statement

The importance of the construction industry is recognized in Kenya as stated in the Fourth and Fifth (1979-83 and 1984-88) Development Plans respectively. However, the dissatisfaction with the performance of this sector of the economy especially its management aspects, [6,7] is expressed in the same documents.

Problems which are experienced in the various aspects of construction fall in the three important parameters in a construction project, namely, cost, time and quality.

On completion, many projects are found to have exceeded the original estimated cost (or contract sum) and original contract period, and are invariably of poor quality compared to specification.

The reasons for this state of affairs which have been given by various sources and reported in the local press include the following:-

1. Corruption and conspiracy among and between client representatives and contractors which result in various anomalies in projects, such as the disappearance of project funds,[8] irregularities in awarding tenders,[9,10,11] registration of projects as complete while there is nothing on the ground,[12] approval by supervisors of buildings which are not built to specification whereupon they earn commission,[13] and situations where uncommitted

contractors "use their influence" to get jobs.[14]

2. Delayed commencement of projects after they have been designed and finances committed to them.[15,16]
3. Lack of experience, technical knowhow or the commitment to carry out projects by contractors.[17]
4. Lack of sufficient funds,[18] especially in self help projects.[19]
5. Delayed payments to contractors by clients coupled with poor credit facilities to contractors by financial institutions.[20]
6. "Squabbling" among project committee members which results in lack of agreement on the course of action to take,[21] and unconducive regional political climate leading to withdrawal of funds by financiers.[22]
7. A lack of adequate manufacturing base which results in prolonged contract periods while waiting for imported building materials and components. Such periods of waiting also lead to higher costs.[23]
8. Lack of proper communication because all trained personnel are invariably on the client's side.[24]

The three-tier problem of cost escalation, delayed completion and poor workmanship in building projects is a countrywide occurence. For example, a statistical analysis of projects for the years 1960-1984 showed that cost performance is directly related to contract size, where size is directly related to contract sum.[25]

Assuming that complexity of a project, and hence need for more sophisticated management techniques increases with project

size, then it is safe to assume that in Kenya, the management techniques used in construction are not sufficiently sophisticated to cope with the needs of complex problems. The case for the use of construction management techniques other than those which are currently in use is therefore clearly established.

Project management will increasingly be carried out in the districts which attained the status of development centres since the launching of the new development strategy in Kenya, the District Focus for Rural Development Strategy. Within the strategy, most projects are conceived, planned and implemented within the districts.

Following is an examination of the new approach, and the challenges of its rural setting which have implications on the management of construction projects.

The District Focus Strategy

On 1st July 1983, the Government of Kenya officially launched a strategy of development called the District Focus for Rural Development Strategy (in short the District Focus Strategy), which aims at streamlining the running of the economy. Its major objective is to direct the attention of the planner to the districts with the aim of achieving faster development through granting districts the autonomy to plan and implement projects at the regional level rather than serving an "extension agency role for the operating ministries."[26]

The official launching of the District Focus Strategy did not constitute the beginning of district level planning in Kenya.[27] The first District Development Committees (DDCs) were set up in 1965 for the purpose of drawing proposals to meet the infrastructural needs and priorities of the district. In 1966, the

Special Rural Development Programme (SRDP) was set up in six districts to experiment with different approaches to rural development. These and other subsequent attempts to decentralise development planning did not achieve their aims because of poor coordination between the districts and the Central Government.

The current revitalized approach to decentralization is an offshoot of a recommendation by the Working Party on Government Expenditure which states in part:-

> "Our major recommendation is that the district team, under the leadership of the District Commissioner and with the guidance of the District Development Committee, should be established as the major force and vehicle for the management and implementation of rural development."[28]

Before decentralization, designing, tendering and supervision of projects were done at and from the headquarters of the recently renamed Ministry of Works, Housing and Physical Planning (referred to only as M.O.W. throughout the remainder of the thesis) in Nairobi. They therefore suffered from the many shortcomings of "rural development tourism, the phenomenon of the brief rural visit,"[29] among other problems.

The implication of the District Focus Strategy is that projects will now be identified and planned at the district level and implemented by the Central Government or donor agencies through the DDCs, or by the DDCs themselves, using district-based personnel and usually within a rural environment. Following is an examination of the challenges of such an environment.

Challenges of a Rural Environment

The rural environment poses unique challenges to project management which may not be present in major urban centres.

The challenges, which differ in extent and content from one rural area to another, and which add to the complexity of an already complex role of project management, have been identified[30] and include:-

- The weak rural infrastructure which makes material supplies and plant and staff delivery difficult. There may also be no storage facilities available for hire near sites and therefore perishable materials like cement are kept in sheds which are not sufficiently weather-proof and may be destroyed by adverse weather conditions. In addition roads may become impassable or bridges may be swept away during rainy seasons. This may result in periodical abandonment of sites.

- Rural areas generally suffer from lack of background information about important factors such as soil types and rainfall through to the occupations and incomes of the rural population, all of which have effects on projects and should be taken into account during planning and implementation of a project.

An attempt to solve the problem of scarcity of design information is being made through the establishment of data banks for each district at district headquarters. This data is, however, of a general nature and may not serve some unique needs of a building project, such as soil conditions on a particular site.

- Some rural areas have a sparse population which may limit the supply of skilled and unskilled labour. Even where population is not sparse, rural people are involved in several activities and the supply of labour will vary depending on the demands placed upon them by their other activities. For example,

there are many reasons why rural workers may decide to withdraw their labour at certain times. Such reasons include household needs, planting and harvesting seasons.

- Rural areas usually have a poor water supply. Except for a few areas, there is no piped water. Other areas may not even have a river in the vicinity of a project, or may have water that cannot be used in building.

Scarcity of water can have confounding effects on a project in terms of cost and delay in completion.

- Plant breakdowns in rural areas may halt some operations before spare parts or repairers are brought to site to repair such plant.

- Some rural areas have no recreation facilities and workers who are imported into such areas may be ran down by boredom and nostalgia thereby reducing their productivity which may lead to delay in completion.

In addition to the problems cited above, this study found that:-

- Some rural communities are hostile to the extent that they sabotage in various ways projects in their "territory" if they are let to "imported" contractors. An example is a cattle dip whose excavations were filled up, a watchman attacked and materials stolen because the contractor was a stranger to the people who had contributed part of the money for the dip.

- Projects in rural areas are usually of a relatively small

monetary value. This may lead to laxity by implementing officials. They may not carry out their duties with the diligence that they would if they were involved in a bigger project.

Study Objectives and Hypotheses

The primary objective of this study is to examine the organization structure of a building construction project in the districts and identify implementation problems which arise from it.

An attempt will therefore be made to:-

(i) Identify the members of the implementing team and their roles.

(ii) Identify the decision-making process for a building project in the district.

(iii) Examine the practice of resource planning, project control, communication, authority and accountability, and coordination within and among projects, all of which are aspects of project management.

(iv) Identify specific problems that are experienced in project implementation.

(v) Suggest possible alternative management procedures for use in the districts to overcome the problems identified.

This study hypothesizes that, inter alia

(i) The project organization structure currently in use in the districts is not suitable for the implementation of

building projects.

(ii) Remedial measures which are proposed from time to time fail to produce good results because of one or a combination of the following:-

(a) they are too narrow-sighted. The problem is not addressed in its entirety and therefore the measures that are proposed can only partially solve the problem.

(b) problems are wrongly understood and therefore the consequent proposals are inappropriate.

(c) they are not enforced on the construction industry by those who are charged with running the industry at district level and elsewhere.

The Study Assumptions

The First assumption is that actions of on-site project implementors (contractors and departmental labour) are directly related to the client's project management procedures. This implies that the more thorough and effective the DDC project team, the more motivated the contractor and/or departmental labour and the faster the rate of project turnover.

The second assumption is that the principles of management which have worked successfully in other industries are adaptable and applicable in building construction. Contract abberations in Kenya do not, therefore, arise out of lack of management skills to resolve them but rather from either:

(i) A lack of appreciation by those entrusted with project management of salient differences in the operations of different industries (especially manufacturing and construction) and therefore lack of proper adaption and application of general management skills to building projects, or

(ii) A lack of appreciation of the complexities that exist in building projects which results in the appointment into leading positions in project administration of persons lacking enough grounding in project management. Along with this is the extension of authority of organizations which were set up and structured for public administration to cover building management, often with half-hearted or no internal reorganization.

Lastly, lack of finance by clients, widely used to explain poor contract performance, is not a problem perse but is partly a reflection of inadequacy of financial management. This study therefore proceeds on the presumption that though money is scarce just like other economic goods, good financial management would remove most of the artificial scarcity which emanates from poor flow

rather than its inavailability at source.

This study recognizes that there is no "one best way" of managing a building project. It raises issues which a project manager should appraise himself with and suggests solutions to some of the problems which are likely to be encountered in the course of administering a project, without claiming to exhaust the spectrum of possible approaches and solutions to any one possible problem. It recognizes that implications of managerial action differ widely between projects depending on the environment within which a particular project is undertaken.

Solutions to problems should always be genenerated in context, taking into account as much of the environment as has any effect on, or is affected by, the solutions.

Importance of the Study

This study is about the management of building projects in the districts within the framework of the District Focus for Rural Development strategy of development. It will identify areas of weakness in the management of building projects in the districts and give recommendations for making project management more effective.

The study puts building projects in the context of the systems approach to management.* It has emphasized the necessity of appreciating the needs of projects and the aspects of the environment that affect projects during design and implementation.

Appreciation of the facts mentioned above, and the diligent application of the principles of management and systems knowledge

* See Chapter 2

which are presented in this report would raise the level of performance by both the design team and the contractors of projects.

This report is not aimed at a specific group of managers of projects in the districts, but to all those concerned with building projects. The cardinal conviction of the systems approach which is proposed in this report is that knowledge of the role of oneself and that of the other person, the relationships that exist between the roles, and the management of these relationships, is the basis of good systems management; and building projects are systems.

REVIEW OF RELATED LITERATURE

Project Management

> "... the construction process, once it is set into motion, is not a self relgulating mechanism and requires expert guidance if events are to conform to plans"[31]

Project management is also necessary "to set the construction process into motion."

The need for management skills in construction arises from the fact that construction projects are compelx. The complexity presents itself in three faces: differentiation, uncertainty and interdependency, which are discussed below.

Differentiation

Construction projects take place in an industry which is differentiated in many respects. Firstly, inputs of materials, skills and information are differentiated. This entails a great number of sources to bring forth all the inputs required. Thus, the industry exists in groups of participants - architects, quantity surveyors, clients, contractors, suppliers of materials, specialist subcontractors,

plant hirers, engineers, financiers, standard setting agencies such as local authorities which set up building by-laws, etc.

Material inputs such as bricks and timber are obtained from quarries and saw mills which are scattered over wide territory. There are many manufacturers of industrial based inputs such as paint nails, glass, cement, roofing materials, steel reinforcement bars, etc. Lifts, electrical goods and an assortment of other materials and components are imported.

For each of the materials, even those which are manufactured by a few factories, there are several distributors and stockists.

The most glaring aspect of differentiation in the industry is the separation of design and production. Design itself is further differentiated into architecture, quantity surveying, engineering etc., while production is achieved by the interaction of main contractors and sub-contractors each employing various skills and resources.

The second major aspect of differentiation is the construction process which proceeds in a series of serially related steps namely briefing which consists of inception of the project and feasibility studies; sketch plans which includes the preparation of outline proposals and scheme designs; working drawings which includes the preparation of detail designs, production information and bills of quantities; tender action whereby a contractor is chosen, after which site operations start.[32]

Uncertainty

Construction takes place in a very uncertain environment. It is therefore not possible to predict with precision the outcome of a project even after detailed planning has been done.

Weather and soil conditions, prices of inputs, labour supply and productivity and the supply of materials can differ substantially from what is anticipated during the preparation of a project.

Interdependence

During design, the professionals depend on each other to be able to carry out their respective duties. For example, the quantity surveyor depends on the architect's and engineer's drawings and specifications to evaluate the cost implications of design solutions at different stages of design in order to develop the most cost effective design.

Interdependence by the professionals exists even during construction where, for example, the architect needs to seek cost and legal advise from the quantity surveyor before he issues variation orders which may disturb the balance of rights and obligations between the client and the contractor.

During construction there is great interdependence between the design team on one hand and the contractor on the other. The contractor depends on the design team for continuity of his work. The design team depends on the progress of the contractor and his requests for information to be able to make further decisions or take action.

At the process level, it is obvious that elements of a building have a sequential relationship whereby the construction of some elements depends on the completion of others. For example, walls have to be built before they are plastered.

The foregoing discussion has showed that differentiation in industry and process severes some of the most salient connections between various interdependent aspects of a project. This raises

the need for reconciliation, or integration, which is discussed below.

Integration

Duccio Turin has suggested that

> "the effect of fragmentation (of the construction industry) is that there are difficulties in coordinating the interventions of the main participants and in ensuring that, although their motivations may be different and their interests conflicting, their energies are channelled to a common goal."[33]

Peter W.G. Morris[34] has suggested that tighter organizational integration is required when:-

(i) The goals of an entity (project) require different groups to work together closely;

(ii) The environment is complex and changing rapidly;

(iii) The technology is uncertain or complex;

(iv) The enterprise is complex or changing rapdily.

The characteristics cited above are found in projects in varying degrees. The need for integration is therefore not in question, and the duty which arises out of this is project management.

Project management is largely accomplished through personnel of different employers working closely together. However because of increased complexity of projects, the process of construction, and the environment within which projects are carried out, the personnel have increasingly found it difficult to adjust mutually and spontaneously to the needs of projects. Need has arisen, therefore, to consolidate the authority and responsibility of project management in the person of a Project Manager.

The project manager provides the cohesive force that binds together the several diverse elements into a team effort for project completion. [35]

In the districts, the District Works Officer (DWO) is the project manager. He is responsible to the government for the implementation of all building projects in the district.

Running many projects simultaneously calls for greater coordination. However, the principles of management which are applicable to one project can be extended to many projects. The principles are found in many texts on management and are discussed in chapter three of this thesis.

RESEARCH APPROACH

Selection of Study Area

The area chosen for this study is the district. This is due to the fact that the District Focus Strategy has given districts a major role in project identification, design and implementation, thus making it the area with the greatest concentration of project management activities.

Although a study of projects in all districts in Kenya would throw a lot of light on the causes of project failures, it was the conviction of this study that given the similarity of set-up of all districts, two districts would be sufficient. Districts are structured similarly to carry out adminstrative and development duties following procedures prescribed by the Central Government

The sufficiency of two districts is emphasized by the nature of the study. It is not concerned with the relationship between spatial distribution and performance of projects. Its concern is

procedure as seen in the light of management principles and systems concepts. It seeks to identify the functions and relationships of the various organs of the district and the state, and non-governmental organizations once they come together for the purpose of providing buildings. It seeks to identify the effect of the procedures and relationships on the performance of a project.

Before going into field research, preliminary inquiries were made through letters, visits and telephone calls to establish districts which had information of the required kind.

Meru in Eastern Province and Kiambu in Central Province were among the districts which were found to have several projects falling within the study period.* The final decision to choose the two districts was based on convenience to the researcher.

The two districts are easily accessible by road from Nairobi where the researcher was based by reason of availability of library facilities which provided the varied literature required for the report. Nairobi is also the seat of the University where the supervisor and other assisting departmental staff were accessible.

The ease of accessibility made it possible to fit the field work within the humble budget available for this work. The budget could not have been stretched over longer distances or into relatively inaccessible areas, especially because of the many trips which were made to each district.

* See p.18.

Study Period

The study covers four years, stretching from January 1983 to January 1987. The projects reviewed were either initiated, planned and implemented, revived, or otherwise placed under the supervision of the District Works Officer within this period.

The period was chosen because the District Focus Strategy became officially operational on 1st July 1983. The six months head start on the operational date of the District Focus Strategy was meant to give a background of the management of projects in the districts before the launching of the new approach. It was also intended to give the background of some of the projects which formed the sample for this study.

It was possible to find within the study period projects at various stages of implementation and therefore identify the various problems which afflict projects at these stages.

Information available within the four years is considered to have adequately served the purpose of this study.

Selecting Projects

The DDC deals with many types of projects - building projects, water projects, community development projects, agricultural projects, etc. in addition to its administrative duties.

The projects which were reviewed in this research are building proejcts. To quality for consideration, a project must have gone through the proposal stage and got approval for implementation.

Cattle dips were considered as buildings because their management problems are similar to those experienced in conventional buildings.

Research Method

Research was carried out in three stages. The first stage involved perusing the records of the DDC, DEC, and DTB which were relevant to the study period. From these records was obtained information of a general nature regarding the procedures followed in identifying, approving, tendering and monitoring projects. They also provided information on the range of participants who play a part in projects. Above all the records contained a wide range of problems which are encountered during the life of a project.

This source fell short of satisfying data requirements for this study in the following respects:

(i) Information was of a general nature, rarely going into details about a single project.

(ii) The voice of the contractor in answer to accusations against him by the other members of the team was missing. The information was largely generated by clients and their consultants, who went only part way in exposing their part in project failures.

This necessitated the research to proceed to the second stage.

The second stage involved the study of files of individual projects selected from among those administered by the District Works office during the study period.

Project files contained signed contract documents such as the form of agreement and form of bond, information regarding briefs, cost advice given to clients, weekly progress reports, and records of site meeting proceedings. There was also correspondence between

various project participants. These include the Permanent Secretary in the Ministry of Works, Housing and Physical Planning, Permanent Secretaries of client ministries, the Chief Archtiect in the Ministry of Works, the Provincial Works Officer, the District Commissioner, the District Works Officer, Departmental heads in the district, consultants, contractors, subcontractors and suppliers. Others were local community development groups and other non-governmental development organizations like churches.

The third step in the survey involved interviewing district-based participants who play prominent roles in projects.* The intention was to find out their respective roles as perceived by them, their appreciation of the roles of other participants, their knowledge in issues of project management generally (this was especialiy for the non-professional participants), adequacy of personnel and facilities, and any policies relating to projects in the districts.

The District Development Officer (DDO) was interviewed because his unique position as the coordinator of development projects in the district exposes him to alot of information on procedure and policy.

The District Supplies Officer (DSO) who is the secretary to the District Tender Board (DTB) was interviewed mainly to provide information on tendering procedures and policies.

The District Works Officer who coordinates the design and supervision of all building projects in the district was interviewed mainly on technical and managerial matters.

* See appendix 1 for questions used.

Kiambu and 7 from Meru.

Although none of the two districts had registered an unwieldly number of projects within the 4 years, the decision to take half the number of the projects was taken in view of the fact that general information pointing to the procedures and problems encountered in a project had been obtained from the records of the DDC, DEC, and DTB.

The records revealed a high recurrence of similar problems (e.g. funding problems) across a great range of projects. It was therefore felt that the number of projects did not bear as great a weight as the depth of examination of individual projects.

In-depth review of the projects was also done within time limits.

Data Recording and Analysis

Recording

Data was recorded in notebooks. Each project was given a number. The number and name of the project was written down on top of the page and all notes relating to the project taken under the title.

The notes followed the chronological order of events as they were recorded and filed. Dates when letters were sent to or by the DDC, DEC, DTB and DWO, or when site meetings were held or reports compiled were noted and the contents of the records summarised under the date. For example, these records were made: 30-11-83.

Letter. Contractor to P.W.O.

-Re-requesting for extension of time already refused

- Asking for site meeting to be arranged since last was held in April 1983.

26-1-84

Letter. P.W.O. to contractor responding to letter of 30-11-83. Site meeting to be held on 14-2-84.

Analysis

The information was grouped under eight subheadings as follows:

Name and nature of project. Under this heading was noted the name and nature of the project. A short description of the scope of the work was also included.

Contract particulars. Here the contract sum, contract period, date of possession and expected completion date were booked. Where available, the final cost of the project and actual completion date were also noted.

Flow of inputs. Statements regarding the ease and timeliness with which the project was supplied with labour, tools, equipment and plant as required were noted. Of particular importance here was the flow of information and funds from the client, and the timing of nominating sub-contractors and/or approving suppliers.

Communication. Time taken to respond to correspondence, clarity of such reports as project proposals and progress reports, and communication breakdowns between various participants was noted here.

Effects of physical environment. Observations on the effect of the weather, especially heavy rains, on contract performance were noted under this subheading.

Control. Observations regarding inputs to facilitate control, such as personnel, transport and stationary; methods of control such as site visits, site meetings and progress reports, as well as tools of control such as work programme charts, and the consistency of the whole practice of control was noted here.

Coordination. Under this heading were grouped the observations on coordination between parties, mainly the professionals, the client, the District Works Office, District Treasury, Provincial and National offices. Other aspects of coordination noted were in the balance of personnel and back-up facilities, and the programming of project supporting activities such as incorporating local labour and other contributions into the project.

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CHAPTER 2

SYSTEMS APPROACH AND MANAGEMENT

The aim of this chapter is to discuss important concepts which are suggested by different models of management and to evaluate them against the management needs of the construction industry.

Although management thinking and practice has been evolving since antiquity, it is considered outside the scope of this work to examine the historical development of management. Three broad models of management which encompass most of the ideas which have been put forward over time are examined. They are, the traditional model, the behavioural and management science model, and the systems approach.

The first two are given a brief treatment because of their shortcomings in the management of building projects in today's complex world. The systems approach is given greater attention because of its applicability in complex situations.

The Traditional Model

The traditional model of management is a broad body of knowledge which was put forward by early management thinkers to replace the rule of thumb method which was used prior to the formation of a coherent body of management knowledge. The following aspects of the traditional model are discussed below: scientific management, administrative management, and the bureaucratic model.

Taylor and Scientific Management

In the late nineteenth century and early twentieth century, Frederic Taylor formulated a system of management based on scientific analysis of work and work processes.[1] The system emphasized planning, standardizing, and improving human effort at the operative level to maximize output with minimum input. Taylor believed that scientific analysis and development would lead into a "one best way" of performing each task.

Taylor's ideas can be seen at work in the improvement of tools and equipment and human skills to enhance productivity in all fields of human endeavour. However they do not take full account of the impact of two very important factors on productivity. These are human behaviour and the environment external to the workplace. They are discussed in detail later in the report.

Fayol and Administrative Management

The French industrialist, Henri Fayol, observed the absence of a well-developed and accepted theory of management, and set about early in the twentieth century to provide such a theory. He believed that an organization should be structured along principles which would make easy the whole practice of management. Consequently he listed fourteen principles of management,[2] whose objective was to ensure the absence of conflict in an organization. He also listed five elements of management, namely, planning, organizing, commanding, coordinating, and controlling.[3]

Fayol has contributed greatly to management by identifying the cardinal functions of management and providing basic principles of administration for an organization. However his theory suffers the same shortcomings as Taylor's scientific management.

Weber and the Bureaucratic Model

An empirical analysis of church, government, the military, and business late in the nineteenth century led Max Weber to believe that the exercise of authority based on position is the most rational means of carrying out control over human beings.[2] His model therefore proposed the establishment of authority and responsibility relationships in an organization as a means of making management more effective.

Together with the preceding two models, the bureaucratic model suffers from a narrow scope of coverage of factors that affect human performance in particular and organizational performance in general.

Behavioural and Management Science Approaches

The two approaches grew out of the development and interaction of various classes of knowledge and technology.[5] The developments were employed in management with the hope of improving it. Both of these approaches are discussed in the following paragraphs.

Behavioural Science Approach

The behavioural science model of management seeks to "understand, explain and predict human behaviour in the same sense in which scientists understand, explain and predict the behaviour of physical forces or biological factors."[6]

Although this approach has the potential to increase productivity by influencing the behaviour of workers towards the achievement of organizational goals, the exactitude of prediction of human behaviour envisaged by the model is not achievable.

Management Science Approach

In many ways, management science (operations research) is an improvement of Taylor's scientific management with the addition of more sophisticated methods, computer technology, and an orientation towards broader problems.[7] It is quantitative in nature and has little to offer in the management of social problems which require qualitative methods. Its most potent application in construction is in activity scheduling.

The management approaches discussed so far are not suitable for the management of complex problems like construction. They are limited in the philosophy they adopt, problem analysis, and the tools they employ in management.

The remainder of this chapter is devoted to the systems approach which has largely overcome the limitations listed above and which is therefore advocated for the management of building projects in the districts; indeed everywhere.

The Systems Approach

The approaches to management discussed in the preceding section have one thing in common; they isolate one factor from the organization and accord it overriding importance in all situations. They then manipulate the isolated factor to increase production. They view an organization as an independent entity whose success is governed by the appropriateness and consistency of the tools of internal management.

These approaches contrast heavily with the systems approach as observed below.

The philosophy behind a systems approach to the solution of problems envisages the following facts:[8]

(i) A piecemeal approach to problems within firms and in local and national governments is no longer good enough if firms and nations are to compete, and indeed collaborate efficiently.

(ii) This is so because technology, firms, organizations and affairs in general are becoming increasingly complex and because policy decisions increasingly require the expenditure of large sums of money and therefore the consequences of bad decision making are becoming increasingly costly.

(iii) A systems approach to problem solving demands that a piecemeal approach is replaced by a holistic approach.

A holistic view of a problem recognizes that a solution is achieved through the interaction of many forces in the environment. This helps during the planning and implementation of projects in that as many forces as can be anticipated are considered, thereby reducing overall uncertainty on the project. It also recognizes the internal complexities of both the problem and the organization which seeks to solve it, and the fact that there are linkages between an organization and its environment. Solutions to organizational problems are obtained largely through the management of these linkages. This brand of management can be addressed only by the systems approach.

Building projects are not exempt from these observations. Indeed, even the simplest project is a complex of decisions and activities with dense interconnections between them.

The appeal of the systems approach in project management is its emphasis on the inter-relatedness of the component parts of a

project. The approach is a flexible methodology which guides a manager in project identification and solution; it is a tool which transcends the artificial boundaries which narrow thinking imposes on a problem (project) to give an appreciation of the problem in terms as close to its totality as possible.

This report suggests a systems-based framework within which building projects can be successfully managed. The framework is flexible to accommodate the unique circumstances of a particular project or group of projects. The ideas presented do not guarantee solutions because:-

(i) available knowledge is contingent upon further development of, and evolution of other branches of knowledge;

(ii) ideas are not magical. They are to be practised and applied inorder for them to produce results. The outcome also depends on the knowledge, appreciation and enthusiasm of those who apply them.

That not withstanding, the study gives a useful theoretical framework for the analysis and solution of problems in construction.

Understanding of systems is facilitated by systems concepts, which are common terms used in a specialised way to identify systems and their characteristics. The following concepts are discussed below:
systems and subsystems, open and closed systems, input-output systems, feedback control systems, and environment.

Systems and Subsystems

A system is an assemblage or combination of things or parts forming a complex or unitary whole which is greater than the simple sum.[9] It can be physical or conceptual.

In the words of Cleland and King[10] "the manager or analyst may define the various systems and subsystems in whatever way best suits his interest." No two people are likely to model a problem in the same manner, but systems models should always achieve some simplification of the original situation, and the interest should always be to form a framework within which the objectives and goals at hand are best achieved.

The component parts of a system are called subsystems. These can be divided into sub-subsystems, and the subdivision can go on endlessly.

In this study, the basis of a systems model for project management is a building project. It is itself a subsystem of bigger systems such as all construction projects in a district, the construction industry in Kenya, the national economy generally, etc.

A building project has various subsystems depending on how it is modelled. For example it can be divided into two subsystems - design and construction, or into yet smaller subsystems to include all the major activities in the process of construction, from inception to commissioning.

In this study, the project is divided into five subsystems after the Karst model of organization. The subsystems as shown in the diagram and discussed below are: goals and values;

technical subsystem; psychosocial subsystem; structure subsystem; and managerial subsystem.

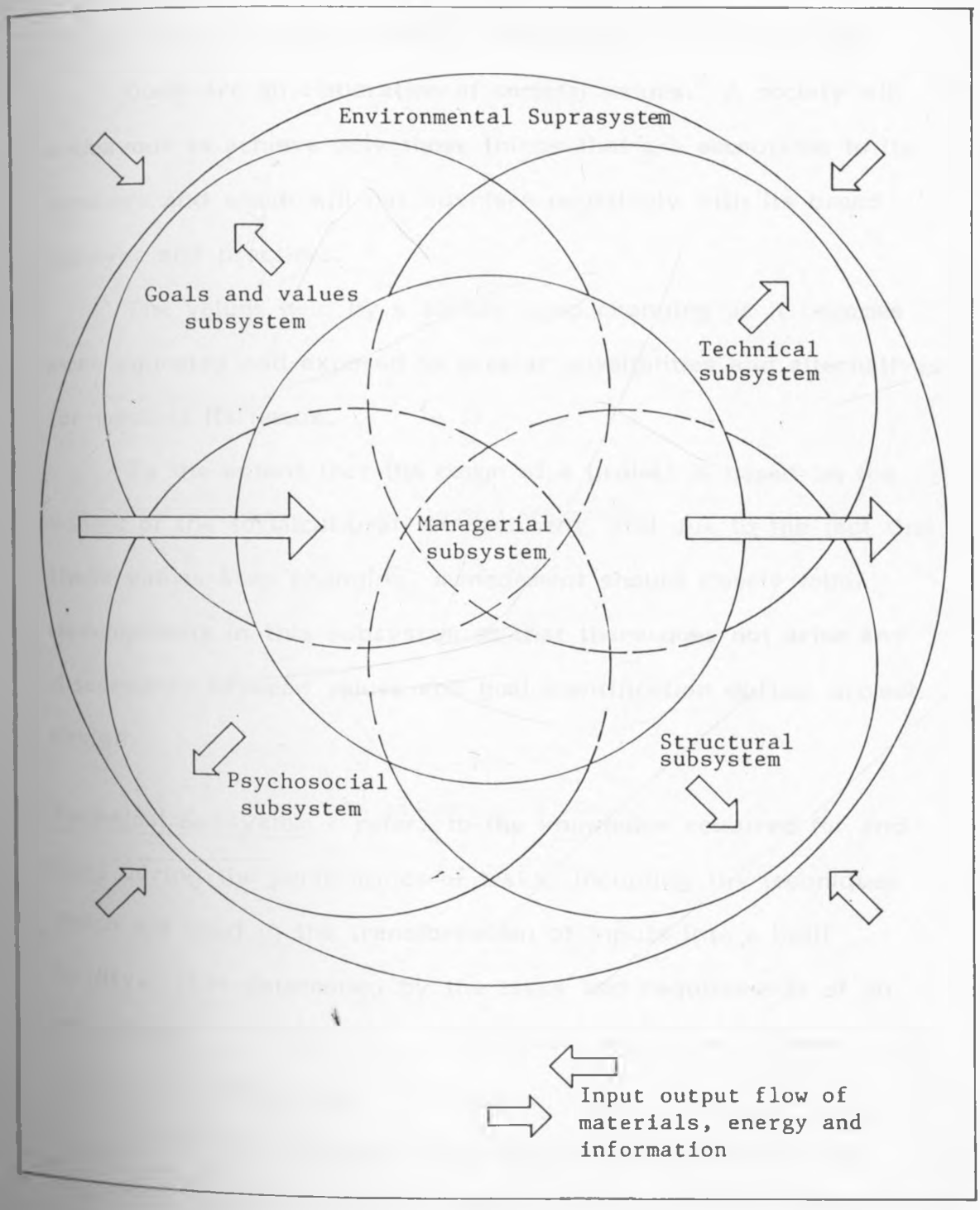

Figure 2.1: The Organizational System.

Source: Kast and Rosenzweig.* p.19

* See ref.4.

Goals and Values - are the combination of what the system aims to achieve. They include space and performance standards, usability and adaptability, and all those aspects of need which the project aims to satsify. They also include the material, information and energy constraints within which the facility is to be provided.

Goals are an elaboration of societal values. A society will endeavour to achieve only those things that are acceptable to its members and which will not interfere negatively with its broad believes and practices.

The values held by a society keep changing as it becomes more educated and exposed to greater possibilities and alternatives for meeting its needs.

To the extent that the design of a project is based on the values of the socialcultural environment, and due to the fact that these values keep changing, management should closely follow developments in this subsystem so that there does not arise any discordance between values and goal identification during project design.

Technical Subsystem - refers to the knowledge required for and used during the performance of tasks, including the techniques which are used in the transformation of inputs into a built facility. It is determined by the tasks and requirements of an organization. In building, the technical subsystem is made up of design and construction knowledge.

The technical subsystem is shaped by developments in technology generally and the extent to which such developments are accepted, applicable or affordable by an organization.

An intimate knowledge of developments in technology, especially appropriate technology* is vital for management for it to be able to utilize readily available resources.

The Psychological Subsystem - is composed of individuals and groups in interaction. It consists of individuals' behaviour and motivations, status and role relationships, group dynamics and influence systems, and is affected by sentiments, values, attitudes, expectations, and aspirations.[11]

The DDC, financiers, users, contractors, subcontractors, local authorities, the local community, and the feelings and attitudes of each of them, all of whom are involved in a project, are part of this subsystem.

The subsystem keeps changing with the changing environment and change of constitution of the groups or circumstances facing them.

To perform its duty of "getting things done through people," management must always be aware of the state of this subsystem and be able to reconcile any conflicts therein.

The Structure Subsystem - involves the way the tasks of a project are divided (differentiated) and coordinated (integrated). It is also concerned with patterns of authority, communication and workflow.

Structure can be discussed from the position and relationships of personnel and parties involved in a project, and the process of construction.

* Appropriate technology is a technology which seeks to provide for the needs of a society by using the resources available to that society.

Structure facilitates production because unstructured resources would be chaotic and cannot combine in any definite manner to produce pre-determined outputs.

The structure of an organization is determined largely by specialization in skills and difference in tasks.

The Managerial Subsystem - spans the entire project system by relating it to its environment, setting goals, developing comprehensive strategic and operational plans, designing the structure and establishing the control process.[12]

This study recognizes the importance of the managerial subsystem in any system. It also recognizes that this subsystem would be effective in an organization if it is clearly identified and its role clearly defined and appreciated.

The functions of this subsystem are discussed in detail in chapter 3 of this thesis.

Open and Closed Systems

A system is said to be open if it trades with its environment and closed if it does not. Open systems exchange information, energy and materials with their environments.

Openness and closedness also apply to the internal environment of a system depending on whether there is trade between its subsystems. Katz and Khan[13] have observed that "the concepts of open and closed systems are difficult to prove in the obsolute. They are two extremes in a continum. Openness and closedness are relative terms. No system is absolutely open and none is absolutely closed."

The concept of system boundaries helps us to understand the distinction between open and closed systems. The relatively closed system has rigid, impenetrable boundaries, whereas the open system has permeable boundaries between itself and the supra-system.* Boundaries are relatively easily defined in physical and biological systems but are difficult to delineate in social systems such as organizations.

Project system boundaries can be defined in terms of activities or processes rather than physical structures. Generally, those activities which are necessary for the system's transformation process defines its boundary. A glaring boundary in the construction process is the transititon between design and construction.

System boundaries perform several functions:[14,15]

(i) They filter inputs passing from the environment to the system, allowing only those inputs that have a positive contribution to the system objectives. Specifications for materials, the tendering process and nomination of subcontractors and suppliers all serve this purpose.

Frequently, the boundaries serve to homogenise inputs so that the system can deal with them more effectively. An example is block making where loose, amorphous ingredients are converted into regular shapes and definite sizes before construction begins.

* Suprasystem is the biggest system which encompasses all other systems.

(ii) They filter the outputs of the system so that only desired outputs are returned to the environment. Quality control through frequent checks on work during construction is an example of this function.

(iii) They provide a degree of autonomy and independence for the system from intrusion of environmental influencies. Isolating resources for the exclusive use in a project thereby protecting the system from competition for resources is an example.

A building project is an open system. It imports from the environment inputs of materials, skills, information and energy and passes its products of built facilities, wastes, acquired skills, incurred debts and information to the environment.

A project is also open internally. Looking at the building process we find that design information is largely generated from the psychosocial, technical, and goals and values subsystems while the structural subsystem partly acquires its shape from the project design. All the subsystems are integrated by the managerial subsystem.

During production, there is a flow of information between and among participants.

Project management operates at the boundary between the system (project) and its environment and also at the subsystem boundaries to perform the filtering and protection functions stated earlier. It also acts as a linking pin between the subsystems to ensure integration and cooperation.

The project managerial subsystem in the districts is found in the DDC which brings forth the project, organizes and follows up

the flow of inputs into it and monitors its progress, while at the same time protecting it from any harmful environmental influences.

Input-Output Systems

Various parts of a system are linked together by the flow of resources. The objective of a system is achieved by the transformation of these resources into outputs. A building project goes through the input-transformation-output process and can therefore be called an input-output system. It can be modelled as shown below:.

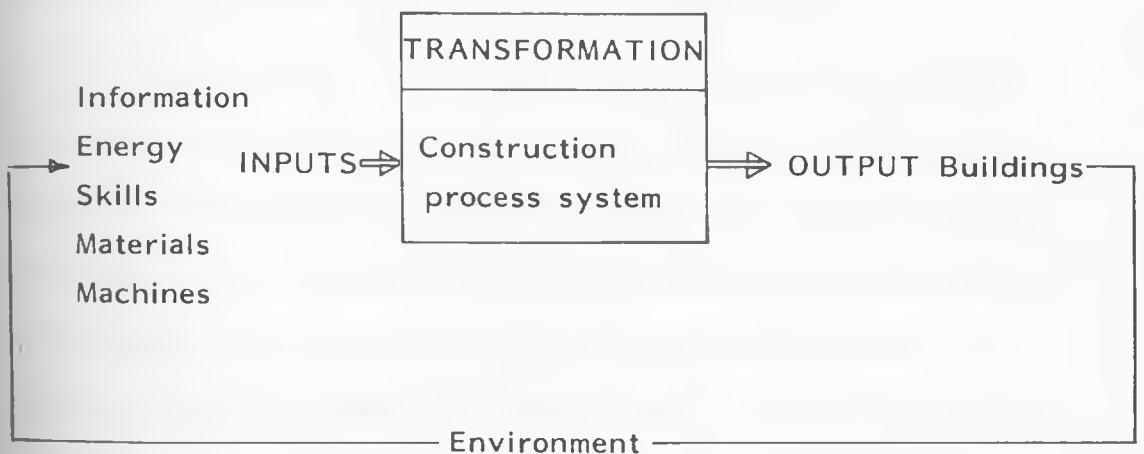

Fig.2:2. Input-Output Model of a Building Project

Adapted from Walker,* p.35.

The diagram shows that a building project imports its inputs from the environment and exports its output to the same environment.

Despite the simplicity of the diagram, the construction process can be broken down into several input-output subsystems where inputs, such as ideas, are transformed through the process of decision making into plans and strategies which are used as

* See Reference 18.

inputs in another stage of the process, and so on until the project is complete.

The fact that outputs of a subsystem are used as inputs in other subsystems within the same project system gives rise to the need for feedback and control, which is discussed below.

Feedback Control Systems

In a project, each participant has a goal to achieve. If these achievements are properly co-ordinated and integrated, they should together achieve the goal of the whole project.

During design, for instance, the architect is primarily concerned with the distribution of space and the aesthetics of a building. The structural engineer sees to the structural stability while the service engineer ensures good servicing of the building. The quantity surveyor evaluates the cost implications of proposed design solutions and relates them to available resources in order to protect the project from financial embarrassment during implemention.

During implementation, the client provides funds while contractors provide labour, skills, materials, and actually assemble the building.

Feedback control systems carry information back and forth among members of the design team until an agreeable design solution is reached. During implementation, the system compares achievements with goals at various stages of accomplishment to establish whether:

(i) activities are progressing towards the set goal;

(ii) there is a deviation, in which case the feedback control system should pinpoint the direction and extent of deviation.

Feedback control systems also monitor the environment so that if there is a force which moves the goal, action can be re-orientated to the new position. An example of such a force is the ban in 1985 of the use of flat roofs in all government buildings. Starting from the time of the ban, re-orientation included redesigning of roofs, rellocation of facilities previously meant for roof tops, issue of variation orders* to construct pitched roofs in all ongoing projects and generally readjusting to all the physical, time and cost implications of the change.

A feedback control system must be designed into the overall organization of a project so that its operation does not place an unforseen burden on the project resources. It must be recognized that such a system requires resources dedicated to it. They include personnel, transport facilities, finances, etc.

The most important prerequisite for a feedback control system is a standard or standards against which progress can be measured and evaluated. Time and financial limits and dimensions of building elements are examples of standards.

Following below is a discussion of the concept "environment" which is much used in preceding sections.

* Directions issued to the contractor by the architect varying the content or nature of contract work.

Environment

According to Hall and Fagen,[16]

> "For a given system, the environment is the set of all objects a change in whose attributes affects the system and also those objects whose attributes are changed by the behaviour of the system."

Understanding of a system's environment is necessary in management because of the interrelationships that exist between the two. De Greene[17] has observed that:

> "Today the interrelationships between and among the organization (project) and its external environments are changing much more rapidly than in the past and both the organization and its environments and the external environments among themselves are becoming more tightly coupled. This means that a purposeful activity or a spontaneous change anywhere in the overall world environment can trigger a succession of events that spread across the entire environmental field and impact on the organization in unexpected ways. Models of organizational growth and change that rely mostly on internal processes are not realistic."

Although the author is referring to the world situation, his statement is equally applicable in the districts and gives a strong indication of the extent of awareness of the environment which project managers should have in order to be effective.

A point to note about the definition of the term environment is that the geographical view of the term is only part of the systems view of the same term. Environment in systems transcends distances. Elements and objects which are geographically far removed from a system may form part of its environment while others which are near it could be external to its environment.

The steel industry in Canada, for example, could form part of the environment of a reinforced concrete building frame in a small town like Chuka in Kenya while the Meru National Park which is geographically closer may not form part of the system's environment. The test for the elements of a system's environment is interaction in inputs and/or outputs.

One of the major duties of a project manager is to relate his project to its environment[18] and to obtain congruence between the two.[19] This can happen only where the project manager has an intimate knowledge of the project's environment. Of utmost importance in the districts is for the project managerial subsystem to understand the contractor and the client, and their environments. These two are the major participants around which all other forces in a project revolve.

In the course of building, a contractor has to harness and schedule resources from the supply subsystem so that he can obtain the supplies where and when they are required and in the desired quantities and qualities.

Apart from satisfying the existing project requirements, the contractor is faced with a changing information mix regarding the project by way of variation orders and site instructions.* The source of resources is also not certain as to its ability to meet requirements at anticipated times, quantities and rates.

*Directions given to a contractor by authorized persons.

The workforce presents one of the most uncertain variables on site. It is made up of astoundingly different elements in terms of humans, whose motivations and willingness to work cannot be truthfully measured at any one time, and who work interdependently to perform tasks in the project.

The physical environment, comprising the weather, soils, directions and strengths of the wind, etc, are also uncertain to some extent.

It is imperative that the client should be aware of the contractor's environment. He would then help to reduce its turbulance by doing the following:

(i) Preparing his cashflow to suit project requirements;

(ii) Going to tender at an appropriate time when adverse weather conditions are unlikely to affect the continuity of work;

(iii) Using designs which will, as much as possible, utilize readily available materials and skills;

(iv) Invoking into the contract terms which are of mutual benefit to him and the contractor. For example he can include a fluctuations clause* where the contract period falls astride important economic periods such as reading of budgets when prices of materials are likely to go up.

* A Clause which provides for adjustment of contract rates to accommodate fluctuations in prices of inputs.

(v) Select a contractor who is capable of utilizing the environment optimally for the benefit of the project;

(vi) Discharge his duties to the contractor, such as paying him promptly when payment is due, knowing that doing so is a service to the project;

(vii) Make firm design commitments so that the uncertainties which befall a contractor who is served with many variation orders are reduced. Many variation orders may make resource scheduling difficult.

This can be done by allowing sufficient time to the design team for design, preparation of drawings, specifications, bills of quantities, and for co-ordination of specialist services.[20] Clients should also cultivate the habit of involving themselves more closely during design to avoid situations where "faults" are recognized when they are implemented. This situation arises when there is no meeting of minds between the client and his team of professional advisers.

The environment of the client is no less turbulent than that of the contractor. For example, the authority subsystem of the public client is bogged down with bureaucracy. There is also great functional differentiation, such as the district works office, district treasury, district tender board, all of which render one service or the other to a single project. There is also need for consensus among the functional groups like the district, provincial

and head offices of a government ministry. Consensus has also to be reached between two or more ministries at all these levels if they come together in a single project. An example is where the Ministry of Co-operative Development may want to build a training institute whose design is based on the standards of the Ministry of Education, with the Ministry of Works as the professional consultant.

There is, therefore, need for a strong integrating mechanism within a project.

Chapter Summary

This chapter has considered different approaches to management, mainly the traditional model of management, the behavioural and management science approach and the systems approach. Their contribution to management generally and the suitability or otherwise of each approach in the management of building projects has been considered.

Various systems concepts, which help to define a project in systems terms have also been explained in relation to building projects in districts. The concepts considered are systems and subsystems, open and closed systems, input-output systems, feedback control systems, and environment.

The following chapter looks at project management in the context of the systems approach and the concepts and terms which have been introduced in this chapter.

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CHAPTER III

PROJECT MANAGEMENT

Project management is the business of securing the end objectives of a project in the face of opportunities, risks, and problems which are encountered on the way.[1]

The functions of project management which are discussed in this chapter describe the crucial tasks which must be performed during the design and implementation of a project. The aim is to bring to light the relevance to the field of construction of functions of management as described in the general theory of management, with the object of enlightening the client and his management system on the crucial role he should play in the performance of each function. Although the functions appear to follow a sequence as a project progresses, they are, in fact, continuously and simultaneously performed at every stage of a project.

The functions discussed are planning, organizing, directing, and controlling, in that order.

Planning

Planning is the most basic function of management. It is defined as deciding in advance what is to be done, who is to do it, how it is to be done, and when it is to be done.[2]

The necessity of planning arises due to scarcity of resources while human needs are multifarious. This state requires that resources be used in the most optimal manner to realize maximum benefits from their use.

Planning lays the framework for influencing and regulating the flow of resources into a project. It should always aim at maximising efficiency in the use of resources, given a certain technology.

Despite the crucial role played by planning as a first step in all resource consuming undertakings, a report on public sector undertakings (in India) by the Administrative Reforms Commission has revealed the following inadequacies in Project Planning.[3]

(i) One of the main reasons for delay and cost overrun is the lack of proper attention to the initial planning of projects.

(ii) While planning projects, all the steps required to be taken during the project formulation stage are not followed. The result is that projects are executed on the basis of incompletely conceived plans and estimates.

(iii) Planning proceeds in a piecemeal fashion i.e. all the technical and economic aspects of projects are not considered together at one time. This necessitates revisions of project proposals and leads to inordinate delays in the initial stage of project formulation.

(iv) Often during initial planning, decisions are taken on the basis of assumptions which have not been verified or supported by a thorough analysis of

the situation, facts and past experience.

(v) Specifically, the more significant differences have been: (a) selection of site based on inadequate soil investigation, (b) omission and under-estimation of several elements of projects.

(vi) At times, two or more projects are inter-related or interdependent. In such cases, there is lack of coordination and sufficient effort is not made to dovetail the different stages of interdependent projects with the result that a particular project, though completed, cannot start its operation till another connected project is also complete.

Public projects in the districts are funded by the government, foreign donor agencies and non governmental organizations such as local community organizations, none of which is exempt from resource limitation and the rule that every agent of rational intent must plan his expenditure. The case for efficient use of resources applies uniformly.

In addition, a new project goes through a process which is vulnerable to the inadequacies cited. This makes it necessary for all participants to know the likely trouble spots in project planning.

A project starts with the acceptance of a proposal by the DDC which discusses and modifies it if necessary. It then goes to the District Works Office for detailed planning and preparation of the necessary documents. During the time, there is consultation

between the District Works Office, the client (government department or local community organization), and funding agencies, namely: the treasury, donors or local authorities, as the case may be. This is to confirm the availability of resources before the DTB invites tenders for the project.

When a contractor is selected, the project commences on site. The planning process outlined above should aim at accomplishing four activities in order for it to be complete. These are:

(i) Setting of goals and objectives.

The results which the project aims to achieve are defined and expressed in specific terms, such as the number of beds to be accommodated in a new hospital wing, total floor areas, time when the hospital should start operations, etc.

(ii) Generation of alternative approaches to achieve the goal.

Several approaches are proposed. These are in relation to aspects of the project such as the type of construction - whether framed or masonry, starting time, sources of funds, specifications, mode of getting the work done - whether through contract or by departmental labour, and others.

(iii) Choosing a suitable alternative.

The alternatives proposed are evaluated for their suitability depending on user convenience, flexibility, acceptability by users, availability of resources, operation costs, governmental, local authority or environmental constraints; and a suitable alternative is chosen.

(iv) Drawing a detailed plan of action .

Production information is compiled into drawings, bills of quantities and other forms of work description, time limits are set, personnel and resources are allocated to different activities and sections of the project, and a methodology for control is worked out.

To ensure that effort is not wasted in preparing projects which are later abandoned, consistent involvement of the funding agent and any other resource contributing body, and the client,* is necessary especially during planning. From the funding agent, assuarance will be required that every commitment made will be provided with the requisite resources.

As regards clients, one of their greatest failures in projects is poor representation during design. Their tendency to give a skeleton brief to designers and leave them to develop it and produce appropriate design solutions may result in designs which deviate widely from client requirements.[4] This behaviour among clients can sometimes be responsible for big contract variations with tremendous cost and time implications. Clients should therefore be part and parcel of the design team throughout planning.

A systems view of the project should be maintained during planning to ensure that a comprehensive plan results. Following below are arguments that have been advanced in support of this idea.

* In cases where donors meet only part of the cost of a project, the local community may be required to contribute money and/or labour towards the overall cost. The client could be a church. There can, therefore, be several resource contributors for one project.

Planning and Systems

Cleland and King[5] have given the following reasons for taking a systems approach to planning:

(i) a comprehensive view of planning requires a consideration of not only those things that affect the project directly but should go beyond the project boundaries and explore environmental influences which may operate during the project period and incorporate them in the plan;

(ii) since a comprehensive view of planning will encompass many elements which must be related in a logical way, a systems framework provides an effective device for considering the myriad interrelationships and feedback loops which are inherent in an overall unification.

(iii) any view of planning which extends deeply into the environment of the organization almost inevitably results in the consideration of second-order social consequences. Such consequences are within the natural domain of the systems approach.

Project implementation follows project planning. For efficient implementation, it is necessary to define the duties of participants and relate them in a complementary manner. The process of doing this is called organising, and the resultant framework is called an organization.

The managerial function of organizing is discussed below:

Organizing

Organizing is the process of building a framework to achieve goals. The result is an organization, which has been variously defined as "a formalised intentional structure of roles or position"[6] or "the division of work among people whose efforts must be coordinated to achieve specific objectives."[7] An organization structures the relationships of the members of the organization and hence influences their responses to the demands placed on them.[8]

The following important aspects of organizing and organizations are discussed below: the organization of a project; organizing as a process; formal and informal organizations and matrix organizations.

The Organization of a Project

Cleland and King have defined a project as "an ad hoc team of human and non-human resources pulled together in some authority and responsibility relationships to accomplish an end purpose."[9]

Every project is unique. Each has objectives and tasks which are peculiar to itself. This makes it difficult to execute a new project within an already established organization. This notwithstanding, general project characteristics will dictate to a large extent the type of cadre and organization to be employed for its execution.

One characteristic which is of almost universal relevance

to all projects in the districts is their small size. Despite the obvious advantages of setting up a team for one project with no other duties,* such a move would be ill-advised because, first, the members would be underemployed for most of the life of the project, and secondly, the numbers of trained personnel in the districts is not sufficient for such one-project-a-time arrangement.

Rather than set up an independent organization for every project, existing organizations serve to maintain a pool of human and non-human resources which are deployed to projects as need arises.

The existing organizations which give rise and resource to projects include:

(i) Government departments that represent various ministries;

(ii) The DDC and its sub-systems, the DEC, DTB, Divisional Development Committees (DvDCs) Locational and Sub-locational Development Committees;

(iii) The District Works Office;

(iv) Non-governmental organizations; local, national and international;

(v) Contractors;

(vi) Suppliers of materials; etc.

During the life of a project, a changing mix of forces from organizations is at play. The structure of the forces at any one time depends on the task

* For example such a team can pay undivided attention to the project.

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being accomplished. As illustrated below, a design phase and a construction phase organization structures are clearly discernible.

Design Phase Organization Structure

Figure 3.1* is a simple representation of the organization structure of a project during design.

The purpose of this organization is to bring together clients, professionals and financiers, all of whom lay the basis for project implementation by raising and developing a brief, interpreting it, preparing production information, and raising the necessary resources for it.

Implementation Phase Organization Structure

During implementation, the DTB falls out of the structures and the remaining participants acquire supervisory roles. Those that feature most prominently are the DDC, DEC, client departments, District Works Office, Ministry of Planning and National Development, Ministry of Finance, and the Provincial Monitoring and Evaluation Committee (PMEC).

Amongst other responsibilities, the DDC and its executive arm, the DEC, review progress reports of ongoing projects to ensure rapid implementation. Where necessary, project sites are also visited. They also coordinate the participants and resolve any conflicts.[10]

Client departments are responsible for the implementation of their projects. They liaise with other participants to ensure progress of the work. They sanction any changes in design.

* See next page.

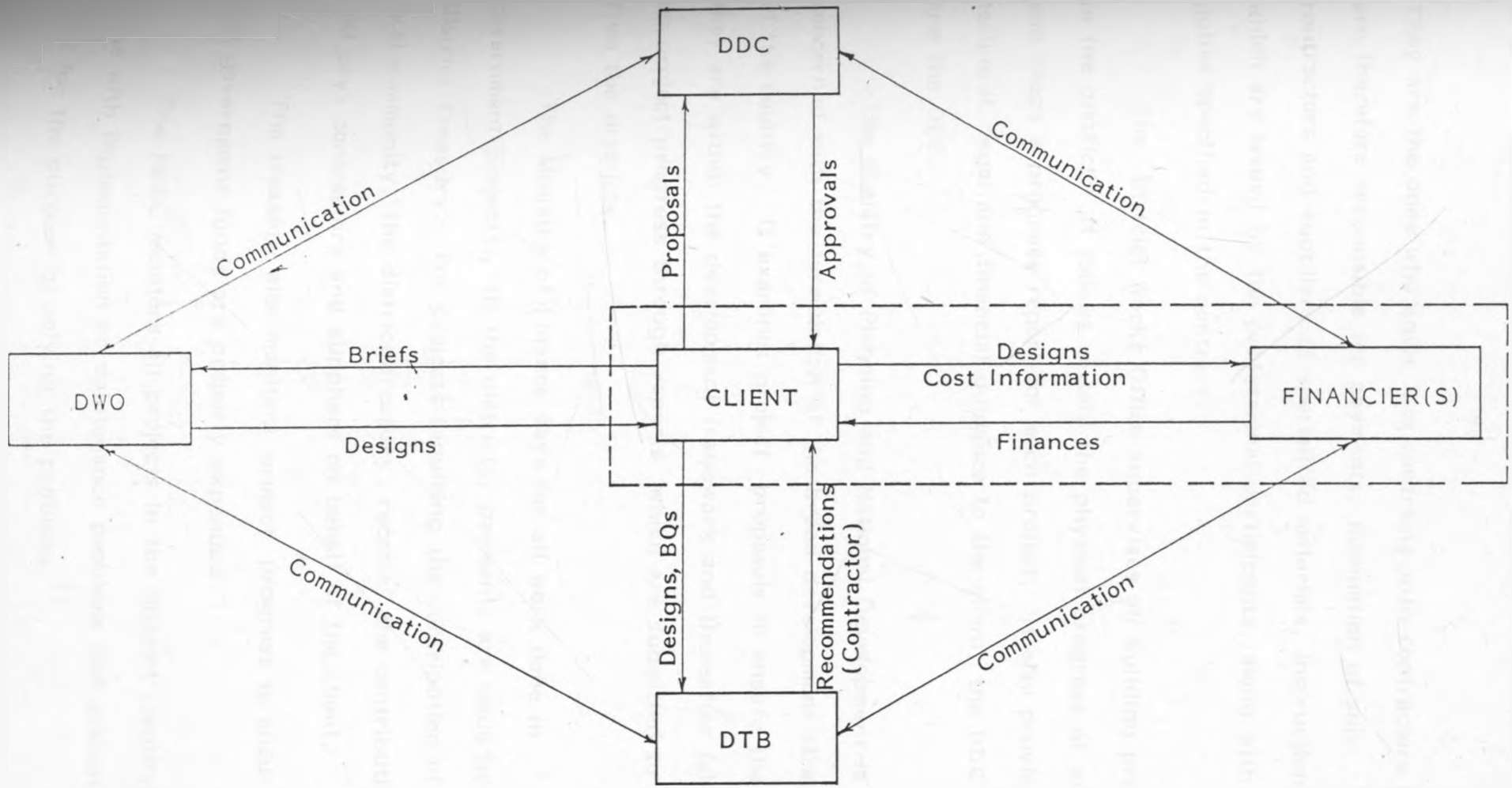

Figure 3.1: Design Stage Organization Structure.

The dotted rectangle indicates that the client can also be the financier.

They are the ones who enter into contracts with contractors and are therefore responsible for payments, nomination of sub-contractors and suppliers of specialized materials, instructions which are issued by the professional participants, along with other duties specified in the contract.

The District Works Office supervises all building projects in the district. It follows closely the physical progress of work and keeps a progress report for each project. It also provides technical, legal and financial guidance to the client, the DDC, and the DEC.

The Ministry of Planning and National Development is concerned with the formulation of the broad development strategies of the country. It examines project proposals to ensure that they are within the development framework and thereafter follows up project progress through reports which are submitted to it from the districts.

The Ministry of Finance pays for all work done in government projects. In the districts, payments are made by the District Treasury. For projects requiring the contribution of the local community, the district treasury receives the contribution and pays contractors and suppliers on behalf of the client.

The treasury also monitors project progress to ensure that government funds are properly expended.

The PMEC monitors all projects in the district identifying those with implementation or maintenance problems and evaluates them for the purpose of solving the problems.[11]

The participants who are based in the districts are closest to projects and therefore contribute most in the supervision.

The interplay of the myriad participants produces an organization structure like the one shown in the figure below.

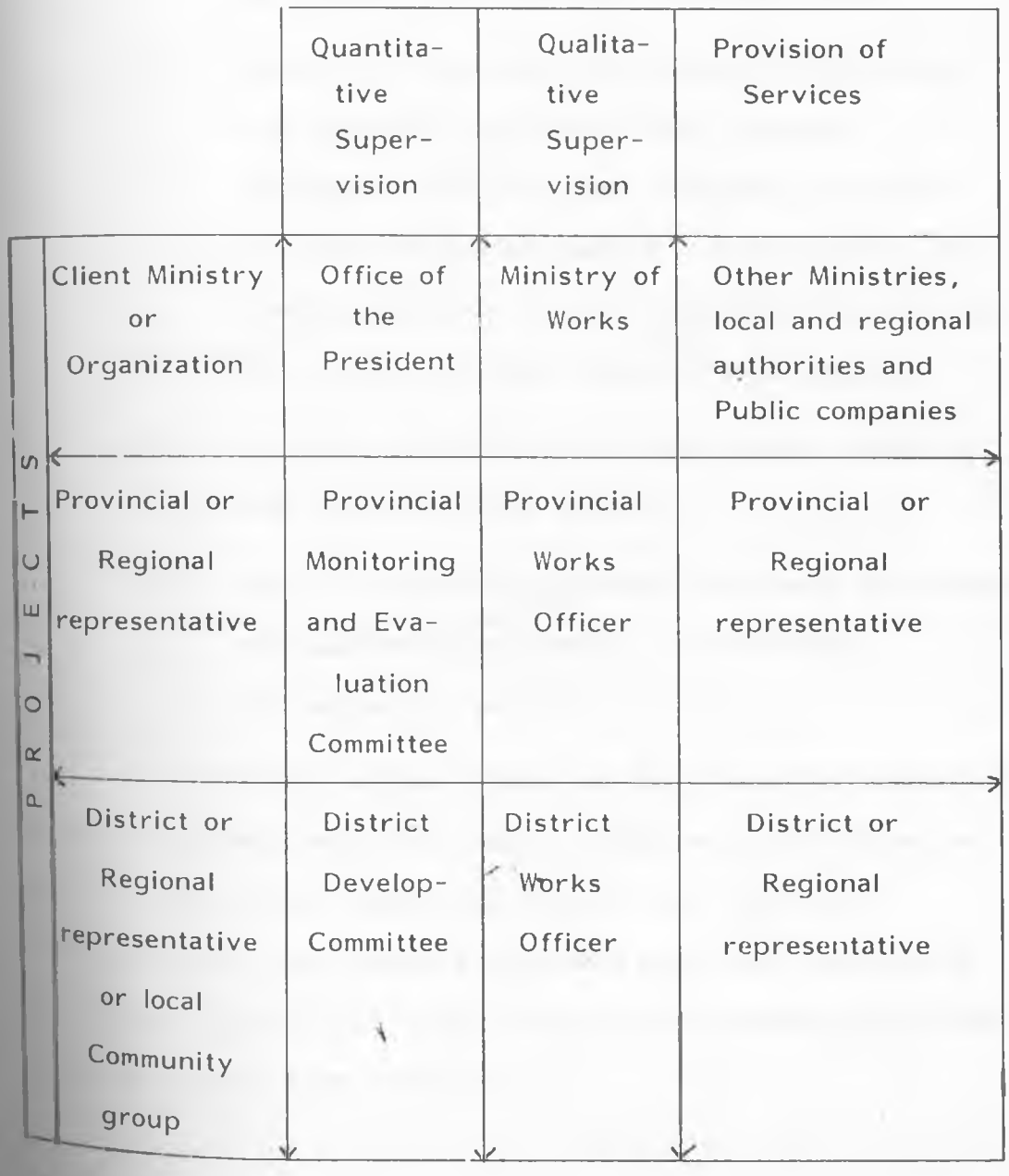

Figure 3.2: Project Implementation Phase Organization Structure.

The arrows indicate that there is movement of information vertically and horizontally within the organization. The organization structure shown is concerned mainly with project supervision and therefore the contractor is left out.

Organization as a Process

An organization structure for a project results from a process which is made up of the following steps:

(i) the goals of the project are identified, quantifiable objectives are then established;

(ii) derivative objectives and policies are formulated from the main objectives. Major resource requirements such as sites, finances, manpower and materials are considered. Tasks such as the tendering process, actual construction on site, etc are analysed for their resource requirements;

(iii) the tasks are allocated to organizations which are best suited to carry them out;

(iv) links are established between and among participants and tasks so that harmony is established throughout the project.

To organize a project, tasks are distributed to established departments which have the necessary skills and other resources, and which are by law empowered to carry out such tasks.* Each department then allocates personnel and other resources to the project. Once this is done, resources are coordinated so that work can proceed expenditiously.

* For example allocation of land can be done only by the Commissioner of Lands.

Coordination is achieved through the patterning, rigidly or loosely, of the relationships of participants. Formal, informal and matrix organizations which aim at achieving this pattern, are discussed below.

Formal and Informal Organizations

A formal organization is a "planned structure and represents the deliberate attempt to establish patterned relationships among components that will meet objectives effectively."[12] It is "prescriptive in nature - a 'blueprint' of the way activities should be related."[13] The process of organizing described previously aims at creating a formal organization.

The purely formal organization does not exist in real life. Many interactions in an organization take place outside the formal structure. Those aspects of the organization that are not explicitly planned but arise spontaneously out of the activities and interactions of participants constitute the informal organization.[14] During the life of a project, both formal and informal organizations operate side by side and contribute in various ways to project performance.

The Matrix Organization

It has been observed elsewhere in this thesis that the nature of projects in the districts precludes the efficient use of organizations set up to serve single projects.

Essentially, the matrix form is a structural design geared to two primary organizational needs:[15]

(i) the need to specialise activities into functional

departments that develop technical expertise and provide a permanent home base for employees, and

(ii) the need to have units that integrate activities of these specialised departments on a program, project, product, or systems basis.

The appeal of a matrix organization is its flexibility. It allows free consultation between members. Information can move vertically up and down, horizontally and cross-wise.

Building projects in the districts are organized in the form of a matrix. The basic structure for this purpose is already in existence.

Having established that potentially efficient organizations can be set up to implement projects in the districts, the question still remains why projects continue to suffer cost and time overruns and poor workmanship. Answers to these questions will be found in the facts that:

(i) an organization structure provides the framework of relationships and avenues of interactions in the course of solving problems. Whether the facility is used will go a long way in determining the outcome of a project.

(ii) districts are neither self-sufficient in resources nor do they have absolute authority to implement decisions deemed to be beneficial to projects. For example, all departmental heads have to refer to more senior members of their ministries when they

are making major decisions while transfer of funds between projects can only be done with treasury approval.

The effect on projects of the lower position of districts in the state hierarchy came out clearly in the case studies.

(iii) organizations cannot be ideal. Problems of relationships may arise, especially in the case where different members may want to maintain their loyalty to their parent departments rather than to the project.

After planning a project and setting up an organization for its implementation, human effort has to be directed and expended on the tasks. The discussion that follows is on the managerial function of directing.

Directing

Planning and organizing effort would go to waste if participants do not carry out their duties with the amount of zeal necessary to produce results. Directing is concerned with channelling the organization's human resources towards the achievement of the goals of the organization.

There are circumstances in which self direction is possible. Ford and Heaton[16] have observed that "if employee goals and organization goals are compatible, and if these goals are specific and measurable so that employees know whether they are reaching them or not, employees can largely direct themselves." But self direction in the project team cannot be relied on especially in the

civil service where the system of reward seldom takes account of individual performance in projects and where punishment for laxity is rare. Also, the fact that there are many participants and details of project design may keep altering makes self direction difficult. There is therefore need for a "director."

There are three forces which interactively determine effective employee performance. They are situational, individual, and motivational factors.[17]

Situational factors refer to the environment and framework of relationships within which a person works.

Individual factors refer to the innate and acquired characteristics which make a person suitable or unsuitable for the performance of some task.

Motivational factors refer to worker expectations which determine the enthusiasm with which he does work. Examples of the three factors are shown in the performance triangle below.

Figure 3.3: The Performance Triangle

Source: Ford and Heaton* p.328.

* See Ref.16.

Once a worker with definite abilities has been employed in an organization which is structured in a certain manner, motivational factors remain the strongest force in determining his performance. Worker motivation is largely done by the "director" or leader. This discussion continues with an examination of motivation and leadership.

Motivation and Motivators

Koontz et al have observed that "the necessity of building motivating factors into organizational roles, the staffing of these roles, and the entire process of directing and leading people must be built on a knowledge of motivation." [18]

Knowledge of motivation in a building project (and elsewhere) includes among other things, a thorough understanding of the individual and the group to which he belongs, his (its) likes, dislikes, needs and expectations - physical, social and psychological. Thus, a manager would be able to decide the most relevant motivators to use on individuals and groups at different times (human needs are continuously changing).

The motivational needs of project personnel should be known at three levels. The first level is that of the civil servants and donor agencies who are involved in the design, funding and supervision of projects. The second level is that of the contractor both as an individual and as an organization. The last level is that of the employees of the contractor, including those who supply him with materials and components.

Knowledge at level one would help to streamline project planning and control, while that at level two and three would enable the client to design ways of interacting with the contractor which would motivate both the contractor and his employees.

Theories and Practice of Motivation

There are several theories of motivation, each of which starts by modelling human nature and going on to suggest an approach to motivation based on the model.

Abraham Maslow's[19] "Hierarchy of needs" theory suggests that man can be motivated by progressively satisfying his needs which present themselves in a stratified form, viz. physiological, security, social, esteem and self actualization needs.[20]

Herzberg's Motivator - Hygiene Theory[21] models human needs into two sets; first their need as animals to avoid physical pain and deprivation, and their need as human beings to grow psychologically.

Herzberg contends that motivation would be achieved by manipulating the satisfaction of these needs.

In his Expectancy Theory, Vroom[22] has suggested that a person's motivation towards an action at any one time would be determined by his or her anticipated values of all the outcomes (both positive and negative) of the action multiplied by the strength of that person's expectancy that the outcome would yield the desired goal, i.e.

Force = Valence x Expectancy.

McGregor's Theory X and Theory Y[23] suggest two diametrically opposed approaches to motivation. The former assumes that humans are opposed to work and should be compelled to work. The latter suggests that expanditure of energy in work is as natural as play and management need only provide a favourable environment to work and workers would motivate themselves.

None of the theories of motivation can singly succeed in channelling human effort towards organizational goals. This is because none of them has fully enalysed the volatile nature of human beings.

The practice of motivation must be based on the recognition and appreciation of the meeting point of the theories, that is; in a goal oriented organization, there is need to mobilize and direct human effort towards the achievement of objectives.

Methods of motivating workers are matters to be decided upon by organizational designers, clients and project managers. For any method to succeed, it needs to take into account circumstances obtaining in the organization and on individuals and groups at the time it is being applied. This is because what can motivate a worker today may not motivate him tomorrow or next week. Whereas some incentives such as prospects for self improvement have long term effects, their day to day effect will be moderated by short term influences such as failure to receive expected information or remuneration in time.

While short term motivation will require the day to day observation of trends in workers and their environment followed by ad hoc responses by project managers, there are widely recognized

motivators which every manager should be aware of. They are implied by all the theories of motivation and include money,[24] positive reinforcement,[25] participation,[26] and job enrichment.[27]

Motivators are dispensed by people or groups occupying positions of leadership in the project.

Leadership

The project system is partly made up of individuals and groups of people. An essential duty of management is to coordinate their activities and direct their efforts towards the goals and objectives of the system. To this end, a manager must understand the nature of leadership and factors which determine the effectiveness of leadership.

Mullins[28] has defined leadership as "a relationship through which one person influences the behaviour of other people." Influence takes place when "there are any changes in behaviour of a person or group due to anticipation of the responses of others."[29]

Although Mullins' defination postulates one person exercising leadership, a group of persons within a larger group can influence the behaviour of the rest of the group.

Ways of influencing behaviour include emulation, suggestion, pursuasion and coersion.[30]

Emulation is made up of leadership by example. Members of the project team will be more willing and enthusiastic to apply their efforts if those above them show devotion to the project. The project manager and his professional team can influence both

the client and the contractor by discharging their project duties in a timely manner. Progress checks and the issuing of instructions to contractors should happen at convenient times for the parties and to the benefit of the project. The client can motivate the contractor by honouring certificates in time and participating in deliberations about the progress of the project in site meetings.

Suggestion involves direct and conscious interaction between individuals or between an individual and a group. Behaviour is influenced by presenting an idea or advocating a particular course of action. Typically, this mode is used when several alternative behaviour patterns for individuals or groups are acceptable and the influence is merely suggesting a preferred pattern.

Suggestion lends itself to building projects right from the design stage where alternative design solutions have to be appraised for suitability and a choice made. During implementation, opinions of different individuals are sought to solve problems which arise.

Pursuasion implies urging and the use of some inducement in order to evoke a desired response. In this group falls the various reward systems. Mere recognition or praise, and monetary rewards are examples.

Coercion involves forcible constraint, including physical pressure. It includes holding back benefits (such as promotion) or administering punishments* until certain behaviour is displayed.

* Examples include sacking, deducting salaries, delaying payments etc.

Verbal threats fall in this category.

Stallworthy and Kharbanda[31] have observed that "pursuation is far more powerful than coercion .... The former builds morale and initiative whilst the latter quite effectively kills such qualities." Unfortunately, there is evidence that coercion is widely practised by supervisors, administrators and KANU* officials on contractors. Even worse, there is "arm-twisting" of workers by contractors.

Projects are ran on a management philosophy which recognizes coercion as the most portent motivator!

Leadership influence depends on the subordinate's perception of a certain power residing in the leader. Mullins[32] has recognized five kinds of power, namely, reward, coercive, legitimate, referent, and expert power.

Reward power is based on the subordinate's perception that the leader has the ability to obtain rewards for those who comply with directives.

Coercive power is based on the perception that the leader has the ability to punish or bring about other undesirable outcomes for those who do not comply.

Legitimate power is based on the perception that the leader has a right to exercise influence because of his role or position in the hierarchy.

* KANU is short for Kenya National African Union which is the ruling party in Kenya and the sole political party in the country.

Referent power is based on the subordinate's identification with the leader. The leader exercises power because of his charisma or reputation.

Expert power is based on the perception of the leader as someone who is competent and who has some special knowledge in a given area.

It should be appreciated that although the reference of superior-subordinate relationship has dominated this discussion of leadership so far, influence can be, and is exercised among peers.

It has been shown that leadership is role related. Each group in a project leads all other participants in matters where it has the necessary power. This multi-pronged nature of leadership requires activity coordination and respect for the role of the other person.

Coordination can be achieved by setting up a communication system which can generate and supply in the most convenient and efficient way information when and to whom it is required. Since the subject of communication traverses wider management concepts than just leadership it is presented separately towards the end of this chapter. Following here is a discussion of the management function of controlling.

Controlling

Controlling is the process of making events conform to plans i.e. coordinating the actions of all parts of the organization according to the plan established for obtaining the objective.[33]

There can be no control without prior planning, and plans lose their influence without follow-up control. Together plans and controls regulate outputs.[34]

The control cycle is an endless sequence of establishing standards, observing performance, comparing performance with standards, and taking corrective action to increase the likelihood of achieving performance which 'measures up' or to revise plans and standards in the light of actual performance.[35*]

There are several reasons why controlling is necessary in a building project. First and foremost is the separation of design from construction. This separation introduces a bottleneck in the flow of ideas from design to construction. There is a possibility of a breakdown of the communication of production information from the design team to contractors. This can lead to a deviation from anticipated standards. Controlling corrects this through systematically evaluating continuing and completed work and taking corrective action.

Secondly, contractors usually have profit motivations while clients have cost saving and good quality buildings as their prime motivations. Controlling reconciles the interests of the two by ensuring that they both suffer what the contract between them stipulates and that they are compensated on the basis of the same contract.

All needs have a time dimension. For commercial projects,

* Performance may be better than the standard or the standard could be unrealistically high. In both cases, consideration may be given to changing the standard.

timeliness is determined by their potential financial benefits. Delay in delivery of such a project - complete - results in financial losses to the client (or to the contractor if liquidated damages* are charged and paid). For public projects, which are the lot of projects of concern in this study, timeliness is a complex matter. They are usually provided when a need has existed for a long time. It is, however, of the greatest social benefit that once resources are committed to a project to facilitate provision of a delayed service, no other unnecessary delay should occur. Controlling aims at meeting the time limits set in the contract.

Lastly, resources are scarce and should be used sparingly. Controlling detects and corrects potentially costly errors so that resources are not wasted on correcting errors, but rather in taking the project closer to completion. Proper controls can also detect areas of cost saving, and realised savings can be re-dedicated.

The following important aspects of controlling are discussed below: the control process, the resources which are necessary in controlling, and the characteristics of a good control system.

The Control Process

Three critical general dimensions which are used in assessing the progress of projects regardless of their nature and specific content are cost, time and performance (quality).[36] These are the parameters to which the control process is directed.

* Compensation charged against a contractor by the employer for failing to complete a project within the contract period. It is based on a pre-determined formula.

Cost control is usually regarded as the effort directed to ensuring that at completion, a pre-determined cost is not overshot. Time control aims at completing a project within a set period while quality control aims at realizing the performance standards envisaged during design.

The basic control process consists of three activities, namely: establishment of standards, measurement of performance, and correction of deviations. These are discussed below.

Establishment of Standards

Central to the control process is the establishment of standards - the criteria of performance. The standards are based on the basic project parameters already discussed.

Cost standards for a project comprise cost estimates, elemental costs and resultant cost plans;* contract sums and rates for various items which appear in bills of quantities or schedule of rates.**

On a wider scale, the cost of projects in a district is determined through a series of activities. The first activity is project selection. Project proposals are evaluated against pre-determined criteria and only those which meet the criteria are selected.

* An elemental cost is the cost of a definate element of a building, such as the roof. A list of all elements that comprise the whole building together with their corresponding costs is called a cost plan.

**A Schedule of rates is a list of items of work and their costs per unit.

The contribution of project selection to the establishment of cost standards is that it establishes a definite number of desirable projects upon which further planning is based.

The second activity is design. Among other things, the cost of a building is determined by its size, shape, form and specification.[37] Since these are decided during design, they can be manipulated at this stage to give a desired cost effect.

The last activity is tendering. This produces a definite contract sum for each project, and rates for each item of work in the project.

Time standards are established through activity programming. This could involve simple planning tools and methods such as bar charts,[38, 39] or more complicated ones like network enalysis,[40] and computer scheduling.[41] All these are based on expected rates of output of labour and flow of resources into a project.

The standards which are established from these processes are time limits for whole projects, and a breakdown of the periods into sub-periods indicating when each activity should start and end.

Clients usually fix contract periods and leave the detailed analysis and programming of work to contractors.

Functional and quality standards are determined during design. These determine the combination of materials and components to be used in the construction.

Measurement of Performance

The second step in controlling is the measurement and evaluation of performance in the light of standards.[42] If any deviation is observed, corrective action is planned and executed to reconcile achievement with plans. The aim of measurement is to detect deviations as early as possible.

This exercise commences with the earliest activities undertaken by a contractor. The method which is most commonly used is one where the contractor does a portion of the work and gets it approved before he proceeds to a successive activity. This is done for setting out, walls, roofs, etc. as a building progresses towards completion. This staged monitoring is important because parts of a building are interdependent. Failure of one element can lead to the failure of a substantial part of the rest of the building. Secondly, it is difficult and expensive to extract a defective part and correct it especially if such a part supports other parts.

For the control of time, starting and finishing dates of activities or sections of work are recorded and compared with a plan or programme of work. Any variation is assessed and efforts made to make up for lost time.

Cost control during construction is primarily carried out by the contractor. Having contracted to complete a project for a specific sum, it is upon him to fit the work within that sum and leave room for profit.

At this stage the role of the design team is to ensure that the client gets value for his money. This is done through the

valuation of work which is executed according to the provisions of the contract. Contract documents also give the method of measurement, the rate of payment, and indicate what should be paid for and what should not.

In projects which are built by departmental or community labour, cost control is done through systematic checks on work in progress to establish whether its value is rising in proportion to the expenditure on it.

Correction of Deviations

The control process is not complete unless action is taken to correct deviations.[43] Correction describes any action which is taken to restore a match between achievements and plans in relation to time, cost and performance.

To correct deviations from time schedule, the man-hours expended in the work per day may be increased by working overtime or increasing the labour force. An alternative is to employ machinery in work originally intended to be carried out manually.

Deviations from budget may be corrected by saving on remaining funds through lowering of the standards of remaining work or, where the problem is overpayment, withholding further payments until a balance is restored between achievements and expenditure.

Correction of performance (quality) is done by removing substandard work and replacing it with good work, or if possible rectifying the work in position.

The three activities of the control process form a cycle, called the control cycle. The figure below illustrates the working of the cycle.

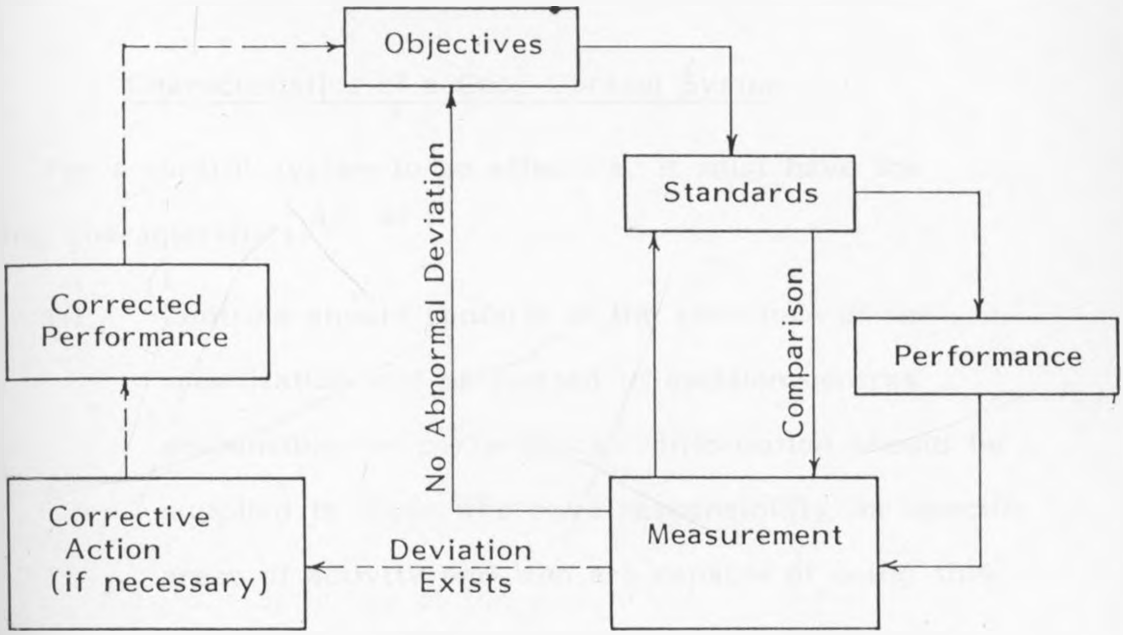

Figure 3·4 The Control Cycle

Source: Strong and Smith[44]

The operation of the control process requires human and non-human resources. After a contract is signed and construction has started on site, members of the design team - architects, engineers, quantity surveyors, consultants etc. - become supervisors in one way or another. This is in addition to clerks of works and site supervisors who are usually permanently stationed on site.

In addition to the stationary required to facilitate recording of performance, transport facilities are required to enable the

supervisors to visit the sites whenever it is necessary.

Along with resources, a control system should have certain characteristics for it to produce good results. Some characteristics of a good control system are examined below.

Characteristics of a Good Control System

For a control system to be effective, it must have the following characteristics:[46, 47]

(i) Controls should conform to the structure of the organization and be related to decision centres responsible for performance. Information should be supplied to those who have responsibility for specific areas of activity and who are capable of using this information to evaluate the degree of success in achievement of objectives. The information should be presented in a form which shows clearly when corrective action is necessary.

(ii) For a control system to be meaningful, it must be understood by those involved in its operation. People who monitor and report on progress should be well versed with what aspects should be stressed on, and the manner in which their reports are put should communicate effectively their message. On the other hand, the recipients of such information should be able to interprete it fully. Only then would right corrective action be taken.

(iii) The system should report deviation from the desired

standard of performance as quickly as possible. A control system which reports deviations when they are so great as to affect significantly the cost, time and performance of the project is not worth operating.

(iv) The control system should draw attention to the critical activities which are important to the success of the project. The more important control points should be identified and understood by all concerned so that time and money are not wasted on trivial activities. Wide and detailed coverage may introduce noise* which may cast shadows over the most crucial points.

(v) To be effective, a control system must be flexible. It should remain workable in the face of changed plans, unforeseen circumstances, or outright failures.

(vi) The system should be consistent with the objective of the activity to which it relates. In addition to locating deviations, it should be sophisticated enough to indicate ways in which performance can be improved. The control system should therefore address itself to causes of deviations rather than to symptoms.

(vii) Control systems should themselves be subject to a continual review to ensure that they satisfy the characteristic features suggested above, and that they are effective and appropriate in terms of the

* See p.86.

results they produce.

(viii) Underlying all aspects of an effective control system is the need to consider its behavioral implications. Effective employment of resources, which is the broad objective of the control function, depends on human effort. Therefore, in the final analysis, control is the regulation of human performance.

Besides its importance in controlling, communication is an important activity in the entire field of management. This is due to the fact that to progress from one state to another, a project depends on ideas which flow back and forth among participants. Thus communication skills are necessary in the performance of all the functions of management.

The following discussion examines the implications of communication in society in general and in project in particular, the process of communication, and barriers and breakdowns thereof. Finally, a simple guide to good project communication is given.

Communication

Communication is defined as the transfer of information to the receiver with the information being understood by the receiver,[48] or the exchange of information and the transmission of meaning.[49]

Information itself has been defined as a "formatted object (endowed with identifiable forms) artificially created by the human being to represent a type of event which he can perceive and identify in the real world."[50]

Ford and Heaton[51] have observed that

> ....The managers ability to implement decisions depends upon communication skills. The best decision is useless unless it can be quickly and easily communicated to those affected by it or those responsible for implementing it. Communication is the glue that holds the organization together. It enables the separate members of the organization to act in unison.
>
> The ability to monitor the environment for problem situations and to change the organization through implementing decisions both rest on the ability to communicate.

Communication is thus a social process of the broadest relevance in the functioning of any group, organization or society. Katz and Khan's[52] observation that many of our individual and social problems are the result of inadequate and faulty communication is manifestly observed in building projects where failure by contractors to complete work on schedule are frequently blamed on missing or wrong information.

At one time at the Ministry of Works, a contractor was issued with drawings upon which he based construction of a building. When it was almost at lintel level, it became apparent that the building which was coming up was not the intended one. It was knocked down on the strength of a variation order. Wrong drawings had been issued thereby occasioning the state to unredeemable loss!

Projects in the districts, indeed everywhere, will attain acceptable states of success when participants appreciate and practice the essentials of good communication.

The Communication Process

Communication is made up of coding, transmitting and decoding information, and reacting to it.

The initiator of the process has an idea which he converts into a symbolic form or code which he perceives would be meaningful to the receiver. He then transmits the message to the receiver through a selected channel. The channel can be spoken words, a letter, bills of quantities, drawings, etc.

The receiver of the message "decodes" or converts the symbols that compose the message into thoughts. Communication is said to take place when the receiver attaches the same meaning to the symbols as the sender.

Feedback is the last step in the communication process. It is comprised of physical or verbal reaction to a message.[53] It involves carrying out instructions or requesting for more information if the one received is perceived as inadequate for the purpose at hand.

The figure 3.5 shows a communication process model.

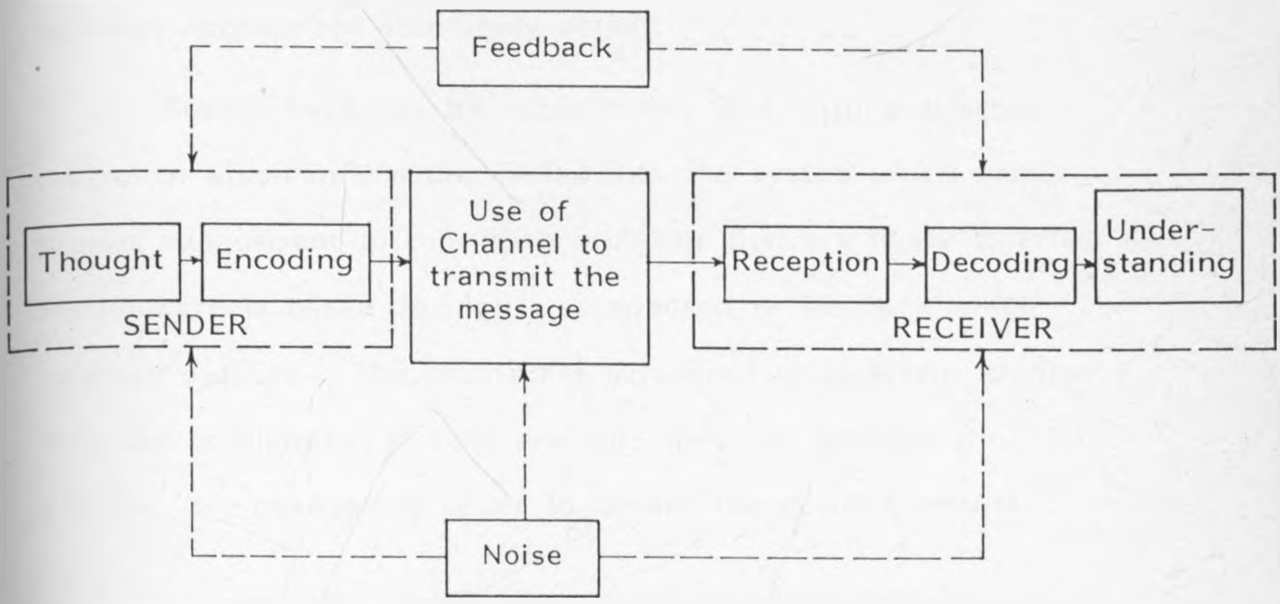

Figure 3.5 A Communication Process Model

Source: Koontz et al* p.538.

"Noise" which is shown in the model denotes all unnecessary information which accompanies the important message. Noise can be introduced by the sender during encoding, or by the channel through which the message is transmitted, or even by the receiver if he "decodes" information which was not coded.

Feedback and Feedforward

Feedback is very important in construction control. For effective control, feedback points are designed into the construction programme so that the necessary type and amount of information

* See Ref. 6.

regarding the progress of work is gathered at the right time to facilitate appropriate and timely action.

Feedforward, on the other hand, is a future directed control in which information is fed into the system which helps project management to cope with problems that are likely to arise. Feedforward is based on inputs as opposed to feedback which monitors outputs. The inputs are monitored to ascertain whether they are as planned; if they are not, they, or perhaps the process, are changed in order to ensure the desired results.[54]

Barriers and Breakdowns in Communication

Effective transmission of ideas can fail because of any one or a combination of the following reasons:[55]

(i) The sender may choose an inappropriate code for his message. An example would be to describe the dimensions of a building whereas it would be more appropriate to use annotated dimensioned drawings.

(ii) Lack of details because of unclarified assumptions about the knowledge of the recipient. An architectural drawing which does not indicate the dimensions of, say, doors "because there are standard sizes for doors" is an example;

(iii) Poor language skills which may result in omissions of vital parts of the message, poor diction, lack of coherence and poor organization of ideas;

(iv) Loss of content during and after transmission especially where a message is passed verbally.

This is due to the inability of the human mind to retain all what it perceives, and the inability of man to relate all what he knows. Verbal site instructions are vulnerable to this problem. Documents can also get lost in transit.

(v) Biased decoding and evaluation of the message especially where the receiver has pre-conceived notions about the sender or the ideas contained in the message. For example, a quantity surveyor may measure granolithic paving floor finish instead of cement and sand screed which is shown on drawings because " my experience tells me that this is a grano area." In fact, the floor finish could be a considered choice of the client;

(vi Wilful or accidental distortion of the message can occur in cases where the ideas are not put into a form that can be usually revisited. Progress reports are particularly liable to wilful distortion where supervisors want to bolster their image as project implementors by giving favourable reports on the projects they are administering. They may also do this to get kick-backs.

Towards Effective Project Communication

Stallworthy and Kharbanda[56] have stated that for communication to be successful, we must know what to say; when to say it; to whom to say it; and how to say it.

This apparently simple guide to communication has alot to offer to the project team. "What to say" deals with the content of the message. To know what to say entails a clear understanding of the task to be performed and the environment within which it is to be performed. Alternative ways of accomplishing the task are evaluated and the choice made constitutes "what to say".

The timing of communication is vital. Delayed communciation means delayed action. Various undesirable outcomes result depending on the type of information delayed. In case of production information, project implementation would be retarded. If the information is for control, the project may veer further from the desired product which may result in costly corrections, or this lacking, the acceptance of a building which is not to the desired standards.

In a project with several participants, "to whom to say it" is a very important communication guide. The right decision conveyed to the wrong person will not initiate the right action.

The "how" of communication deals with the channel or medium of transmission. The importance of the correct medium has already been observed.*

Summary

The four major functions of management have been discussed against a background of the systems approach. The role the performance of each function is supposed to play in the

* See barriers and breakdowns to communication, page 87.

management of a building project has also been discussed. A management model against which the research findings presented in chapter four are evaluated has evolved from the discussions.

Although the functions of management have been given independent treatment for the sake of clarity, they are deeply interrelated. Cleland and King[57] have provided a "word game" which illustrates the interrelationships. Thus, the manager must plan for organising; plan for directing; plan for controlling; organize for planning; organize for directing; organize for controlling; direct planning; direct organizing; direct controlling; control planning; control organizing; and control directing.

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CHAPTER IV

THE CASE STUDIES

The research was based on two hypotheses; firstly, that the organization structure currently in use in the districts is not suitable for the implementation of building projects, and secondly, that the measures proposed from time to time to improve the performance record of projects are inappropriate.

Research was carried out in the two districts chosen in an attempt to get information which points to the institutional relationships of participants in a project, the way the organization structure facilitates or impedes the implementation of projects, and the effects of various managerial decisions and actions on project performance.

Data for the research was largely historical. There having not been any involvement of the researcher in either the deliberations on, or management of projects by way of direct participation or witnessing, it should be appreciated that the detail and accurancy of the records had no way of being verified. For example, the truth could not be established in a case where, in one of the projects studied, the architect threatened to take action against a contractor if he did not supply a progress chart upon which the contractor replied that the chart had "all along" been in the archtiect's office, subsequent to which the architect wrote another threatening letter on the same issue without reference to his previous letter or the contractor's reply.

This chapter gives the findings of the research. It starts

with a brief overview of the project organization in the districts, then gives the characteristics of the 15 sampled projects upon which most of the rest of the discussion is based. It proceeds to the discussion of the problems encountered in availing resources to projects, controlling the progress of projects, and in communicating project information. Finally, findings on the project authority structure are presented.

Project Organization Generally

The DR, who in the district is usually the DWO, designs or adopts to client needs and site conditions standard designs, and supervises projects on behalf of client departments. Clients are responsible for the financing and overall control of projects.

The DTB is responsible for tendering of all building projects while the DDO reports on the progress of projects in the whole district. The District Treasury pays contractors on behalf of the AIE holders - the clients. Contractors and subcontractors do the actual execution of work on site.

At a higher level are found participants such as the Provincial Monitoring and Evaluation Committee which follows the progress of projects in the province, and agencies which finance projects through the Treasury. The project organization structure in the district can be loosely interpreted in terms of the systems model shown on page 35 of this report.

The goals and values subsystem is seen in terms of the space, performance, usability and adaptability standards of built facilities, and the materials, information and energy constricts in the districts within which the facilities are provided.

The technical subsystem can be seen in terms of the offices of the District Works Officer and contractors who provide the knowledge and techniques which are necessary in the design and construction of

buildings.

The psychological subsystem, which is made up of individuals and groups in interaction, can be inferred from the composition of the District Development Committee, especially with respect to members who are concerned with buildings, that is, the District Commissioner, District Development Officer, District Treasurer (accountant), heads of client departments, other clients, financiers, District Works Officer, District Surveyor, Local Authorities, Local Communities, contractors, etc. Buildings in districts are a result of the interaction of all these participants.

The structure subsystem is concerned with the division of work The managerial subsystem can be seen broadly in terms of the DDC. The DDC has the duty of coordinating the participants. It is here viewed as a matrix within which participants can resolve their conflicts and achieve harmony, and as an administrative body which can direct the participants on the course of action to take in order to achieve harmony. More narrowly, this subsystem can be seen in terms of the Districts Works Office which receives, interpretes, adapts and channels resources towards the realization of buildings.

Before discussing the problems which were identified in project design and implementation in the two districts generally and in the fifteen sampled projects in particular, following is a summary of the nature of the fifteen projects.

The Sample Projects

The sample consisted of twelve new construction projects, two projects for the electrification of buildings and one alterations project.

Eleven projects were fully contracted, i.e. the contractor bought his own materials and hired his labour and got paid for work done. Two were labour-only contracts. The remaining two projects had one part fully contracted and another part let on labour-only basis.

Eight projects were complete. Of these, two had been completed on time and one before the expiry of the contract period, while five had exceeded their original contract periods.

The remaining seven projects were on-going. Four of them had exceeded their original contract periods while one was within the contract period. Two had no information about their contract periods.

Project Management

The outcome of the process of project identification, screening and approval is largely determined by the manner in which the beneficiaries present their need, the development priorities of the districts, and politics.

After a project is approved for implementation, activities which follow fall centrally in the stream of management. The manner in which it is managed determines its success.

This research identified shortfalls in resource planning, project control, communication and coordination, and authority and accountability in projects as discussed below.

Resource Planning

Resource planning is here examined in relation to availability of sites and funds for projects.

Lack of Sites for Projects

Only one out of the fifteen projects sampled had a site problem - a very slopy site. The reason for this small number was that for a project to be tendered, a site must have been available.

This does not mean that there were no problems of lack of sites in the districts. DDC and DEC minutes revealed three types of site problems.

Firstly there were cases where highly prioritized projects could not be implemented because there were no sites available for them. This was most prevalent in projects which had been proposed by the local community in the two districts.

The second problem was that of unsuitable sites. Cases where sites were too slopy or too small for the proposed projects were identified. The former problem affected the proposed extension of Meru District Hospital while the latter was the case the an Institute of Technology in the same district. The institute was built on a small plot and at the time of this research, there were proposals to transfer it to a bigger site but agreement had not been reached on what to do with the facilities which had been built on the first plot.

The third problem identified was that of squatters. Although this was not a major problem and was encountered in only one case, it is significant in that it may increase as pressure on available land increases with population growth.

Some projects which were found not to have sites were also found to have had funds allocated for their implementation but the funds would not be utilized.

The management problem which manifests in site problems is that of disjointed, rather than holistic planning. Disjointed planning refers to planning which treats different aspects of a project independently. It does not use the relationships between

the different aspects to guide planners in the development of an all-embracing plan which addresses the aspects and their relationships in the generation of alternative solutions.

For example it runs against the grain of good management thinking and systems approach to seek funds for the execution of a project which lacks the basic requirement - a site, tie the funds to the name of the project, and later return the funds to the financiers when a site is finally not forthcoming.

Shortage of Funds

Lack of funds for project completion was the single most frequently occuring reason for project delays in DDC and DEC minutes. It was most prevalent in local community and Rural Development Fund (RDF) projects,* especially cattle dips. The reasons for lack of funds during project implementation were largely organizational.

The DDC is charged with the responsibility of developing detailed project designs and estimates for all projects before they are funded.[1] Interviews with the District Developemnt Officers in the two districts revealed that designs often lacked detail and kept changing during project implementation, thereby changing the financial and time needs of projects.

Once funds are allocated, they are expended on items which were not accounted for during the preparation of the estimate. Two common methods by which this happens are paying allowances

* Projects which are financed from the RDF reserves.

to field officers, and hiring transport for materials to sites in departmentally executed projects.

Frequent changes in project designs during implementation and poor estimates during planning are partly the result of poor brief development. Poor brief development can itself be traced to the cumbersome organization structure of the client. Projects are proposed at sub-location level, passed to the Locational and Divisional Development Committees and then to the DDC which delegates the duty of designing to the District Works Officer. The DWO is supposed to consult the project committee during detail designing. However, due to the often long distances between the district headquarters and the locations where the projects originated, and the chronic lack of transport from the office, this consultation rarely occurs. When it does, it is usually through letters which take long and are not an effective method of consultation for the purpose of designing.

Use of unqualified personnel in estimating was found to contribute to the shift in project costs during implementation. Two cases were identified from the minutes of the DDC. The first one is that of cattle dips. Cost estimates for dips were prepared by veterinary officers. In another isolated case, the manager of a village polytechnic seeking funds to repair a building which had been damaged by the wind sent another letter to the DC to update the figure which he had given earlier after a health officer visited the school and adviced that "metal bars were required to make the wall stronger".

In both the two cases it is felt that estimating was done by

unqualified personnel. This frequently led to situations where some projects were over-costed while others were under-costed.

Shortage of funds for some projects existed side by side with surplus funds for others. This was possible because there is little integration between projects. Each is taken as an independent entity and funds cannot flow freely even between projects which are financed from the same source, such as the Rural Development Fund.

The process of reallocation of funds between projects faces a structural and a communication problem. The DDC has to deliberate and recommend such transfer. Reallocation is, however, not effected before treasury approval is obtained. This takes a long time given the slow rate of information flow between the districts and the treasury in Nairobi. There is therefore a conflict between the need for accountability of funds and that of a fast rate of project implementation.

Indecision and poor coordination among the members of the design team was found to contribute to cost and time overruns in projects. In one project, details which were based on major decisions started changing from the beginning of the contract. The location of the three buildings involved was changed to avoid uprooting some trees on the site. This was after the contractor had set out the buildings and started excavating. After relocating the buildings, the contractor found that earthworks were more than he had anticipated and therefore work would not progress at the rate he had planned. After excavating the foundations, a new set of drawings was issued which required him to increase the width of

the excavations all round. This shows poor decision making.

Lack of good coordination between building professionals showed clearly in two cases involving electrical works. In one of them, the electrical engineer was brought into the team after a prime cost sum for all eletrical work had been inserted in the bills of quantities and the project tendered. He said that the amount provided for electlrical work was too small for the work involved.

In the second case, a prime cost sum of Ksh.300,000 was included in the bills of quantities by the quantity surveyor. When tenders were invited for the electrical subcontract, the lowest offer was Ksh.637,000. This tender was accepted. At the time of this research, supplementary funds were being sought from treasury to cover the deficit. These two examples show poor coordination of the design professionals.

Project Control

Control aims at achieving pre-determined objectives. In building projects, the objectives are good standards within a pre-determined time frame and cost. The process of control involves the establishment of standards, measurement of performance, comparing objectives with achievements and correcting any deviations. The findings on these aspects of control are outlined below.

Establishment of Standards

It was not indicated in DDC minutes whether many of the projects which were said to be delayed had time limits within which to complete them. Financial limits were stated but these were not adhered to in most cases. Labour-only contracts were based on drawings and specifications and therefore these and full contracts

had performance standards set.

To be able to review progress periodically, certain tools such as network diagrams and work programme charts, commonly known as progress charts are necessary.

In all the fifteen projects studied, progress charts were mentioned in only two projects. Both were Health Centre projects, one over Ksh.5 million and the other over Ksh. 7 million. Both contracts were to run for 60 weeks. In both, the progress charts were said to be unavailable 7 and 34 weeks into the contract periods respectively. It was not clear whether they were provided because there was no further mention of them in the records.

Architects in Kiambu and the Quantity Surveyor in Meru (there was no Architect there) indicated that the charts are not a stringent requirement in small projects but are required in big projects.

Measurement of Progress

Measurement of progress suffered from lack of appropriate tools. Progress was measured against time in terms of percentages i.e. percentage of work done against percentage of contract period elapsed.

Whatever other advantages this method may afford the supervisors, it is inferior to charts because it does not take account of how the contractor plans to carry out the work. Where charts are used, it is possible to compare achievement against time limits set for elements of the building or operations.

The problem of inappropriate tools was compounded by the

fact that most projects did not have resident Clerks of Works to follow progress on a day to day basis. Of the fifteen projects studied, only three had resident clerks of works; and these were appointed sometimes after the start of site operations. Only seven projects had weekly reports prepared on them. A general conclusion of this research is that supervision of work was not consistent. Interviews revealed the following as contributing factors:

(i) Shortage of funds to pay buidling inspectors field allowances in order for them to be permanently stationed on site;

(ii) Lack of transport to take inspectors to site.

Due to these problems only "sensitive projects," those with large contract sums or those with political backing from powerful individuals were given priority.

In all projects, site meetings are supposed to be held once a month to review progress and solve any problems facing the project. In the information regarding their progress, only five had recorded any site meetings. In one project, only one site meeting was held in nine months. In three others, four meetings were held for each in nine, ten and nineteen months respectively. The remaining project recorded eight meetings in nineteen months.

A common characteristic of site meetings was that they were held more frequently in the early part of the contract period and got infrequent and sometimes ceased later in the period. The latter part of the contract periods is when projects got into problems

and needed site meetings even more.

Qualitative Evaluation of Work

To attain the quality standards set for a building, recognised sections of work are checked and approved by the DR before the contractor can proceed with the work.

DDC records contained several complaints from clients and the DWO that completed projects were of substandard quality. This can only mean that work was not checked at all until it was complete, or it was checked by people who were not competent and later developed visible defects. In one of the districts a recommendation was made to demolish and reconstruct a cattle dip because the dip pit was thirty six (36) feet long instead of the recommended eighteen (18) feet.

Approval of work was found to suffer delays. In the sample projects, one contractor complained that the DR did not check work segments immediately they were completed and that caused delay of the entire project. The DR in this case was a consultant architect and the contractor had to seek approval of work from the DWO. Even then, he had to provide transport for officers because the Works Office had a transport problem.

In another project, the contractor complained that work which had earlier been approved was later condemned.

These two cases depicted a compounded problem in which there was a mismatch between the need for control and the resources available to facilitate carrying out the function of controlling. There was a conflict between the mode of carrying out quality control and the need for timely completion of projects.

Cost Control

There was evidence of measures to control cost. These include cases where designs were prepared and costed and then funds applied for on the basis of the estimate. In other cases, funds were provided and a design to utilize the funds prepared.

During construction, valuations of work were prepared by quantity surveyors and payments made according to the valuations. However this last practice applied to projects where the District Works Office was involved. In all other cases, it was not evident from the records examined the criteria which was used to evaluate work to determine what to pay the contractors.

As already observed, cost control generally suffered from frequent changes in design and prolonged periods between the time when funds were provided and when construction started. The most glaring flaw in the practice, however, was the apparent lack of accountability requirements for project funds. This was especially evident in RDF projects where supplementary funds were approved for projects without the original funds being accounted for.

Feedback and Feedforward

Feedback was poor. Weekly progress reports were submitted several weeks late and could not serve any purpose to correct deviations. They only provided a historical account of the projects. This is in variance with the need for timely communication of contract information.

Progress reports were ambiguous because of lack of

standards against which to evaluate site observations. Phrases like "skeleton labour only on site" and "work behind schedule" were common in the reports despite the fact that no labour and time schedules were available on sites.

Lack of communication skills among field officers was noted. In addition to much generalization, there was a case among the seven projects which had progress reports in which successive reports made use of the word "ditto" to mean conditions and progress on site had not changed. The trend continued even after the Provincial Works Officer wrote a letter to the DWO protesting to that kind of reporting.

A good attempt at feedforward was identified in site meeting records and other correspondence in which conditions which were likely to affect the project were discussed. These included outstanding design information, impending weather conditions, and appointment of subcontractors. Feedforward, however, had one glaring flaw - lack of clarity in relation to time. For example, no time limits were set for provision of details and appointment of subcontractors. Vague phrases such as "as soon as possible" and "before it is too late" were frequently used.

Correction of Deviations

Deviations can only be identified in relation to established standards. Deficiencies in establishing standards have already been discussed. The deficiencies notwithstanding, DDC records indicated that projects suffered cost and time overruns and poor workmanship. This raises the issue of correction of deviations.

There was no indication of attempts to control the cost of

projects which were not supervised by the DWO. Concern arose only when projects run out of funds. The solution was to apply to Treasury for supplementary funds.

In relation to time, only projects supervised by the DWO indicated contract periods. Therefore, although delay was constantly mentioned, it was not in relation to any pre-determined period. In any case, labour-only contracts which were used in many local community projects suffered from funding problems and their completion depended more on funds availability than the effort of the contractors.

Poor supervision of work meant that deviations in quality were not identified in time and therefore were not corrected at the appropriate time. The case of an extra long cattle dip already given is an example.

The foregoing account is based on the records of the DDC and the DEC.

The fifteen sample projects revealed problems akin to the ones mentioned above. Of the eight projects which were complete, information on final payment was not available for two. Two were completed for a sum less than the original contract sum while four exceeded their original contract sums.

The main cause of rising cost during construction was addition of work. There was no indication of any attempts made to re-design projects to accommodate changes within the contract sums. Additional work was valued and extra costs included in contracts through variation orders. Extra money was then sought from financiers.

The design team ruled out claims by contractors for any other reason than additional work. Every letter granting extension of time indicated that the extension was not to form a basis for a claim. This happened even when the delay was clearly the result of the design team's failure to carry out its duties.

All the five projects which were completed after the expiry of their original contract periods had a common problem. Electrical contractors were appointed late, thus delaying the progress of the work. Provision of drawings and details were also not timely.

Recommendations which were given to restore the progress of work to schedule such as to take "full labour" on site lacked a frame of reference to establish what should constitute full labour.

A problem which was shared by three on-going projects which had overran their original contract periods and which was closely related to the control of time, was that of delay in payment to contractors. One project did not have any AIE on it for about six months after the expiry of the first AIE at the close of the financial year. The other two had problems of payment from the district treasury.

Communication

Communication problems have been implied throughout the preceding part of this chapter. In this section the problems are consolidated and evaluated against the process model of

communication.*

Several projects experienced delays in funding due to poor documentation. Others were struck off the works programme altogether. In one of the districts, a proposed school could not be funded by the Ministry of Higher Education because additional information was required. Some six projects (type not indicated) were rejected for funding by the European Economic Community Micro-projects 5th Tranche Programme because "non had the necessary information and data to merit their processing for the programme."

Transmission of information, especially between the district offices and higher offices was found to be very slow. This was partly due to the cumbersome organization structure observed earlier in this chapter. This affected projects, especially those which had a contract sum of over Ksh.250,000.00 for which contract documents had to be countersigned by the Permanent Secretary of the client ministry for the contract to be legally binding. Before this happended contractors were not paid although they embarked on the work as soon as they were given a go-ahead by the client's district office.

The long route of communication aside, there were delays in responding to requests for information between the District Works office and client offices in the district. Response by the design team to requests by the contractor was also slow.

* See p. 86.

Authority and Accountability

The authority structure for projects was cumbersome. There was little delegation. This was exemplified by the vesting of authority to transfer funds between projects in the Treasury and the requirements for countersigning contract documents by Permanent Secretaries of client ministries. Lack of delegation of authority by such high offices had far-reaching effects on project performance. There were cases where contractors could not be paid for work done because the Permanent Secretary's signature had not been obtained.

Authority and accountability were not matched. For example, the AIE holder was accountable for the expenditure of project funds. The DWO who was better equiped with skills to control project costs and who actually recommended payment to the contractors did not shoulder responsibility for the expenditure of the funds.

This chapter has established that the project organization structure in the districts is cumbersome. It has also presented shortfalls which were observed in project management in the areas of resource planning, control and communication. It is observed that the authority and accountability structure which are in operation are inappropriate for project implementation and are sometimes contradictory.

Evidence of poor departmental and activity coordination runs throughout the chapter and therefore coordination has not been given separate treatment.

Chapter five contains a summary of the whole report and the recommendations arrived at after consideration of the findings.

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CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

The summary section of this chapter contains the theme of the report, the management approaches which have been reviewed, notes on the complex nature of the construction industry and the implications of this in project management, and the main findings of the study.

In the conclusions section, the construction industry is viewed in the context of the whole economy. Here also, the hypotheses of the study are examined in the light of the findings.

The recommendations section contains the main recommendations of the study and suggestions on areas of further research.

Summary

The subject of this study is the public client in the construction industry. The main hypothesis is that the project organization structure currently in use in the districts is not suitable for the management of building projects. The central theme of the report is that a systems approach will improve the project management capabilities in the districts.

In 1983, the government of Kenya formally launched the strategy of development which recognized districts as implementing centres for rural development. The system of project identification, approval and financing was reorganized to align it with the new

strategy to make districts a more effective unit for the management of rural development in partnership with the people.

The enhanced status of the districts in the new strategy gave the rationale for basing this study in the districts.

Three broad models of management have been examined. They are: the traditional model, the management and behavioural science model, and the systems model.

In the traditional model, management concentrates on the improvement of the efficiency of performing individual tasks to improve the efficiency of the organization. Success is attained when the "best way" of performing each task is developed.

The management science model emphasizes on planning using sophisticated methods and tools. The underlying assumption here is that good, detailed plans will always lead to good results.

The aim of the behavioural science model is to model human behaviour scientifically so that it can be predicted in given circumstances, thereby giving management the ability to manipulate human behaviour to improve production.

The systems model takes a wider view of management problems. It seeks to identify facets of the problem from within the organization and from its environment. This holistic approach to solving problems is most suitable for solving complex problems; and building projects are complex by reason of the great number of participants involved, the wide variety of materials and skills used as inputs, and the vulnerability of the building process to changes in the physical environment.

Bringing together inputs of construction and coordinating them during the process of building requires conscious effort. This effort is called project management. Project management entails the functions of planning, organizing, directing and controlling.

Planning and controlling establish the standards of performance expected in a project and ensure that the final product conforms to the standards.

Organizing and directing create an enabling environment for the performance of the tasks involved in a project. A system of communication is necessary in the performance of all the duties of project management. It carries information within the organization to facilitate coordination of inputs into the project.

If the functions of management are performed effectively in a project, it is expected that the project would be completed within pre-determined cost and time, and to satisfactory workmanship.

This research, however, found that projects suffered time and cost overruns and were invariably of poor quality at completion. The work of the design team is sometimes crippled by inadequacy of facilities such as stationery and transport. Delay in payments to contractors and exhaustion of project funds in the course of implementation were frequent occurences. Project management is therefore not effective in the districts.

Conclusions

The general conclusions of this study are that

(i) Project planning and control are generally inadequate;

(ii) There is poor coordination between participants;

(iii) Bureaucracy and accounting procedures are a handicap to quick decision making;

(iv) There is a general lack of appreciation of the money value of time;

(v) There is lack of discipline and respect for official procedure in project administration.

A major conclusion is that the problems of the construction industry as presented in this thesis cannot be wholly solved by focusing management effort on the industry alone. This is because of the heavy dependence that construction has on other sectors of the economy. Efficiency in construction can only result from efficiency in the national economy and the structures which support it.

Finally, it is concluded that the systems approach contains the philosophy of management that can help to improve project administration in the districts.

From the conclusions, the hypotheses that the organization structure in use in the districts is not suitable for project implementation, and that proposals that have been put forward to solve implementation problems are either narrow-sighted, based on a wrong understanding of problems, or not enforced on

the construction industry, are all accepted.

Recommendations

Ways and means of overcoming the management problems discussed in this thesis have been implied or explicitly suggested within the discussion. Following is a summary of the main recommendations of the study.

(i) No project should be included in budgets unless implementation steps have been realistically scheduled, implementation targets set, and the availability of future recurrent resources requirements assured.[1]

(ii) No project should be designed to detail or allocated funds before a suitable site is provided and approved.

(iii) Financial discipline should be restored in the design team by ensuring that prompt action is taken against any officer whose irresponsibility results in overexpenditure in projects. Project time tables should be drawn at the beginning of the design of every project and adhered to. Contractors should be paid their certified dues without undue delay, and the procedure of prioritizing projects in order of rehabilitation, completion, and new projects should be strictly followed.

(iv) Projects should always be scheduled to take maximum advantage of dry weather.

(v) Ministries which have many building projects in their programmes should establish in-house building departments to advice on project management matters.

(vi) It should be a requirement of every project that a programme of work and plant and labour schedules be submitted to the DR at the start of every contract. Agreement should also be reached on the times when outstanding design information would be provided to the contractor and the times when suppliers and subcontractors would be nominated. A time table to this effect should be drawn. The schedules and time tables should be binding on the parties.

(vii) Clients and consultants should work more closely. The widespread use of letters for briefing on progress should be discouraged and instead meetings between the two should be held occasionally to review progress and agree on future courses of action.

(viii) Co-ordination of the design team should be improved to ensure that the inputs of each member are incorporated at the right time to avoid inconsistencies in design and remove the practice of basing estimates on assumptions where information is not available. Participation of physical planners and maintenance surveyors in design should be encouraged.

(ix) Cumbersome bureaucratic procedures should be reduced by a policy of delegation of authority.

Areas for Further Research

In view of the fact that the District Focus Strategy is meant to promote the use of locally available resources in all sectors of the economy, a research should be done to establish the ways in which local materials and skills are being promoted within the building industry in the districts. Such a study should aim at identifying the problems which districts may be facing in their endeavours to promote the use of the resources with a view to suggesting possible solutions, thereby hastening the pace of strengthening the resource base for the construction industry in the districts.

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APPENDIX 1

The following questions were used to guide interviews with the DDO, DSO and the DWO.

DISTRICT DEVELOPMENT OFFICER

District . . . . . .

Date . . . . . .

1. What are the duties of this office?

2. What are the sources of funds for projects in the district?

3. How are the sources named in 2 coordinated to avoid duplication of projects and funding?

4. What specific duties concerning building projects does this office perform?

5. Once money for a project has been allocated;

   (a) Who prepares the A.I.E. ?

   (b) Who authorizes payment to contractors?

   (c) Who actually pays?

6. When a contractor has been awarded a tender is he required to give any evidence to show that he can complete the project within the contract period?

   If No, go to 8.

7. What kind of evidence is required from him?

8. Which ministry (or department) has the greatest number of building projects in the district?

9. Who determines the amount of money required for a project?

10. Are funds allocated to projects usually;

    (a) Not enough

    (b) Just enough

    (c) In excess of requirements?

11. Give your opinion on why the situation named in 10 exists.

12. Are funds for projects given in the amounts applied for?

13. Are project funds given in lump sums or in instalments?

14. Who selects sites for projects?

15. Are there problems associated with site acquisition?

16. How is self-help incorporated in projects?

17. Which among self-sufficient contractors and labour-only contractors perform better in terms of;

    (i) Time limits

    (ii) Cost limits

18. Does the DDC have any policy on the development of indigenous contractors?

DISTRICT SUPPLIES OFFICER

District . . . . . .

Date . . . . . .

1. What is the overall work of your office?

2. What is the work of the DTB?

3. Which specific duties of the DTB relate to the construction of buildings.

4. Are there pre-qualification requirements on contractors wishing to tender for work?

5. Do you keep a list of contractors who qualify to undertake certain categories of work?

   If No, go to 8.

6. Are such lists permanent or are they altered with time?

   If permanent go to 8.

7. What prompts such alterations?

8. Does your office register contractors?

9. How many methods of selecting contractors are in use in this office?

10. What factors are taken into account when preparing short lists of contractors?

11. How many contractors are invited to tender for any one project?

24. Are there particular months during which different categories of projects are tendered?

25. How are tenders for cattle dips awarded?

26. Is there a minimum number of tenders which must be received before a tender is awarded?

27. Who are present during the opening of tenders?

28. Are there any estimates against which tenders are evaluated?

If Yes, who prepares them?

29. What is the role of the DTB in a project after a contract has been awarded?

30. Does the DDC have any policy on the promotion of indigenous contractors?

31. Are you satisfied with the present performance of building projects in the district?

32. Do you find any weakness in the present system of project administration in the district?

If No, go to 34.

33. What, in your opinion, can be done to improve the present situation?

34. Is the DTB adequately constituted, in both numbers and skills, to carry out its various tasks?

35. Do you find any shortfall in the present system of progress monitoring and reporting on projects?

DISTRICT WORKS OFFICER

District . . . . . .

Date . . . . . .

1. Does this office get proper briefs from the departments and organizations which it serves?

2. Do you normally have ample time to prepare drawings, specifications and cost estimates for projects?

3. On what information are cost estimates for building projects in the districts based?

4. How many people are involved in a project during design?

5. How many categories of technical staff do you have in this establishment and what work do they do?

6. Do you experience a shortage of personnel at any level?

7. How is skilled (professional) labour deployed to projects?

8. Is there enough supporting staff and working equipment in this establishment?

Supporting staff	Yes	No ....
Equipment	Yes	No ....

9. Is the supporting staff qualified to cope with professional work of the type that goes on here?

10. Are there supervisors permanently stationed on sites for all projects?

11. Who do site supervisors report to?

12. What does the person named in 11 do with the reports?

13. Are there any problems associated with site supervision?

14. Who decides contract periods for projects?

15. Is the contract period negotiable before the commencement of work?

16. Is a contractor required to give any documentary evidence that he can complete the project within the stipulated period?

17. With regard to departmentally executed projects;

    (i) What circumstances give rise to the decision to construct a project using departmental labour?

    (ii) Is all the labour (skilled and unskilled) provided by this office?

    (iii) When are materials bought?

    (iv) Where are the materials bought?

    (v) When is payment for materials made (before, after, or on delivery)?

(vi) Are there any problems associated with procurement and storage of materials?

18. Does this office own any construction plant?

19. Is any plant or equipment hired?

20. Who are involved in the implementation of any one project?

21. Are funds for projects always given in the amounts applied for?

22. Are funds allocated to projects usually;

(a) not enough

(b) just enough, or

(c) in excess of requirements?

23. What is the reason (or reasons) for the situation indicated in 22 above?

24. What is the overall work of the District Works Office?

25. Is there any investigation done on sites to establish their suitability for the types of construction proposed?

26. How many contractors based in this district are eligible to tender for building work?

27. As 26 above but for electrical work.

28. How many contractors are shortlisted to tender for a building project?

29. Which among self-sufficient contractors and labour-only contractors perform better in terms of:

Time?

Cost?

30. Why do the situations indicated in 29 above prevail?

31. Are there unique problems associated with labour-only contracts?

32. What role does the District Works office play in RDF projects?

33. Does this office keep a list of contractors who qualify for different categories of work?

34. Does this office register contractors?

35. What role does this office play in the tendering of a project?

36. Who decides the period allowed prospective tenderers to prepare their tenders?

How long is this period usually?

37. How is the contract period allowed for a project determined?

38. Is the number of tenderers invited to tender the same for all projects?

39. What action does this office take against contractors who win tenders but fail to take up the work?

40. Is the Clause on "damages for non-completion" strictly enforced by this office?

41. What factors are taken into account when shortlisting a contractor to tender for a project?

42. What can you attribute to the present performance of projects in the district?

43. How is the performance of contractors generally?

44. Is there any duplication of work among the parties involved in a project?

45. What role does this office play in projects which are managed by consultants?