

**PROJECT MANAGEMENT IN THE
PUBLIC SECTOR OF SAUDI ARABIA,
PROBLEMS & SOLUTIONS**

Thesis submitted in accordance with the
requirements of the University of Liverpool
for the degree of Doctor in Philosophy

by **Muhammed Hassan AL-Ashaikh**

JAN 1996

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ABSTRACT

This Research aims at providing a detailed study of project management in the public sector in the Kingdom of Saudi Arabia through a serious endeavour to study impediments and negative impacts that affect such projects and through the provision of proposals that contribute to the development and enhancement of performance of these projects.

The Research first provides detailed information on such projects in respect of their various phases, applicable laws and regulations, Building Procurement systems applied, types of tenders used and types of contracts that are adopted. Thereafter, the Research determines through a survey of public sector projects the extent of use and application of Building Procurement systems, types of tenders and contracts. The Research results show that most of these projects suffer extensive delays in execution beyond the scheduled period.

This Research then goes on to shed light on impediments to public sector projects in the Kingdom of Saudi Arabia, causes of such impediments and their probable effects, This is accompanied by an overview of real life examples represented in three case studies of three different projects that were previously executed. The case study examples are aimed at giving this study more realism and credibility.

The Research then concludes, through another survey, that project managers at public sector projects in the Kingdom suffer a discrepancy in their management capabilities resulting from negligence on the part of their departments in this important factor of project success.

The Research thereafter gives proposals that contribute to the development and enhancement in performance of public sector projects through the following:

- * Proposals that contribute to development of management abilities of the public sector's project managers.
- * Proposals that contribute to development of systems that govern the performance of public sector projects.

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CHAPTER 1

Introduction

1.1 General

The discovery of oil represents an important turning point in the history of Saudi Arabia. This discovery has led to numerous changes in the economic, social, educational, health, and other fields. The government of the Kingdom of Saudi Arabia has endeavoured to take advantage of the huge revenue resulting from the discovery of oil in building a comprehensive cultural advances in all fields. In fact the Kingdom of Saudi Arabia over the past two decades was in a race with time to elevate itself to the level of developed countries through ambitious development plans. It was indeed able to withstand all circumstances and make great leaps forward towards building its civilization and towards making great achievements in all fields within a very short period of time. It was necessary in realizing such objectives to construct a large number of projects in all fields ranging from infrastructure, airports, hospitals, schools, universities, ... etc which have cost thousands of billions of S.R.

To give a basic idea on the size of projects that were carried out during the past four development plans, Table 1.1 shows the size of completed projects in public sectors in millions of Saudi Riyals during that period. The table shows that the size of projects completed during the past four development plans in all sectors was SR.717,286,000,000 this is equivalent to a sum of 128,086,785,715 Pounds Sterling (using the current exchange rate of 5.6 SR to the Pound Sterling , this rate will be used in the rest of the research) .This amount shows the shear size of projects completed during that period. In comparing the private sector construction projects with the public sector we find that the private sector projects were very limited. The major role of the private sector during that period was represented in its execution of all government projects whether through local , joint venture or foreign companies.

Given the comprehensive development that was achieved by the Kingdom

TABLE 1-1 : GOVERNMENT EXPENDITURE ON
PROJECTS BY DEVELOPMENT PLANS (1)
(IN MILLIONS. S.R)

	1 st plan	2 nd plan	3 rd plan	4 th plan	Total
Infrastructure Development	11,555	112,224	210,098	50,649	384,526
Building Sector	89	13,026	45,017	13,950	72,082
Transport Sector	6,848	52,022	90,360	17,995	167,225
Communications Sector	862	15,100	23,318	3,118	42,398
Municipal and Rural Affairs	3,756	32,076	51,403	15,586	102,821
Economic Resources Development	8,183	21,634	160,228	31,861	221,906
Agriculture and Water	1,578	8,754	53,625	15,439	79,396
Petroleum and Natural Gas Sector	53	6,605	2,686	204	9,548
Minerals Sector	236	1,696	3,186	811	5,929
Industrial Sector	250	1,029	59,680	5,463	66,422
Electricity Sector	7	907	10,060	9,142	20,116
Technology and research	46	1,043	1,073	152	2,314
Public Investment Fund	6,013	1,600	29,918	650	38,181
Human Resources Development	837	10,098	28,968	11,266	51,169
Public Education (Boys)	620	7,324	8,744	4,015	20,703
Public Education (Girls)	194	2,730	4,343	1,164	8,431
Higher Education	23	44	13,695	5,192	18,954
Management and Training	0	0	2,186	895	3,081
Social development Sector	910	11,413	21,316	7,911	41,550
Health	698	4,405	10,595	4,736	20,533
Social Affairs	59	277	1,205	170	1,711
Information	103	2,724	1,773	230	4,830
Youth Welfare	50	3,908	7,743	2,775	14,476
Public Administration	739	4,295	10,672	2,429	18,135
Islamic Affairs	0	0	0	0	0
Hajj and Endowments	39	508	1,919	834	3,300
Other Public Institutions	700	3,787	8,753	1,595	14,835
Total Development Spending	22,224	159,664	431,282	104,116	717,286

Note:

1st development plan's period: 1390 - 1395H (1970 - 1975)

2nd development plan's period: 1395 - 1400H (1975 - 1980)

3rd development plan's period: 1400 - 1405H (1980 - 1985)

4th development plan's period: 1405 - 1410H (1985 - 1990)

5th development plan's period: 1410 - 1415H (1990 - 1995)

and the great achievements that were realized and the large number of projects that were completed over the relatively short period, it was natural to find some negative aspects that contributed to problems in construction.

However, there is a very important issue here which cannot be considered as an ordinary matter. The execution of those projects was accompanied by negligence on the part of the public sector departments that own those projects of an aspect that has a direct impact on the success of the projects, namely effective project management. There was no clear definition of the concept of project management and the role it can play.

One of the important shortcomings on the part of public sector departments in charge of execution of these projects, and a basic hypothesis of this research, was that there was a clear discrepancy in the efficiency and capabilities of the project managers employed by such public sector departments. In other words, the public sector department did not benefit from the opportunity which presented itself to them during the said period and did not develop qualified persons with a high level of efficiency in the field of project management .

The omission by public sector departments of the project management aspect and the consequent negative effects have prompted us to propose this research. It is serious attempt to prepare a comprehensive study of this issue for the purpose of shedding light on this subject and in order to provide proposals and recommendations that will contribute to avoiding most of the negative effects that have accompanied the execution of these projects over the past period. Thus a better performance of future public sector projects can be achieved in all aspects, be it time, cost, quality or user satisfaction . Perhaps what helped me to gain knowledge of problems related to project management in the public sector in the Kingdom of Saudi Arabia is my work in this sector for over 14 years in supervision and follow-up of project that exceeded in aggregate US\$ 5,000,000,000 . This in addition to my supervision of a committee of 17 members that was formed to review a legal, financial and technical dispute that arose between one of the government departments and a contractor carrying out a government project (case study (1) of this research) .

The committee worked on this matter for approximately 12 months. During that period through continued and intensive study of all contractual, technical and financial aspects and through continued meetings with both parties, the committee was able to reach a solution that was acceptable to both parties and the dispute was resolved amicably .

This research covers the following :

- a) Definitions of project, project management, objectives of project management and the successful project management. Relationship between management and project management and the importance of project management to the construction industry. Comparison between the duties and responsibilities of a project manager and that performed by the project manager in the public sector of Saudi Arabia. Literature review of management and project management development and determination of project management development methods.
- b) Study of public sector projects in the Kingdom through an overview of major regulations that govern performance of such projects and a description of the various phases such projects undergo. The study will include a determination of types and procedures of tenders, types of contracts and building procurement systems used in the execution of such projects.
- c) A survey of public sector projects executed during the period from 1982 to 1992 in order to assess the extent to which such projects have used those types of tenders, contracts and procurement systems. it will also determine whether such projects have suffered an increase in cost of execution or time delay and the causes of such delays .
- d) A study of negative effects and impediments to public sector projects and, through the overview of such negative effects and impediments, a determination of causes and impacts. This will be illustrated by three case studies of previously executed projects.
- e) An evaluation of the management abilities of public sector project managers in order to determine discrepancies and to put forward proposals to enhance their capabilities and efficiency .

- f) A developmental study of the systems that govern the operation of government projects and proposals that contribute to the development and enhancement of effectiveness of such systems.

1.2 Research Goals

The goals of this research can be summarized as: the determination of proposals and viewpoints that will contribute to the development and enhancement of the effectiveness of the two main factors which influence public sector projects, namely:

- a) People managing public sector projects.
- b) Systems that govern the performance of the public sector projects .

1.3 Scope of Research

It is important to clarify that this research is limited to:

- a) Public sector building projects completed during the period from 1982 to 1992.
- b) Study of the management of public sector projects in the Kingdom of Saudi Arabia from the public sector viewpoint only, without study of the management aspects of contractors or consultants who participate in such projects.

1.4 Research Method

1.4.1 General

It is important to mention here that we have faced many difficulties in gathering information related to chapters three, four, and five of the research. This was attributed to the following reasons:

- a) Little was published on this subject. Published materials were limited to papers submitted to symposia that address small parts of the research area .
- b) Lack of accurate statistics on the subject, with the exception of general information on the sizes of projects completed. This was attributed to two reasons:

- i) There is no public sector department that is charged with the task of collection and updating of this data.
- ii) The public sector departments concerned with public projects do not collect information on their projects in a scientifically organized method.

In order to overcome the aforementioned difficulty, we have to conduct a painstakingly continuous and detailed research to obtain required information. For that purpose we have to collect information using a number of techniques .

1.4.2 Literature Survey

One of the sources through which we obtained some information on the subject matter was symposia that were held in the Kingdom of Saudi Arabia which may relate to the subject matter.

The examination of internationally published books and journals. These books and references were used in chapters two, six and seven of the research.

1.4.3 Study of the Laws and Regulations Governing Performance of Public Sector Projects

This study includes two parts:

Firstly, formal Laws and Regulations, which in turn are divided into two parts:

- a) Regulations that are easily accessible such as the government procurement regulations and their rules of implementation.
- b) Regulations that are difficult to obtain given their confidential nature such as the contractors classification regulations.

Secondly, circulars and resolutions appended to such regulations which are difficult to assess given their large numbers and the lack of a manual that collects them together for ease of reference.

It is important to mention here that the extract from the various laws and regulations in Chapters three, five and seven are my translation into English . The Arabic stipulation of these laws and regulations are listed in Appendix - F.

1.4.4 Questionnaires

Questionnaires are considered the most important sources of information we gathered. The research necessitated preparation of two separate questionnaires as follows:

- a) First Questionnaire: This was prepared and designed to allow for the collection of information on public sector building projects that were completed during the period from 1982 to 1992.
- b) Second Questionnaire: This was prepared and designed for the collection of information on the public sector building project managers (education, training, experience, viewpoints).

In order to ensure the comprehension of persons in the various public departments who filled in the two questionnaires, and in order to ensure the accuracy of information gathered, the following procedure was used :

- a) Upon preparation of initial draft questionnaires, a number of project managers from various government departments were selected to fill in the questionnaires and to discuss their contents in order ^{to} ensure that the questionnaires were comprehensive and covered all required information, as well as to facilitate ~~their~~ preparation and clarity. Their comments were taken into consideration before the final version of the questionnaires was prepared.
- b) The questionnaires were hand delivered to each of the persons selected to fill in the questionnaires.
- c) The questionnaires were discussed with those persons item by item.
- d) Follow up on the telephone and by personal visits to ensure required care was given.
- e) Filled in questionnaires were collected by hand.

1.4.5 Case Studies

To ensure a more realistic study of these problems, we have referred to

three case studies of different government projects. This information was obtained through continued lengthy investigation and research into previously executed government projects and a study of actual problems that they faced during execution in order to be able to give realistic examples of the problems. Details of these case studies are given in Appendixes C,D and E.

1.4.6 Personal Interviews

Numerous personal interviews were conducted with the public sector department personnel concerned with projects, for the following purposes:

- a) To collect missing information that could not be obtained from the aforementioned sources.
- b) To ascertain the accuracy and validity of some information previously gathered.

1.5 Outline of Research and Thesis

The research was divided into two main parts: Part I described in chapters two to five, and Part II described in chapters six to eight. In summary, chapters three, four and five of Part I covers the investigation of problems in the construction of public sector projects in S.A. Part II covers the investigation into remedies and improvements of the performance of public sector projects.

1.5.1 Chapter Two: Project Management Development

In this Chapter, we will present the content of a number of references in respect to definitions of project, Project management , objectives of project management and successful project management. We will also determine the relationship between management and project management then we will show the importance of project management to the construction industry . The Project manager's duties and responsibilities will be outlined and compared with the duties and responsibilities of the project

manager in the public sector of Saudi Arabia. Management and project management development in United States, United Kingdom and Saudi Arabia and the methods which may contribute to development of project management will be briefly presented.

1.5.2 Chapter Three: Construction Industry in the Public Sector of Saudi Arabia

A number of questions are answered in this chapter.

- a) What are the laws and regulations that organise performance of this sector projects?
- b) What are the various phases of such projects?
- c) What are the building procurement systems, tendering and contracts types used in these projects?

This Chapter attempts to reply to the above questions by two means :

Firstly, an overview of the more significant clauses of the government procurement regulations, their rules of implementation and appended regulations.

Secondly, a comprehensive study of the phases of public sector projects in Saudi Arabia including:

- a) Preliminary Studies Phase
- b) Design Phase
- c) Construction Phase

This phase was divided into two main stages as follows:

- i) Supervision of construction work.
- ii) Execution of the work.

1.5.3 Chapter Four: Survey of Public Sector Construction Projects

A number of questions are answered through this questionnaire which was designed to maximize information obtained on these issues. The questions include :

- a) How commonly each of the building procurement systems, tendering and contract types, discussed in Chapter three, were actually used in public sector projects.
- b) Do public sector projects encounter over-runs in cost ?
- c) Do public sector projects encounter delay in construction and fall behind schedule? What are the causes?

1.5.4 Chapter Five: Obstacles and Problems Encountered in Performance of Public Sector Projects

The aim of this Chapter was to provide a comprehensive, detailed study of the obstacles and problems encountered in performance of public sector projects. To achieve this goal we prepared :

- a) An overview of problems encountered during each of the project phases separately .
- b) An overview of each problem, including definition, causes and negative impacts .

We have quoted a number of viewpoints voiced by many organizations and individuals involved in such projects.

To ensure a more realistic approach in our study of such problems, we refer to three case studies that represent three different public sector projects. We collected the required data through a comprehensive study in order to give real life examples of the problems whenever possible.

1.5.5 Chapter Six: Measuring and Improving the Management Capabilities of the Public Sector's Projects Managers

This Chapter aims at the determination of proposals that can contribute to enhancing the abilities and efficiency of public sector project managers.

To achieve these objectives, the following points were addressed:

- a) Clarification of whether there is an actual discrepancy between the management abilities and qualification of public sector project managers and their duties . This was done through an evaluation of

their qualifications and management abilities and determination of various existing weaknesses.

- b) Formulation of appropriate practical solutions that may be adopted to achieve the aspired objective.

To achieve that, the following was carried out:

- i) Establishment of minimum standards of essential qualifications that characterise an efficient and successful project manager.
- ii) Preparation of a questionnaire addressing the various aspects related to management abilities of the project manager. Analysis of findings to produce an evaluation of their management qualifications .

This Chapter was divided into two main sections related to the above research steps:

Section (1): Evaluation of qualification and management abilities of public sector's projects managers.

Section (2): Proposals and views on what contributes to development of management abilities of the public sector's projects managers.

1.5.6 Chapter Seven: Improving the Systems that Govern the Public Sector's Projects Performance

We shall endeavour in this Chapter to provide proposals which will contribute to the improvement of public sector projects through improvements related to systems that govern performance of such projects.

To that end, we have studied the basic aspects of such systems including:

- a) Appropriate procurement system
- b) Study of tender procedures applicable to public sector projects
- c) Study of Contracts that govern the performance Public Sector Projects
- d) Summary of proposals.

1.5.7 Chapter Eight: Conclusion and Recommendations

This chapter contains two sections as:

- Conclusions reached through out this research.
- Recommendations, which are divided into two categories:
 - Recommendations on view points and proposals reached in this research which contribute to the development of people managing Public sector Projects and systems that govern the performance of the public sector projects in Saudi Arabia.
 - Recommendations for further research.

PART - I

CHAPTER 2

Project Management Development

2-1 General

In this Chapter , we will present the contents of a number of references with respect to project and project management definitions. The objectives of project management and successful project management will be established. We will also determine the relationship between management and project management and then we will show how important project management is to the construction sector .

The project manager's duties and responsibilities will be outlined and compared with the duties and responsibilities of the project manager in the public sector of Saudi Arabia. Management and project management development in United states, United Kingdom and Saudi Arabia will be briefly presented.

We will then go through the methods which may contribute to the development of project management before we conclude this Chapter with a summary of points covered. Based on the above, this Chapter will contain the following :

- Project definitions.
- Project management definitions.
- Objectives of project management.
- Successful project management.
- Relationship between management and project management.
- Project management and the construction industry - the need for project management.

- Duties and responsibilities of a project manager.
- Duties and responsibilities of the project manager in the public sector of Saudi Arabia.
- Management development.
 - United States.
 - United Kingdom.
 - Saudi Arabia.
- Project management development.
 - United States.
 - United Kingdom.
 - Saudi Arabia.
- Project management development methods.
- Summary.

2-2 Project Definitions

Many workers have attempted to define the term "project", a small sample of these definitions is given below :

- Harrison⁽²⁾ in the second edition of his book "Advanced project Management " defined the project as "*A non-routine, non-repetitive, one-off undertaking, normally with discrete time, financial and technical performance goals*".

In the third edition of the same book, Harrison⁽²⁾ added another definition of the project he called it the simple definition of the "basic" project, where he defined the project as "*A discrete undertaking with finite objectives- often including time, cost and technical performance goals* " .

Gray⁽³⁾ defined the project as "*A complex of non routine activities*

that must be completed with a set amount of resources and within a set time interval "

Stuckenbruck⁽⁴⁾ defined the project as "*A one-shot, time limited, goal-directed, major undertaking, requiring the commitment of varied skills and resources "*

Cleland⁽⁵⁾ defined the project as "*Any undertaking that has definite, final objectives representing specified values to be used in the satisfaction of some need or desire "* .

Turner⁽⁹⁾ defined the project as "*An endeavour in which human material and financial resources are organised in a novel way, to undertake a unique scope of work of given specification, within constraints of cost and time, so as to achieve unitary , beneficial change, through the delivery of quantitative and qualitative objectives "* .

The Project Management Institute's⁽²⁾ (USA) definition of a project is "*Any undertaking with a defined starting point and defined objectives by which completion is identified "* .

In its body of knowledge, the U.K Association of Project Managers⁽⁶⁾ defines a project as "*An undertaking to achieve a desired objective "* and goes on to state that "*generally all projects evolve through a similar " life-cycle" sequence during which there should be recognised start and finish points "*

The most suitable of the afore-mentioned definitions which may be used as a definition for the project in the public sector in Saudi Arabia is that presented by the Project Management Institute (USA), because it presents a simplified and general definition for the project. Due to the fact that the projects in the public sector of Saudi Arabia are large in number and varied in nature from one to another ranging from

infrastructure, airports , hospitals, office buildings, roads, ... etc., this definition presents a general perspective which can be used as a standard definition for all such projects.

2-3 Project Management Definitions

In referring to some of the project management definitions in the various references, we find that project management was defined in a number of ways:

The Chartered Institute of Building⁽⁷⁾ defined project management as "*The overall planning, control and co-ordination of a project from inception to completion aimed at meeting a client's requirements and ensuring completion within cost and to required quality standards*"

The International Dictionary of Management⁽⁶⁵⁾ defined project management thus "*Project management consists of the comprehensive management of all aspects of Projects from conception to completion of construction and commissioning* " .

Harrison⁽²⁾ defined project management as "*The achievement of a project's objectives through people , and involves the organizing, planning and control of the resources assigned to the project, together with the development of constructive human relations with all those involved, both in - company and with the other companies involved* " .

Gray⁽³⁾ defined project management as "*Project management is planning, scheduling, and controlling the complex of non routine activities that must be completed to reach the predetermined objective or objectives of the project* " .

The project Management Institute⁽⁵⁾ (USA) defines project management as "*The art of directing and coordinating human and material resources*

throughout the life of a project by using modern management techniques to achieve predetermined objectives of scope, cost, time, quality and participant satisfaction "

Hunter and Stickney⁽⁸⁾ defined project management as *"The application of the systems approach to the management of technologically complex tasks or projects whose objectives are explicitly stated in terms of time, cost, and performance parameters" .*

Out of the above mentioned definitions, the first two definitions presented by the Chartered Institute of Building and by the International Dictionary of Management express the concept and definition of project management as presented in this research project, because they are compatible with the proposed system in Chapter 7 as a proposal that contributes to the development and enhancement of performance of public sector projects. Such systems can be summarized as managing the entire project starting from being as idea and ending with a project ready for usage.

2-4 Objectives of Project Management

The Chartered Institute of Building determined the objectives of project management thus: *"To apply management skills and techniques to the organisation and control of all aspects of the project and to optimise the use of resources to produce a well designed and soundly constructed facility which will meet the client's requirements of function, cost and time"*⁽⁷⁾.

The Royal Institution of Chartered Surveyors determined the objectives of project management as *"To establish the management and control of a*

project from inception to completion within the parameters of the clients brief." (10) .

Meredith and Mantel⁽¹¹⁾ see the objectives of project management as to meet specified performance within cost and on schedule .

Out of the above determination of the objectives of project management , the Chartered Institute of Building's view presents the most suitable determination in the context of this research, because it present the same objectives of the proposed system in Chapter 7, aiming to apply project management skills and techniques to the public sector's projects, control of all aspects of these projects, and to optimise the use of resources available in the public sector in order to produce a successful project.

2-5 Successful Project Management

We defined the objectives of project management in the above paragraph, but how can we measure or establish their success?. Baker, Murphy and Fisher⁽⁹⁴⁾ answer this question stating that "project management can be described as successful if the project meets the technical performance specification and/or mission to be performed , and if there is a high level of satisfaction concerning the project outcome among : key people in the parent organization , key people in the client organization , key people on the project team , and key users or clientele of the project effort".

Kerzner⁽¹²⁾ sees that : "*Successful project management can be defined as having achieved the project objectives :*

- Within time
- Within cost
- At the desired performance/technology level.
- While utilizing the assigned resources effectively and efficiently" .

Having successful project management and, consequently, accomplishment of a successful project which meets the required technical specifications, the estimated time and budget and achieves the client's satisfaction, is a goal which this research paper tries to address. Chapters 6 and 7 discuss solutions and makes proposals which may contribute to the development and enhancement in performance of public sector projects in Saudi Arabia.

2-6 Relationship between Management and Project Management

Does a relationship exist between management and projects management? If so, what is the nature of this relationship? In this section we will endeavour to present the viewpoints of some relevant references trying to identify the nature of this relationship.

Martin⁽¹³⁾ determined the relationship between management and project management by stating that "*Management should look on project management as the newest extension of its influence on the management of the organization, aiding it in its complicated coordination of a large number of separate functions and divisions, each with its unique disciplines, expertise, and practices*"

While Harrison⁽²⁾ sees that Project management can be considered as another branch or specialized form of management.

O'Neill ⁽¹⁴⁾ demonstrates that the development of project management methods has taken place mainly in the past few decades, in line with the growth in general management knowledge and practices. He believes that if "management" is defined as " the control of resources, then " project management" may be defined as "the control of resources in a temporary arrangement to achieve project objectives" .

Any organization chart is based on the idea that general management alone has ultimate authority over all the divisions , departments, and parts of the organization, many of which must be directed , shaped, improved, and perhaps changed to accommodate the ideas of project management. Since the best results always come from leadership at the right level, the success of project management always depends initially on good general management (13) .

The above presentation shows that a relationship exists between management and project management. Project management may be considered as an extension of management, on the other hand, good management may be considered as a cause contributing to the project success. This is one of the reasons that we have identified management , in Chapter 6, as one of the main subjects which contribute to the preparation of a successful project manager.

2-7 Project Management and the Construction Industry-The Need for Project Management

Sir Monty Finniston⁽¹⁵⁾ demonstrated that *the world of international industry has always been concerned with the creation and operation of major constructions based on technical concepts and related to market potential. He saw that as this century nears its end, these projects are becoming not only larger, thus requiring considerable investment, but also more complex in planning terms of time and people. Sir Monty Finniston believed that these projects require professionalism at the highest level of knowledge and practice updated as new ideas and intelligence from all quarters are continually generated. In this respect he stated that "project management is not a matter for only one or two industries. It is not a*

matter of size or of high technology or low technology , Project management relates to all industries" .

While Kerzner⁽¹²⁾ saw that the rapid rate of change in both technology and the marketplace has created enormous strains upon existing organizational forms. He concluded that the traditional structure was highly bureaucratic, and that experience had shown that it cannot respond rapidly enough to a changing environment. Thus , the traditional structure must be replaced by project management.

Harrison ⁽¹⁶⁾ saw that the principal reason for the development of the project management concept, organization, and specialised , often highly sophisticated techniques, was that the traditional forms of organization structure and management techniques do not handle project type work effectively. He believed that there was a need for different forms of organization, specialised information systems, managers skilled in the techniques of project planning, financial management, control and the particular human problem arising in project work, because of the special characteristics of projects and the problems caused by them.

Harrison⁽²⁾ determined four reasons for the widespread adoption of professional and advanced project management today as :

- Management is recognizing that many of its organization's activities are projects and that the management of projects is different to the management of its other operations .
- Market conditions are becoming more demanding and projects are becoming larger, leading to a requirement for more professional project management .
- The rate of change facing industry is increasing and more undertakings are having to be treated as projects with tight time, cost and

performance objectives.

- The problems of integrating multiple disciplines in multi-company undertakings is making the adoption of project management critical to their success.

2-8 Duties and Responsibilities of a Project Manager

The Chartered Institute of Building⁽⁷⁾ determined the duties and responsibilities of a project manager, these have been summarized in Table 2-1 .

The services provided by a Project Manager vary according to the project and the client's specific requirements, and do not necessarily covers all of the listed duties and responsibilities.

In the next section we will discuss the specific project manager roles in the public sector of Saudi Arabia.

2-9 Duties and Responsibilities of the Project Manager in the Public Sector of Saudi Arabia

As shown by the results of the second questionnaire in Chapter 6, all the project managers in the public sector of Saudi Arabia are engineers from various disciplines, e.g electrical, mechanical, structural, architectural, .. etc. The project managers in the public sector of Saudi Arabia are not appointed to a project at its early stages, during the Preliminary studies phase or the design phase, but instead, they are only appointed after signing the construction contract. The selection of project managers in the public sector by the government departments they are assigned to is not done in accordance with definite standards and measures of ability

Table 2-1 : Duties and responsibilities of a project manager⁽⁷⁾ .

Initial stages with the client	Pre-construction stage
<ul style="list-style-type: none"> a) Define the degree of involvement from the client. (b) Set out clearly the approvals required by the client. (c) Assess the financial and technical viability of the project from the initial information provided by the client. (d) Establish what funding arrangements exist for the project. (e) Set out lines of communication with the client. (f) Establish the reporting required by the client. 	<ul style="list-style-type: none"> (a) Establish with the client the general procedures for selection and appointment of contractors. (b) Set up a management structure for the project. (c) Set up procedures for clearly defining responsibilities of the team. (d) Produce a master programme for the design and construction phases and communicate to all parties. (e) Check at all times that the design produced complies with the overall cost budget. Ensure design consultant produce specifications for all aspects of the works.
<p>Feasibility stage</p> <ul style="list-style-type: none"> (a) Examine the client's basic proposals for the project and collect available data (b) As the brief is defined, establish that the client has a viable proposition and that development is both technically and financially feasible. (c) Prepare a programme for the total project and establish a total time scale . (d) Advise the client on the selection of the design team and its terms of appointment. Select the team and recommend its appointment to the client. (e) Ensure that preliminary investigation of the site or sites is carried out. (f) Advise on the site location and suitability . (g) Assess the client in obtaining basic approvals necessary from the government and local government. (h) Arrange for such site investigation including topographical surveys, soil reports, bore holes and such other government tests as necessary. (i) Ensure that preliminary architectural and engineering drawings and preliminary material and equipment specification are prepared for the purpose of planning . (j) See that budget is prepared for the project with investment proposals including cash flow projections. (k) Define the basic building and structural requirements and establish outline planning approval within the required time scale. (l) Prepare a feasibility report outlining all aspects of the project for the client's approval. 	<ul style="list-style-type: none"> (f) Ensure that the client is aware of developing design and specifications and that his approvals are obtained at the agreed stages of design and specification developments. (g) Re-examine the preliminary project budget to produce a definitive budget for cost control purposes. (h) Establish costing systems to continuously monitor the budget. (i) Check on material availability. (j) Establish accounting procedures and cost controls to cover the various stages of the project (k) Ensure that planning approval and building regulation approval is obtained. (l) Compile all contract documents for the construction phase in accordance with the agreed policy regarding tendering and selection of contractors. (m) If contractors are to pre-qualify, obtain pre-qualification information from selected contractors well in advance of tender dates. (n) Produce recommended list of contractors who will be invited. (o) Evaluate tenders received and make recommendations to the client regarding the appointment of contractors . (p) Ensure that adequate staff are available for the site inspection and quality control checking and for monitoring the progress of works during the construction phase.

Table 2-1 : Continued

Construction phase	Completion
<ul style="list-style-type: none"> (a) Advise the contractor of programme procedures and requirements. (b) Ensure the contractor erects hoardings and protection to other areas as specified and record with the contractor. (c) Set up regular progress meetings with designers, contractors , sub-contractors and suppliers. (d) Co-ordinate, direct and inspect all construction work. (e) Arrange for the work to be measured, valued and certified regularly and that payments are made on behalf of the client to the contractor in accordance with contract requirements. (f) Ensure that site security and safety standards are maintained at all times. (g) Ensure that construction works are carried out in accordance with the specification. (h) Identify with the contractor problems, anticipate problems and take such measures as are necessary to resolve these to the best advantage of the client. (i) Ensure that design information is produced in accordance with the master programme requirements and that variations are kept to a minimum. (j) If necessary, arrange for the recruitment and training of personnel. (k) Issue on the client's behalf all certificates required under the conditions of contract. (l) Where not the contractor's responsibility, place orders on behalf of the client and ensure that all statutory undertakers carry out their works in accordance with master programme requirements. 	<ul style="list-style-type: none"> (a) Ensure that all necessary pre-commissioning checks are carried out. (b) Ensure that all final accounts are dealt with in accordance with the contract conditions and that any claims are settled. (c) Assist the client in carrying out commissioning. (d) See that all necessary operating manuals, drawings, planning and lease conditions and instructions are supplied to the client. (e) Monitor the works during the defects liability period .

and efficiency. The project manager is usually selected in an impromptu and spontaneous manner which contributes to the weakening of the role he may be able to play . Looking at the duties and responsibilities of the project manager as listed in Table 2-1, the extent of the role which should be played by a project manager becomes evident. However, looking at actual duties and responsibilities of a project manager in the public sector of Saudi Arabia, one realizes the significant variance between the role exercised and that assumed. The role the project manager plays in the public sector is marginal in reality and it is only limited to construction phase where his role does not exceed in most instances coordination between the project owner, the contractor and the consultant, without a clear definition of the function he is supposed to carry out. Perhaps what makes matters more complicated is that the project manager in the government sector does not bear any clear cut responsibilities for the performance of his job. This may lead to him not giving his work adequate attention, and therefore not gaining the full benefit from carrying out his assumed tasks and increasing his experience in this field. Moreover, this may also sway him towards not devoting care to the development of his own abilities.

2-10 Management Development

2-10-1 United States

In 1916 the American Association of Collegiate School of Business (AASB) was founded. In demonstrating the role this school played, McKenna (17) (1989) stated that " Although the American Association of Collegiate Schools of Business was originally founded in 1916 to promote the development of business education in the United States ,

it was really not until the post-World War II period that the association began to exercise a considerable influence over the direction of business education" .

Black (18)(1979) showed that from the time of World War I, through the early 1920s, training programs improved and supervisory training was added. He believed that Frederick W. Taylor and his movement toward scientific management had showed the need for training at the supervisory level in the years immediately prior to World War I .

In the years between the wars, the universities delved into management and behavioural theory. The work of Elton Mayo at Harvard, Kurt Lewin at the University of Iowa and M.I.T., Rensis Likert at the University of Michigan, Mason Haire at the University of California, Herbert Simon and Richard Cyert at Carnegie-Mellon University, and many others came to the attention of corporate management.

In describing the growth in management development programs at American universities Watson (19) (1979) showed that, in 1932 Edwin Shul began the first university management development program at M.I.T. in Cambridge , Massachusetts. Other executive programs were set up in the years that followed. Harvard University established its program in 1945, Western Ontario University in 1948, and Pittsburgh University in 1949, and , in the early 1950s, several other major universities established programs.

In 1959, Professor Frank C. Pierson of Swarthmore College published his research findings on the state of business education in America. This research was sponsored by the Carnegie Corporation and was intended to " assess different approaches to academic preparation

for business, careers" (17).

Also in 1959, Robert A. Gordon(University of California , Berkeley) and James E. Howell (Stanford University) Published their research finding on the state of higher education in business in the United States. This project was funded by the Ford Foundation and took professor Gordon and Howell three years to complete. Even today the Gordan and Howell report is viewed as one of the most comprehensive studies of university based higher education in business (17) .

In their commentary on the importance of both reports, Porter and Mc Kibbin⁽²⁰⁾ (1988) stated that "These two reports made major recommendations for curricular change that were extremely influential over the course of the next couple of decades" . Mc Kenna ⁽¹⁷⁾ (1989) comments stating that " The Pierson report and the Gordon and Howell report filled much of the research vacuum created by the earlier American Association of Collegiate School of Business studies. Each of these projects sought to clarify the major issues in business education and establish future directions"

In a data published in 1986 by the Bricker Executive Education Service showed that the academic institutions offering major Executive Education and Management development programs has increased from 39 in 1962 to 73 in 1985 , the general management programs has increased from 39 to 139 in the same period, while the total number of participants has increased from 1900 in 1962 to 14600 in 1985 ⁽²⁰⁾

Through a study conducted by Porter and Mc kibbin⁽²⁰⁾ in 1988 about the management education in USA , they concluded that the development of managers should not stop with the completion of the

traditional front-end degree, but instead , must be continuous, must be , in effect, lifelong. In this respect they stated that "The issue, however, is how to meet this need effectively, and in our opinion, to do so will represent a major future challenge for both business schools and corporations, because at the present time this need is being met only partially and inconsistently at best".

Skousen and Bertelsen (21) 1994 believed that in meeting the demands of the ever-expanding business world and, in turn, the demands placed upon management graduates, both administrators and faculty members must respond accordingly by implementing needed changes and even retooling if necessary. In this respect they stated that `` A program or college cannot remain static or live in an academic bubble. The academic product-the graduates- must be able to move into the professional world with the least amount of discomfort and disruption. Change must be viewed as beneficial, not something to be feared and avoided" .

2-10-2 United Kingdom

Jarman (22) (1978) demonstrated that In United Kingdom, management was being studied at Manchester College of Science and Technology as early as 1922, the British Institute of Management was founded in 1947 and many technical and professional bodies included management as a subject in their examinations before the Second World War. He believed that the real impetus for management training and development has only appeared since 1945 and most specifically since the Franks Report of 1963 and the foundation of the Business Schools at London and Manchester in 1965.

Alistair Mant ⁽²³⁾ (1981) saw that the main growth in British management education occurred after the Second World War in two phases. First, the Administrative Staff college was established in 1945, based on the principle of providing long (e.g. three-month) mid-career programmes for specialists on the move to senior, general management posts. The second phase of growth occurred in the 1960s , in response to a widely-held conviction that the lack of American-style business schools was constraining the development of British industry. The shape of the second phase was effectively established by Lord Franks whose report recommended the establishment of two new institutions, one in London and the other in Manchester, as the focus for further development.

In 1987 John Constable and Roger Mc Cormick⁽²⁴⁾, and Charles Handy⁽²⁵⁾ published two major reports, The first report by John Constable and Roger Mc Cormick was prepared for the British Institute of Management and the Confederation of British Industry. The second report by Charles Handy sponsored by the Manpower Services Commission, the National Economic Development Office and British Institute of Management. The two reports showed that the investment made in management skills in Britain lagged far behind that in France, West Germany, the United States and Japan. The reports also demonstrated that compared with their counterparts in other advanced nations, British managers were under-educated and poorly trained ⁽²⁶⁾.

Barry⁽²⁶⁾ (1984) believed that although there was little doubt that there was room for substantial improvement in the provision of management education and training in Britain, considerable growth

had taken place in such activities during the previous quarter of a century. He demonstrated that in 1985 it has been estimated that, more than 100 universities, polytechnics and colleges provided programmes for some 70,000 people enrolled on a wide range of business or management courses. He pointed out that there was much to be done to promote standards of managers in United Kingdom, he stated that " It should be borne in mind that the United Kingdom has some three million managers and a great deal needs to be done to raise their level of management education to that achieved by their counterparts in other advanced nations " .

Robinson (27) (1991) believed that, in spite of a shift in thoughts towards management education and development in United Kingdom, an agreement on what needed to be done to promote management had yet to be reached, he stated that "In the interim, there have been a number of significant shifts in thinking on the subject of management education and development in the United Kingdom. The publication of the Handy and Constable reports meant that a whole generation of politicians and members of various British management bodies developed a belief that management development was important and that something should be done about it . Unfortunately, there does not appear to be a high degree of consensus as to what that something should be " .

2-10-3 Saudi Arabia

The onset of management development in the Kingdom was associated with the establishment of the Institute of Public Administration, a governmental institute which was founded in Riyadh under Royal Decree

Number. 93 in 1960. According to Article (2) of its code, the Institute targets enhancement of government staff efficiency as well as promotion of their scientific and practical preparedness to shoulder their responsibilities and exercise their authorities in a way which would ensure enhancement of management standards. The Institute further contributes to the administrative organization of government departments and offers consultancy in respect of management problems referred to it by government departments⁽²⁸⁾ .

Since its foundation, the Institute has been active in the area of management training. The management training programmes were divided into the following ⁽²⁹⁾ :

- Training Programmes

The Institute carried out the first training programme in 1962, through implementation of three training schemes for government employees :

- General programme in intermediate management with a total of 23 participants.
- General administration programme with 53 participants.
- Introductory financial affairs programme with 32 participants.

- Preparatory Programmes

These programmes started in 1971 with the following programmes :

- Government regulations programme with 42 participants.
- Financial studies programme with 50 participants.

These training programmes have continued during subsequent years to date. Government employees were attracted to the training programmes sponsored by the Institute because they are seen as a

means for career promotion . On course termination, the trainee acquires a certificate which shows whether or not he has successfully passed the prescribed course. However, it must be stated that there is no actual evaluation to show how efficient and effective were the programmes in the promotion of administrative potential of government staff. Consequently, one cannot say how successful the programmes were in realizing set goals.

2-11 Project Management Development

2-11-1 United States

The Project Management Institute (PMI) announced the establishment of the project management professional (PMP) program⁽³⁰⁾ in December 1983, the program was subsequently described in detail in March 1984. Martin⁽³⁰⁾ (1988) described the announcement of the project management professional programme by stating that " The announcement in December 1983 was a milestone in the history of the project management institute". whereas Choyce⁽³¹⁾ (1993) described it by stating that " This was a hallmark event, It was the first formal recognition of project management as a professional endeavour " Archibold⁽³²⁾ (1989) demonstrated that in 1989, Project Management Institute had 267 persons who were certified as "project management professionals" .

To determine the extent of development and growth in project management training in the USA, a study conducted in 1993 showed that in 1989, only 19 percent of contractors spent more than U.S.\$25.000 on project management training. By 1992 the percentage

had risen significantly, to 35% percent⁽⁹⁵⁾.

Kerzner⁽³³⁾ 1994 confirmed the growth and development in project management by stating that " Fifteen years ago, colleges and Universities could not be convinced to offer as little as one course in project management . Today , we are offering master's degrees and M.B.A's in project management" . But he criticized many of these programs and the way faculty members are selected by stating that "Unfortunately, many of these programs are geared more towards "historical" traditional project management principles, rather than modern project management practice" . He goes on saying that " The college/university appoints faculty members who have possibly no project management experience" .

Donnelly and Kezsbom⁽³⁴⁾ (1994) summarized their views on means and methods of promoting the project management team by stating that " Team building cannot be prescribed according to a rigid program or formal plan, it occurs in spurts of progress followed by apparent relapses, with new insights developing along the way".

2-11-2 United Kingdom

A paper submitted by the Chartered Institute of Building⁽⁷⁾ (1979) criticised the courses leading to professional qualification in project management by stating that " The courses leading to the various initial professional qualifications do not provide the necessary knowledge to meet all the requirements of project management. Some educational establishments have given some thought to project management but little progress has been made to providing any courses of this nature" Woodward ⁽³⁵⁾(1985), in discussing professional qualifications in the

field of project management in United Kingdom, demonstrated that the Association of Project Managers is the professional body concerned with the establishment of professional standards. He showed that the Association has established three separate grades of membership, namely associate membership for prospective project managers, full membership for the main group of working project managers and fellowship for those members who have made a special contribution to the art and practice of project management. He believed that the Association of project managers started to grow strongly and that its influence became so evident, he stated that "While the Association of Project Managers does not yet have the same high proportion of membership as the engineering and similar institutions, it is a body with growing strength and influence".

In a study carried out at Bradford University to investigate the managerial knowledge used and needed by members of the Chartered Institute of Building, {Finnigan, Mare and Wearne⁽³⁶⁾ (1987)} concluded that "Members of all ages have a great need for managerial knowledge and skills, and the evidence indicates that they are not sufficiently prepared in many of these, particularly in the human relations, organization, contractual and motivation skills".

Graham⁽³⁷⁾ (1988) found that If project management is to develop into a serious discipline, two things are necessary :

- A recognition that project management is a skill in its own right. He believed that the management of a large project is not something that can be left to the career development specialists. Equally, it cannot be left to project specialists who are likely to do nothing more than repeat the errors of the past.

- Training, where he believed that it is not a substitute for experience, but neither is experience a substitute for training. The two are complementary and necessary. Training, should be a means of translating experience into learning, and learning into action.

Dingle⁽³⁸⁾ (1990) described the available resources for project management development in United Kingdom as:

Firstly, the established academic institution, some 47 universities and 44 polytechnics.

Secondly, professional bodies such as Chartered Institutions, and others like the Association of Project Managers.

Thirdly, a relatively small number of independent quasi-academic organizations which offer more or less specialized training courses on a commercial basis.

Fourthly, employers either in trade associations or individually, which provide what are essentially 'in-house' courses for the career development of their own employees.

In a study carried out at Loughbrough University of technology, to identify the qualification of project managers in United Kingdom Adham⁽³⁹⁾ (1992) concluded that Construction project managers were engineering graduates and they were of a very strong technical background, but of low managerial, financial and legal basic academic background. In this respect he stated that "the need for management and other knowledge and skills is of paramount important to the project manager's job. Engineering educational institutions have failed to address this issue" .

2-11-3 Saudi Arabia

In the public sector of Saudi Arabia there are no institutes or other specialized organization agencies in the field of project management to effectively contribute to the development of Sector's Project managers. The first Programme in the field of Project Management was offered by King Fahad University for Petroleum and Minerals in 1983. Since that date, the university have sponsored a number of short courses which covered various topics in this field.

King Fahad University was the source of such programmes during the period from 1983 until 1987 at which time the Institute of Public Administration started to organize a few programmes in the field of project management including :

- Planning of construction projects.
- Management of Projects execution and supervision .

In 1990 the Engineering committee, which is a government body established under the Ministry of Commerce Resolution No. 264 of 1982 to carry out research and studies which target the promotion of the Engineering practice and enhancement of related standards ⁽⁴⁰⁾ , organized the first training programme in the field of project management.

As in the case of the general management training programme discussed in section (2-10-3), one cannot say whether or not these programmes are a success because of the lack of any attempt at comprehensive and precise evaluation.

2-12 Project Management Training Methods

Simonds and Winch ⁽⁴¹⁾ stated that " No correct formula for

conducting training exists". Watson⁽¹⁹⁾ saw that the relative effectiveness of the various methods for achieving particular training objectives is a major concern of training professionals as they face the questions as to which method to use to teach this or that concept, or skill, or personal characteristic. He demonstrated that the training literature contains only a little helpful information along these lines and that the research studies which have been carried out to determine the relative effectiveness of training methods are quite limited in scope. Most compare only two methods for producing one or more types of learning . He believed that this is largely due to the fact that this type of research is quite complex and to study more than just a few variables at a time requires a very cumbersome research design.

Woodward⁽³⁵⁾ listed five different modes for project management development as :

- Short courses (up to two weeks).

This method represents the most common and wide spread training method. The most important reason for this preference is due to its short duration . in which participants do not need to be separated from their employers for a long period of time which is also welcomed by employers. In his evaluation of the extent of benefits from these short courses, Woodward stated that " Many of these courses are well constructed and well organized and serve a useful purpose; others are not so good, and may at best regarded as a waste of time and money, and at worst may do actual harm"

- Medium length courses (3-20 weeks).

Due to the long duration of these courses , the opportunity to

receive more information is there. Because these courses are quite expensive, participating organizations should carefully select participants in order to ensure that maximum benefits are obtained and that courses have, in fact, earned the desired interests.

- **Undergraduate Programmes**

Woodward⁽³⁵⁾ believed that it is useful to provide undergraduates with some basic information related to project management and that efforts in this area should be encouraged as it is difficult to have Project Management as an independent discipline by its own .

- **Higher Education**

This refers to postgraduate courses leading to a higher degree specifically in the area of project management. This method is important because it contributes to the creation of a specialized project manager to undertake the tasks and duties of a project manager in a proper manner that contributes to the project success and the realization of its goals.

- **Research**

Through the preparation of research projects , all available resources are reviewed and verified , thus enhancing personal capabilities and provide a significant information in this particular field. Research is also a vital means of development and identification of solutions to problems which hinder the success of projects or cause their failure.

Woodward⁽³⁵⁾ believed that each of the above methods has a part to play in the education of project managers, and there can be no

ideal course for future project managers. He sees that it is unlikely that any one of the modes will in itself prove to be sufficient.

A study conducted by Thamhain⁽⁴²⁾, to identify the most important effective sources in training project managers in U.S, concluded that such sources include the following:

- **On-the-Job Training**

Where a project manager has the opportunity to receive training on site, thus enabling him to put theoretical data to practice which ultimately leads to better understanding of these two important aspects in the preparation and making of a successful project manager.

- **Self Education**

Thamhain demonstrated that this is an important source of information and knowledge which, through proper on-the-job application, can be transferred into skills.

Robinson ⁽⁴³⁾ , in his evaluation of this source, says that the importance of self-development should not be underestimated. It is a truism to say that most people are eager to learn more, but are not keen to disclose to others that they need to do so. Thamhain demonstrated that one of the major constraints to their learning about their jobs by reading is the lack of knowledge as to which book, paper or journal would be suitable to provide the knowledge they require, They may not even recognize appropriate information when they see it . He believed that it may only be necessary for the boss to identify the sources to enable them to embark on a useful training activity which they can carry out in their own time and at their own pace.

- **Seminars**

A prerequisite of a successful seminar is that all participants have sufficient training and experience in the subject at hand to enable them to contribute to the discussion. The seminar method also helps the participant relate job experience to the material being covered in the seminar since one is called upon to contribute from one's own store of experience.

- **Formal Courses (Degree programs)**

Thamhain showed that project managers find these courses an effective way to gain knowledge and the basis for further skill development, especially in administration, communication, organization, tracking, and measuring of project activities.

- **Professional Conferences**

Thamhain presents conferences as vehicles for quick updates on new project management concepts, techniques, support systems . Equally important, the students value the personal contacts and sharing of experiences between the project managers from different companies.

From a study , which surveyed 110 project manager to determine the most important training sources that contribute to the enrichment of project manager abilities, Adham (39) concluded that the most important sources are :

- On-the-job training
- Off the-job-training
- Academic training courses.
- Secondment to other departments.
- Lectures and Seminars.

- Self Education.

Simonds and Winch (41) stated that " One important point needs to be made it is that training cannot be viewed as a one-shot effort. Training must be constant and consistent. It must be endorsed by management". They believed that participation need to be encouraged and rewarded and that project managers should be able to apply new concepts immediately to their work and to integrate those concept with the knowledge they already possess . In this respect they stated that ``when training meets all these criteria and is followed up and reinforced, it can make a difference in the quality of project manager a firm sends into the challenging market place of the 1990s " .

Finally, it is important to state here that training sources covered by the second questionnaire in Chapter 6 have been determined based on training sources discussed above and the compatibility of each source with the status quo governing the practice of public sector projects in Saudi Arabia.

2-13 Summary

Looking through what we have presented in this Chapter about the project management development in the public sector of Saudi Arabia and the training programmes organized in this field up to date, we notice that the efficiency of these programmes experience lack of realistic and comprehensive evaluation of programmes efficiency. Furthermore, the qualification of the staff who design and execute these programmes for trainees have not been assessed. This means that such programmes may not be upgraded to meet actual needs of project managers in the public sector of Saudi Arabia.

Through the different sources which we presented as possible contributors to project management development , a number of training sources have been identified which match the status quo of project managers in the public sector. These sources were included in the second questionnaire of Chapter 6.

Our presentation of the project manager's role and the comparison of such a role with the actual practice of a project manager in the public sector in Saudi Arabia shows that there is no basis for comparison. The role played by a project manager in the public sector is marginal and does not correspond to the priorities of tasks and responsibilities a project manager is expected to shoulder.

A full chapter in this research project, Chapter 6, has been dedicated to review the management abilities of project managers in the public sector. To assess these abilities, decide whether or not project managers in the public sector suffer from lack of management abilities and to determine the extent thereof.

CHAPTER 3

Construction Industry in the Public Sector of Saudi Arabia

3.1. Introduction

To be able to study the various phases construction projects undergo in the public sector, It was essential to collect as much information as possible about such projects. To achieve this goal, the required information was obtained from several sources;

- a) Laws and regulations that govern the performance of such projects.
- b) A questionnaire,for distribution to government departments, was prepared containing detailed information on such projects and the phases they undergo (Chapter 4 of this research).
- c) Interviews were conducted with individuals concerned at the various public sector departments to obtain information which we were unable to collect through the approaches described above.

From these sources we obtained a large quantity of significant information which we shall describe in this Chapter.

3-2 Legal Framework Governing Public Sector Projects

Before venturing into the discussion of the various phases public projects undergo, we believe it is important to provide a synopsis on the legal framework presently governing public sector projects :

- In Saudi Arabia the legal decisions for the settlement of conflicts arising

in connection with execution of contracts to which a government body is a party, are based on the following sources ⁽⁵⁴⁾ :

First, AL-Shareah, rules of the Islamic Religion, These include all rules quoted in the Holy Koran or the Hadith of Prophet Mohammed, May God's peace and blessings be upon him.

Second, Government procurement regulations and their rules of implementation. These regulations will be discussed briefly under Section 3-3 of this Chapter.

Third, Religious Scholars Improvisations and Court Judgements based on general principles . These are diverse in nature, the following are examples :

- The Contract must be interpreted in accordance with the mutual accord of the parties without strict adherence to the literal meaning of expressions.
- The contract is based on the concept of common interest, the guarantee of the smooth and regular operation of a public facility and giving the common interest priority above individual interests.
- Although the public department is empowered to unilaterally amend the contract at anytime, it is under an obligation not to use this right to the extent which would change the economic balance of the contract.
- All contracts for projects to which a government department is a party are subject to the Government Procurement Regulations and their Rules of implementation. All design, supervision and execution contracts must include a stipulation which clearly states that such contracts are subject to these regulations . No addition, modification or alteration to any article of the regulations is permitted except if passed under a Royal Decree .

- In case a need for exclusion of any provisions contained in the regulations arise, the issue will be referred to a designated ministerial committee. The committee will present its recommendations to the Prime Minister (or his Designee) who will pass a proper decision (Article 12 of the regulation) . A circular No. 3/C/29152 dated 3.12.1397H, (1977), from the Deputy premier outlined steps to be followed in the event of requesting an exclusion. These are as follows :-
 - The concerned government department shall submit an application to the Cabinet's presidency Bureau . The application will be reviewed by the Deputy Premier.
 - If the Deputy Premier deems the application worthy of discussion,it will be referred to the ministerial committee.
 - Once the committee reviews the issue it will submit a report of recommendations to the Deputy Premier for decision making.
 - The Cabinet's Presidency Bureau reports the decision to the concerned department directly .

It is worth noting that two Royal Decrees No.26053 and 3/R/13984 dated 26,10,1397H and 9,6,1398H, respectively, (1977, 1978), were passed to discourage applications for exclusion of regulations provisions except in cases of dire necessity.

- No uniform contracts exist for design and supervision works, whereas there is a uniform contract for the execution of works. All government departments have been forced to incorporate it as part of the contract documents whenever a project is put out for bid . The most important items of this contract will be discussed under paragraphs b-iii & b-vi of section 3-4-3-2 of this chapter.
- The uniform contract for execution of projects is governed by the

Government Procurement Regulations and their Rules of implementation .

- Any conflict arising out of the execution of the uniform Contract which cannot be amicably solved by the parties thereto is referred to the Board of Grievances to pass a final and binding judgement (Article 57 of the uniform Contract) . The Board of Grievances is a government agency which was established under the Royal Decree No. M/51 of 17,2,1402H, (1982). The Board's code states under Article 8/1/D that : "The Board has jurisdiction over claims brought forward by concerned parties in connection with conflicts related to contracts to which the public sector's department is a party" (54) .
- Government departments may not incorporate any provisions which contradict the Procurement of Government Purchases regulation in any of their contracts. In cases where such provisions are incorporated, the contract will be referred to the Board of Grievance who will issue an equitable decision, Royal Decree No. 487 of 5,8,1398H, (1978) .
- Any Government department which contemplates entering into a long term contract (over one year duration) must furnish a copy thereof to the Ministry of Finance for their comments . Should a response not be received within two weeks, this will be construed as approval of the contract and absence of objections or reservations on the part of the Ministry of Finance, Royal Decree No.335 of 27,3,1388H, (1968).
- A government department , before entering into a contract the value of which is Saudi Riyals 100 million or more (17,860,000 Pounds Sterling) , must secure the prior written approval of the Deputy Premier, Royal Decree No.470 of 29,6.1398H, (1978).
- To follow up and ensure compliance of contracting parties with the applicable laws, rules and regulations of the Kingdom throughout the

contract execution stage, a government agency called the "General Audit Bureau" has been set up to exercise this function. Article No.4 of Royal Decree No 733 of 9,6,1395H, (1975), obliges every government department who enters into a contract to furnish an original copy of the contract to the General Audit Bureau within two weeks of the contract signature date (62) .

3.3 Government Procurement Regulations and their Rules of Implementation (44)

The Government Procurement Regulations and their Rules of Implementation were put into effect on 4.5.1397H, (1977), in accordance with item (1) of Royal Decree No.M/14 dated 7.4.1397H, (1977). These regulations have superseded the previous Tender and Auction Regulations, Ministry of Finance Circular No.17/8636 dated 15.5.1398H, (1978). The Government Procurement Regulations and their Rules of Implementation are regulatory controls. The Government Procurement Regulations consist of fourteen articles while their rules of implementation consist of forty articles. The fourteen articles which comprise the Government Procurement Regulations cover the following :

- Article 1 : Includes basic regulations and is divided into seven parts.
- Article 2 : Includes regulations on bid submission and is divided into six parts.
- Article 3 : Includes methods of procurement and performance of works and is divided into fourteen parts.
- Article 4 : Includes one part on non-limitation to certain persons or organization.
- Article 5 : Includes regulations on bid award and is divided into five parts.

- Article 6 : Includes one part on authority of award and contracting.
- Article 7 : Includes contract conditions and is divided into four parts.
- Article 8 : Includes terms of payment and is divided into two parts.
- Article 9 : Covers regulations on delay penalty and is divided into three parts.
- Article 10 : Includes one part on contract formats.
- Article 11 : Includes one part on procedures to be followed and observed when selling items.
- Article 12 : Includes one part on procedures to be followed to make exceptions to the regulations.
- Article 13 : Includes one part on the authority vested in the Minister of Finance in respect of the issue of rules of implementation of government Procurement Regulations.
- Article 14 : Includes one part on rescinding anything that is contrary to Government Procurement Regulations.

A number of those articles underwent amendments by subsequent circulars and royal decrees. We shall address some of the important articles of these regulations as they relate to the subject of this research.

3.3.1 Tender Procedures

3.3.1.1 Design and Supervision of Works

In respect of tenders for design and supervision of works, the regulations stipulated that such tenders shall be made through a selected tender procedure. This was subsequently ratified by Royal Decree No.3/167/M dated 27.1.1404H (1983).

3.3.1.2 Construction Works

Article 3 of the Regulations demonstrates that invitation to bidders to execute government projects may be prepared based on selected tender procedures. . However, Royal Decree No.9751 dated 26.4.1403H (1983), was subsequently mandated stipulating in its first paragraph that *"opportunity should be given to a maximum number of qualified contractors to bid for government projects and that contract awards shall not be restricted to a limited number of companies and establishments but all projects should be announced in a open tender and advertised in newspapers"*. We shall discuss this subject in some detail in item (c-i) of Article (3.4.3.2) of this chapter.

3.3.2 Contract Variations

Article (25) of the Rules of Implementation of Government Procurement Regulations stipulates that *"the contractor's obligations may be increased or decreased by 20% of total contract value"*. However, a subsequent Royal Decree was issued under no.21909 dated 15.9.1403H (1983), mandating that *"the contractor's obligations may not be increased by more than 10% while the decrease may be up to 20% of total contract value"*.

3.3.3 Advance Payment

Article 8.a of the Government Procurement Regulations stipulates that *"the government department may pay the contractor an advance payment of up to 20% of its entitlement at contract signature against a letter of guarantee in an amount equal to the value of the advance payment and provided that such payment is deducted from invoices in instalments."* However, Royal Decree No.76 dated 2.4.1405H (1984) was subsequently issued stipulating that *"the amount of the advance payment may not exceed 10% of contract value, and in any case, may not exceed SR.100 million irrespective of contract value."*

3.3.4 Bid Bond

Article 2/D stipulates that *"the bidder shall attach to its proposal a bid bond in an amount of between 1% and 2% of its bid price as required in tender documents"*.

3.3.5 Performance Bond

Article 7/a of the Government Procurement Regulations stipulates that *"the contractor shall submit a performance bond in an amount of 5% of contract value."*

Article 7/b stipulates that *"the performance bond is not required in consulting works contracts, (design and supervision) ."*

3.3.6 Delay Penalty

Article 9/A stipulates that *"the contractor shall be subject to a delay penalty, the aggregate of which may not exceed 10% of construction contract or consulting works contract (design and supervision) value unless the delay is caused by a force majeure, an emergency incident or a reason beyond the government contractor's control."* The method of calculation of this penalty for consulting and contracting works was set forth in Article 35 and 37 of the Rules of Implementation.

3.3.7 Assignment of Contract - Subcontractors

Article 28 of the Rules of Implementation stipulates that *"the contractor may not assign the contract, in whole or in part, without the written consent of the Department that owns the project; nevertheless, the contractor shall remain jointly responsible with the assignees or subcontractor for contract performance"*.

Moreover, Royal Decree No.124 of 1403H (1983) mandated that *"the foreign contractor shall carry out an equivalent of at least 30% of the value of its contract through a Saudi contractor and shall provide all services, supplies and*

transportation through Saudi firms" taking into consideration that regulations allow the contractor free choice of its subcontractors and government departments do not impose particular subcontractors.

3.3.8 Bid Compliance with Contract Document Requirements

Article 1/G of the Regulations stipulates that *"bids may not be accepted or lead to contract award except as specified in distributed contract documents"*.

3.3.9 Contractor's Warranty of Installations

Article 30 of the Rules of Implementation stipulates that *"the Contractor shall warrant total or partial demolition of constructed works for a period of 10 years starting from the final handover date of the project, if such demolition results from a fault in performance."*

3.3.10 Contractor's Responsibility for the Accuracy of Project Documentation

Article 31 of the Rules of Implementation stipulates that *"the contractor shall be responsible for review of all the details of engineering and technical designs and shall notify the project owner of any technical faults it discovers in designs that are apt to affect the safety of installations."*

3.3.11 Legal Documentation to be Attached to the Bid

Government Procurement Regulations demonstrates that the bidder shall attach a number of legal documents to its bid. some of these are described in Ministry of Finance and National Economy Circular No.17/7942 dated 3.5.1398H (1978) as follows:-

- a) *Copy of the bidder's valid commercial registration.*
- b) *Copy of a valid zakat and income tax certificate* (Saudi contractors are

required to pay zakat according to islamic regulations, while non-Saudi contractors are required to pay an income tax) (45)

- c) *Copy of valid chamber of commerce membership certificate.*
- d) *Copy of valid classification certificate."*

The classification certificate is required to be submitted by construction contractors only. Consulting offices that perform design and supervision works are not required to submit such a certificate as there is no classification for their activities. We shall discuss the contractor's classification regulations in some detail in item (C-ii) of Article (3.4.3.2).

Royal Decree No.22884 dated 11.10.1401H (1981) mandated that *"companies and establishments which deal with the government shall include the following statements and information in their bids:*

- a) *A statement from a bank known and acceptable to the Saudi Arabian Monetary Agency describing the company's financial position, its financial reputation and commercial ability.*
- b) *Statement of work the company has performed abroad in a field similar to that of the project bid for. The contents of such statement shall be authenticated by the Chamber of Commerce and Industry in the company's home country".*
- c) *Performance certificate obtained by the company for works performed in the Kingdom and abroad.*
- d) *Copy of the company's balance sheet and statement of profit and loss for the past two years attested by a certified public accountant.*

3.3.12 Bid Opening Procedures

Article 2/e of the Government Procurement Regulations stipulates that *" bids, submitted in sealed envelopes, shall be opened under the supervision of a committee that meets at the time specified for bid opening. Bid prices shall be announced to the attending bidders or their representatives".*

3.3.13 Currency

Royal Decree No.4/2261 dated 11.7.1404H (1984) mandates that *"if the Contractor is a foreign company or a joint venture, and if the contract cost exceeds SR 300 Million, bids shall be submitted in United States Dollars only. If the contractor is a Saudi entity, it shall have the option of expressing its prices in the currency it chooses. However, contractors shall take into consideration that the contract value may not be paid in more than one currency."*

3.3.14 Method of Payment

As stated in item (3.3.3) "Advance Payment", the regulations provide for disbursement of an advance payment equal to 10% of contract value, not to exceed SR 100 Million. The balance of the contractor's entitlement shall be paid in instalments commensurate with progress of works and provided that a part of the value is withheld until completion and preliminary handover of project and the submission of a certificate from the zakat and income Tax Department stating that the contractor has paid levied taxes. Moreover, the "Ministry of Finance and National Economy" has issued a subsequent circular under no.3/1262 dated 20.2.1406H (1985) mandating that *"entitlements shall be disbursed in monthly instalments and that interim invoice amounts shall be paid in full without any deduction, and amounts withheld to contract completion may not exceed 10% of contract value."*

3.3.15 Cancellation of Tender

Article 5/e of the Government Procurement Regulations state the circumstances under which a tender can be cancelled *"A tender may be cancelled and bids may be discarded in the event where need for the works diminishes, or if the committee decides that all bid prices are not suitable, or*

that contract requirements are not complied with and negotiations do not yield results."

3.3.16 Types of Contracts

3.3.16.1 Design and Supervision Contracts

Article 3/i of the Regulations stipulates that *"design contracts shall be at lump-sum amounts while supervision of construction contracts may be at lump-sum fees, periodic fees or at a percentage of the value works."*

3.3.16.2 Construction Contracts

Government Procurement Regulations do not specify types of contract to be adopted by government departments. However, Royal Decree No.136 dated 13.6.1408H (1988) ratified the contract format prepared by the Ministry of Finance and National Economy to be used for government construction projects. This contract stipulates that construction contracts shall be remeasurement contracts. We shall discuss this contract in item (b-iii) and (b-vi) of Article (3.4.3.2) of this Chapter.

3.3.17 Division of the Project

Article 2 of the Rules of Implementation stipulate that *"contract may include a provision to allow the government department to divide the project if such division is deemed in the best interest of the government department."*

3.3.18 Site Visit

Article 8 of the Rules of Implementation stipulates that *"the bidder shall investigate first hand prior to bid submission the nature of works and prevailing local conditions and shall obtain adequate information on all aspects that are apt to affect the categories of its bid and risks arising from its obligations. The government department shall provide all available information as required from bidders prior to bid submission."*

3.3.19 Comprehensive Prices

Article 7/F of the rules of implementation of government procurement regulations which stipulates that *"categories listed in the price list are inclusive of all expenditures and obligations incurred by the contractor or subcontractors."*

3.3.20 Validity of the Bid

Article 10 of the Rules of Implementation stipulates that *"the bid shall remain valid and irrevocable until the date specified for rendering a decision as to the successful bid. The government department concerned may request the bidder to extend the validity of its bid. The bidder shall be deemed to have accepted continued commitment to its bid if it does not request at expiry of its bid bond, withdrawal of the bid and release of the bid bond. In the event the bidder withdraws its bid before the government department selects the successful bid, the government department shall be entitled to confiscate the bid bond without prior notice or legal proceedings"* .

3.3.21 Withdrawal of Work from Contractors

Article 29 of the Rules of Implementation stipulates that *"the government department and the contractor shall execute the contract in accordance with contract provisions. In the event the contractor fails to fulfil its contractual obligations, the government department may notify the contractor in writing to remedy the situation within 15 days. If the contractor fails to take corrective measures within the 15 day notice period, the government department may perform contract works at the contractor's expense or terminate the contract. In both cases, the government department may demand compensation from the contractor. In the event the government department fails to fulfil its contractual obligations, the contractor may demand compensation following official written notice to take corrective measures within 15 days. The contractor may not stop performance of contract works because of the government department's failure to fulfil its obligations."*

Article 32 of the Rules of Implementation stipulates that *"the government*

department may, in the event of withdrawal of works from contractor, perform works at the contractor's expense in any way it deems appropriate.

Moreover, Article 33 of the Rules of Implementation stipulates that *"the government department may prevent the contractor from retrieving its tools and equipment from the project site and may use such tools and equipment to complete works following issue of minutes describing the condition of installations at the time of withdrawal and the site contents of tools and materials. The government department shall however notify the contractor of the time of preparation of the intended minutes in order to allow the contractor ample opportunity to express his views in that respect. If the contractor fails to attend the preparation of such minutes, the minutes shall be considered evidence against the contractor."*

3.4 The Various Phases of Projects

Through a detailed study of executed government projects, and through numerous personal interviews with personnel concerned at the various government departments, we may classify the phases of public sector projects in Saudi Arabia as follows:

3.4.1 Preliminary Studies Phase

The size and scope of preliminary studies of a project and the emphasis on such studies vary from one government department to the next. However, conceptual study procedures in most government departments may be categorized as follows:

- * Determination of requirements/scope of work
- * Determination of project procurement system.
- * Selection and provision of site.
- * Cost Estimation.

3.4.1.1 Determination of Requirements/Scope of Work

This includes:

- * Overview of the project.
- * Explanation of the relative importance of the project.
- * Description of purpose and objectives of the project.
- * Determination of project components.
- * Determination of basic requirements.

3.4.1.2 Determination of Project procurement system

In this phase an initial decision is made on the procurement system of the project to be used due to its impacts on initial cost estimates.

In chapter 4 of this research, we shall explain the procurement systems adopted in the public sector as one of the questionnaire results.

3.4.1.3 Selection and Provision of the Site

A suitable site for the project is selected by one of the following methods, in order of preference.

- * Study of government department's property in the selected region to find land that meets project requirements.
- * Study of other government departments' property, such as Ministry of Municipal and Rural Affairs or Ministry of Finance property. If suitable land is found, the government department concerned may be contacted to approve use of the selected plot.
- * Study of private sector property, determine cost of selected private land and include that cost in initial project cost estimates that are sent to the Ministry of Finance and National Economy for approval.

3.4.1.4 Cost Estimation

The Government's budget is issued annually and consists of four parts. The fourth part is allocated to construction projects while the first , the second and the third are allocated to salaries, operational expenses and projects maintenance respectively. In accordance with the budgetary decrees, all government departments shall, prior to announcement of government project tenders, ascertain the availability of adequate funds. Government departments prepare initial estimates of project costs and relay them to the Ministry of Finance for approval.

Upon approval by the Ministry of Finance, the required amounts are allocated, based either on initial cost estimates or on cost estimates made by the design engineers after preparation of all design documents. Thereafter the project tender is announced.

- If the least bid price is within allocated funds, the contract is awarded accordingly. However, if least bid price exceeds allocated funds, one of the following procedures is followed:
 - Negotiate with the three lowest bidders to decrease their prices. If bid prices are decreased to within the range of allocated funds, the contract is awarded to the least bidder.
 - Re-announce the tender after making amendments to design in order to bring costs down to within the range of allocated funds.
 - Make an exception, and in this case, a royal ratification must be obtained.

3.4.2 Design Phase

3.4.2.1 General

Generally, in medium and large sized projects, government departments contract a specialized consulting office to carry out required project design works. It is worth mentioning here that there are a number of differences between the existing method that is followed in licensing engineers in Saudi Arabia and methods followed by European countries, the United States, Canada, and Japan⁽⁴⁶⁾. Foremost among those differences are :

- Licensing in Saudi Arabia, unlike existing systems abroad, must be issued by first opening an office or a certain entity . Therefore, a license may not be issued to an engineer to practice his profession without his having an engineering or consulting office, or without his being a partner in an engineering or consulting office.
- The process of evaluating the abilities of the candidate and his eligibility for licensing in the Kingdom does not exceed examination of documentation and verification of their legality. In other words, the candidate does not have to sit for any kind of examination or test .
- Up to now, there is no real system for follow-up contrary to what is adopted by the aforementioned countries. Moreover, Licensing is permanent and remains in effect as long as it is not withdrawn upon the request of the licensee, or due to the licensee's violation of Saudi Arabia regulations.

The design phase in general include the following:

- Preparation of design tender documents.
- Tender procedures
- Contract award
- Project design and preparation of construction documents

3.4.2.2 Preparation of Design Tender Documents

a) Types of Contracts

There are no uniform government draft contracts for the design phase. Such contracts are prepared as deemed appropriate by the government department concerned. Design contracts are made at a lump-sum fee and usually include the following documents:

- Instructions to bidders
- General conditions
- Special Conditions
- Scope of Work
- Form of Agreement

b) Instructions to Bidders

This document usually contains instructions to bidders in respect of the method to be followed in bid submission.

This process is governed by specific controls and requirements to be complied with by all bidders while preparing their bids. Most important of which are:

i) Bid Submission Letter Form

A uniform draft form prepared in advance by the government department for use by all bidders stating their full compliance with contract requirements as stated in contract documents.

The bidder fills in the blank spaces designated for contract performance cost and affixes its signature and official stamp thereon.

ii) Bid Submission and Bid Opening Dates

This document provides the bid submission deadline and bid

opening time and date. Bids received after the deadline will not be accepted.

iii) Legal Documents Required

These usually include requirements as stipulated in the Government Procurement Regulations and their Rules of Implementation which we have addressed in item (3.3.11) of this Chapter .

They also include other requirements as follows:

- Management and technical organization structure of the consultant's head office as well as a list of its senior engineers and detailed resumes containing names, qualifications and experience of the staff nominated to perform design works.
- List of names and addresses of other consulting offices the consultant intends to subcontract to, with a description of the part(s) of work to be assigned to them,
- A flow chart showing the dates and sequence of work progress throughout the entire contract term.

iv) Validity of the Bid

Whereas Government Procurement Regulations and their Rules of Implementation stipulate that the validity of the proposal shall be determined by the government department concerned without specifying a certain time period in particular, this document shall include a separate article to determine the validity of the proposal which is usually set at 120 days from bid opening.

v) Bid Bond

In accordance with Article 2/D of the Government Procurement Regulations, as stated in item (3.3.4) of this Chapter, this document shall include an article that requires a bank guarantee, usually of an amount equal to 1% of contract value, valid for the entire bid validity period.

vi) Currency

This document contains a provision for the currency of the contract. Since total cost of design works is usually less than SR 300 Million, Saudi Riyals are considered the currency of the contract.

c) General Conditions

This document contains a number of general conditions which govern the relation of the government department and the designer. Most of these conditions are extracted from Government Procurement Regulations and their Rules of Implementation with some additions, mainly:

i) Designer's Authority and Obligations

This item specifies the designer's authority and obligations as deemed appropriate by the government department commensurate with works the designer is required to carry out.

ii) Government Department's Obligations

This item contains a general description of the obligations of the government department such as providing the designer, free of charge, with statements and information that are in its possession and that will assist the designer in fulfilling its

contractual obligations provided that the provision of such statements and information does not undermine public interests. The obligations of the government department also include supporting the consultant's application for visas, certificates and licenses.

iii) Contract Variations

This item contains a stipulation similar to that of Article 25 of the Rules of Implementation of Government Procurement Regulations as described in item (3.3.2) of this Chapter.

iv) Disputes

Contracts normally contain a stipulation stating procedures to be followed in the event of a dispute. For example, one of the contracts that was prepared at a government department stipulates :

- *"In the event of a dispute between the Ministry and the Contractor pertaining to execution or interpretation of contract provisions, or performance of contract works, and such dispute cannot be amicably settled, the contractor, following receipt of the Ministry's final decision on the disputed matter, may complain to the Board of Grievances. The contractor's failure to complain to the Board of Grievances within 30 days after its notification of the Ministry's decision will be interpreted as acceptance of his part of that decision. The resolution of the Board of Grievances shall be binding to both parties.*
- *The contractor may not halt any part of assigned works or services as a result of the dispute including those parts that are affected by such dispute. The contractor shall continue to perform all works in accordance with the Ministry's directives until settlement of the dispute or until issue of a final resolution by the Board of Grievances."*

d) **Special Conditions**

This document contains a number of special conditions which are deemed necessary by the government department concerned to deal with certain contract requirements. An example is provided from the stipulations of a government contract:

i) **Design Compliance with Government Department Requirements**

A government contract stipulated under this title: *"The designer shall be responsible for ensuring that all study and design works are in compliance with the latest requirements and controls issued by authorities concerned such as municipality requirements, Civil Defence requirements, etc. the Ministry may not be held liable for any additional expenditures incurred as a result of any amendments in the study and design or any delay resulting from such causes."*

ii) **Method of Payment**

Usually payment is not disbursed periodically, but based on a ratio of performed works, where the designer submits an invoice supported by detailed report showing the ratio of designed works completed during the period covered by the invoice. The invoice shall be supported by all documents which prove the designer's claim.

e) **Scope of Work**

This document contains a description of the scope of work to be carried out by the designer and includes the objectives of the design, its technical requirements as well as the various project requirements based upon which the designer shall prepare the various construction documents including detailed drawings, specifications, bills of quantities and project construction cost estimates.

f) **Form of Agreement**

This document usually contains a specific number of important items including:

- * Works to be carried out by the designer.
- * Site location
- * Term of contract
- * Contract documents.
- * Contract value.

The signature and stamps of both parties are affixed on this contract.

3.4.2.3 Tender Procedures

a) **Method of Tender**

Following completion of design tender documentation, a number of specialized engineering offices are invited through a selected tender procedure where those offices are contacted directly without need for an advertisement in newspapers.

b) **Qualification of Engineering Offices**

There is no classification of engineering offices in the Kingdom and such offices are normally invited by either of the following two methods:

- * Most government departments select such offices based on their own experiences or previous dealings with those offices (if any).
- * A very limited number of government departments qualify such offices by using special standards such as US Government Form numbers. 254 and 255⁽⁴⁷⁾.

c) **Delivery of Tender Documents**

Following classification of contractors and selection of approved offices, an invitation is set out requesting those offices to take delivery of

complete contract documents which include a specified date for bid submission.

d) **Bid Opening**

Bids are opened by a committee that is formed for that purpose. Bids are opened on the date specified in bid documents in the presence of all bidders and bid prices are read aloud. Moreover, attachments and legal documents submitted with the bid as required in the documents are enumerated and a minutes of the bid opening session are prepared.

e) **Technical Analysis**

Another committee is formed to carry out the technical analysis. This committee carries out an in depth study of bids to ensure completion of all required legal documents and to ascertain the validity of bid prices. Bids are evaluated from a technical viewpoint through the study of the qualifications and experience of the designer's nominated staff. Thereafter, a report is prepared containing the committee's findings vis-a-vis each of the bids starting with the *lowest* bid and progressing to the highest. If the least bidder is, as deemed by the committee, technically qualified, the committee recommends in its report awarding it the contract. Otherwise, the committee includes its findings in its report.

f) **Successful Bid Selection**

This is usually carried out by a permanent committee that is formed in each government department. This committee receives the bid opening session minutes as well as the technical analysis committee report and, based on the contents of these two reports and the findings of the members of this committee, the contract is awarded. The contents of

the report of the technical analysis committee shall in no way restrict the decision of the bid selection committee.

3.4.2.4 Contract Award

The successful office is notified of project award by an official letter from the government department stating its approval of contract award. Thereafter, a contract is signed by and between both parties and the site is handed over to the engineering office in order to commence design works.

3.4.2.5 Project Design

The project normally undergoes several phases. Following is an example of "design requirements" as required by one of the government departments:

- Overall study of the site
- Scheduling and initial studies.
- Preliminary Design Phase.
- Pre-Final Design Phase.
- Final Design Phase.

a) Overall Study of the Site

The most important requirement here is the designer's performance of the following works:

- Soil tests.
- Study of site services and sources of such services.
- Topographic survey and contour plans.
- Overall site works (external works).

b) Schedule Preparation and Initial Studies

The most important components of this phase are:

- Design concepts report.
- Master Site Plan (Preliminary).
- Preliminary Drawings.
- Cost Estimates (Preliminary).

c) Preliminary Design Phase

The most important components of this phase are:

- Development of the Master plan.
- Development of preliminary drawings and preliminary design calculations.
- Preparation of preliminary technical specifications.
- Estimates and refinement of construction costs.

d) Pre-Final Design

The most important components of this phase are:

- Preparation of pre-final drawings and design calculations.
- Site works and pre-final foundations drawings.
- Pre-final technical specifications.
- Preparation of bills of quantities.
- Pre-final cost estimates.

e) Final Design Phase

The most important components of this phase are:

- Submission of final construction drawings and design calculations.
- Submission of final technical specifications.

- Detailed bills of quantities.
- Final construction cost estimates.
- Submission of all study and design documents including catalogues, project prototypes, ... etc.

3.4.3 Construction Phase

This phase consist of two main stages as follows:

- Supervision of Construction Work.
- Execution of the Work.

3.4.3.1 Supervision of Construction Work Stage

a) General

The government department, in medium and large sized projects, usually contracts a specialized engineering office to supervise construction. Supervision of construction phase usually involves:

- Preparation of tender documents.
- Tender procedures,
- Award.
- Supervision of construction work.

b) Preparation of Tender Documents

i) Types of Contracts

As is the case in design works, there are no uniform government contracts for supervision of construction works. Such contracts are prepared as deemed appropriate by the government department concerned taking into consideration stipulations contained in Government Procurement Regulations and their Rules

of Implementation. These contracts usually include the following documents:

- Instructions to bidders.
- General conditions.
- Special conditions.
- Scope of work
- Form of Agreement.

ii) Instructions to Bidders

These are similar to instructions previously described under design contracts.

iii) General Conditions

These are similar to the general conditions previously described under design contracts.

iv) Special Conditions

This documents usually contains the special conditions the government department opts to clarify to the supervising consultant. For example:

Qualifications of the Supervisory Staff

This paragraph describes in detail the required supervisory staff to be provided by the consultant in a statement usually consisting of four columns, the first column containing the category number, the second column containing the job title, the third column containing minimum required qualifications, and the fourth column containing minimum required experience of the supervisory staff.

Contract Extension

This paragraph describes the procedures to be followed to

extend the contract term. For example, one of the supervision contracts that was prepared at a government department stipulates *"in the event project works are not completed on the scheduled times, or in the event the construction contract term is extended, the consultant shall continue to provide consulting services until completion of project works and until preliminary and final handover of the project at the same conditions and prices of the original contract. The government department may specify the number of supervisory staff required during that stage commensurate with work needs."*

Method of Payment

Payment is usually made to the supervising consultant in monthly instalments based on the actual attendance of the supervisory staff on site and based on man/month rates as agreed upon in the contract.

v) Scope of Work

This document sets forth the scope of work of the supervising consultant. The following is a summary of some of the most important requirements that are specified in one of the government contracts.

- Review of construction calculations, concrete works drawings and specifications to ensure that they are free of technical faults that may endanger works.
- Review of architectural and structural dimensions and coordination between drawings and other documents to ensure compatibility.
- Review of contract mechanical and electrical drawings to ensure compatibility as well as the review of related design calculations to ensure adequacy and compliance

with contract specifications and approved design standards.

- Examine foundation test excavations and ensure the accuracy of designs in accordance with especially *the* prepared drawings. The consultant shall also review soil analysis studies.
- The consultant shall examine all field works carried out by the contractor and ensure accuracy and compliance of completed works with drawings and specifications.
- The consultant shall review and audit invoices submitted by the contractor against completed works and materials available on site and shall also ensure the accuracy of measurements and quantities.
- The consultant shall prepare technical and financial studies of amendments and changes to the project as needed or as required by the government department.

vi) **Form of Agreement**

This document is similar in its contents to the contract document described under design contracts.

c) **Tender Procedures**

These procedures are similar to the procedures of the design tender.

d) **Contract Award**

These procedures are similar to the procedures of design tender award.

e) **Supervision of Construction Work**

The supervising consultant commences its work immediately following signature of contract and takes necessary action towards recruitment

of the required staff. The consultant also takes necessary action towards securing housing, office space, etc for its supervisory staff.

3.4.3.2 Work Execution Stage

a) General

The government department enters into contract with a specialized contractor to perform intended project works. This is done through several procedures as follows:

- Preparation of tender documents.
- Tender procedures.
- Contract award
- Execution of the Project.

b) Preparation of Tender Documents

i) Types of Contracts

Whereas Government Procurement Regulations and their Rules of Implementation previously did not specify a certain type of contract to be adopted by government departments, a number of contract formats that were used. However, it is possible to say that most contract formats used during this period are limited to three types of contracts as follows:

- Lump-sum contract
- Re-measurement contract
- Re-measurement contract with a ceiling price.

Royal Decree No.136 dated 13.6.1408H,(1988), ratifies the contract format prepared by the Ministry of Finance and Royal Decree No. 11330 dated 29.7.1408H (1988), instruct its use for government construction projects. This contract states that it is a

re-measurement contract and contains two of the contract documents only, which are the general conditions and the form of agreement. We shall address these two documents in items (b-iii) and (b-vi) of this article. Construction contracts usually consist of the following documents:

- Instruction to bidders
- General conditions
- Special conditions
- Scope of work
- Form of agreement.
- Drawings
- Specifications
- Bills of quantities

ii) **Instructions to Bidders**

These instructions in their entirety are similar to those explained in article (3.3.11) and item (b-iii) of Article (3.4.2.2.) of this Chapter pertaining to instructions to bidders for design contracts. However, a requirement that is not a prerequisite except in construction contracts is that the contractor is required to submit a copy of its classification certificate provided that such certificate is valid at the time of bid submission. We shall address this requirement in some detail in item (c-ii) of Article (3.4.3.2).

iii) **General Conditions**

General conditions in the uniform contract consist of 60 items and mostly consist of stipulations previously explained when we addressed Government Procurement Regulations and their Rules of

Implementation in Article (3.3) of this Chapter. Following is a summary of the major items which were not addressed in the Government Procurement Regulations or which have been modified.

Subcontracting

Article (4) of the General Conditions stipulates *"The Contractor shall not subcontract all contract works constituting the object of the contract and shall not unless otherwise stipulated in the contract - subcontract any part of the works without the prior written consent of the owner. However, such consent does not relieve the contractor from the responsibilities and obligations resulting from the contract and he shall remain responsible for any act or mistake or neglect on the part of any subcontractor or his agents or employees or workers as if such act or mistake or neglect were committed by the contractor himself or his agents or employees or workers."*

Article 12.2.d also stipulates that *"the foreign contractor shall assign not less than 30% of the works constituting the object of the contract to a Saudi contractor and the competent authority shall - in agreement with the Ministry of Finance and National Economy - relieve the foreign contractor wholly or partly from the obligation of assigning the above percentage of the works to a Saudi contractor if no works may be implemented by such contractor or if the percentage is less than 30%. This exception shall apply only if the competent authority's technical staff determines, upon preparing for the project and before inviting tenders, the percentage of total or partial relief from such obligations with the participation of the consultant that designed the project and formulated its specifications"*

Contract Variations

Article 43 of the General Conditions contains the stipulation stated in Article (25) of Government Procurement Regulations and their Rules of Implementation as explained in item (3.3.2) of this Chapter. However, it was added that it is necessary to obtain the written

approval of the government department before execution of the variation order.

Evaluation of Changes

Article 44 of the General Conditions contains a stipulation that describes the method of evaluation of changes. This Article stipulates that *"the engineer shall determine the value if any to be added or deducted from the bid price due to additional or omitted works. The work shall be carried out in accordance with contract provisions if the consultant deems them practicable. If the contract does not contain any rates that apply to the additional work, the owner and contractor shall reach a mutual agreement on fair prices."* The same article also contains a stipulation as to the method that can be followed by the contractor to claim such variables it stipulates that *"the contractor shall send the engineer once a month an account showing in a comprehensive and detailed manner the information relative to all his claims for additional expenses as well as all additional works authorized by the engineer and carried out by the contractor in the previous month. Any claim for payment of the value of such works shall not be considered if it is not contained in the aforementioned special information or monthly account."*

Quantities

Article 46 of the general conditions stipulates that *"bills of quantities are an estimation and payment is made based on actual quantities performed."*

Measurement Methodology

Article 48 of the general conditions regulates work measurement methodology. This Article stipulates :

- *"works are measured on a net basis unless otherwise expressly stipulated in the contract.*
- *Except as specifically stipulated, the metric system shall be used in all measurements and purposes relative to this contract."*

Preliminary and Final Hand-over

Articles 51 and 52 contain procedures that are followed for preliminary and final handover of the project.

Disputes

Article 57 of the general conditions stipulates that "any disputes arising from the implementation of this contract and remaining unsettled between the two parties shall be referred to the Grievance board for final settlement".

Remissness on the Part of the Owner

Article 59 of the general conditions contains action taken in the event of remissness on the part of the owner. This Article stipulates that *"the owner shall respect the terms of the contract in good intention and shall pay to the contractor the due installments without delay. In the event the owner violates any of the conditions of the contract or neglects payment on due time, the contractor may request compensation for any losses resulting from such neglect or violation. However, the contractor may not suspend the work on the basis of delayed payment on the part of the owner as a result of any error committed by the contractor and the contractor shall be deemed as relinquishing any right for compensation that he does not claim within thirty days from the occurrence of the incident on the basis of which the compensation is claimed. "*

iv) Special Conditions

The uniform contract does not contain any special conditions.

Government departments may determine such conditions at their discretion.

v) Scope of Work

This documents specifies the scope of required works the contractor shall perform commensurate with project type and nature.

vi) Form of Agreement

The uniform contract contains this contract document which consists of 8 articles. The article which is not mentioned in the Government Procurement Regulations, Article 4, stipulates that *"The Contractor shall fully guarantee the works that constitute the object of the contract for a period that starts from the date of preliminary handover and ends on the date of final handover, taking into consideration the details mentioned in Article No.(41) of the general conditions which stipulates that the period of maintenance refers to the period specified in the contract that starts from the date of preliminary handover until the date of final handover. In the case preliminary handover is carried out in stages, the period of maintenance shall be calculated for each stage as of the date of its preliminary hand-over. "*

c) Tender Procedures

i) Tendering Type

Due to Article (3) of Government Procurement Regulations which entitles government departments to send limited invitations when they wish to announce a project for tender, invitations were previously carried out in such manner while some announcement were made by open tender, and a limited number of projects was being awarded through direct negotiations. However, Royal Decree

9751 dated 26.4.1403H, (1983), mandated that "*government departments shall made tenders open to the public by announcement in official newspapers*". The number of projects awarded through open tenders gradually increased and this form of announcement has now become the only approved method in all government departments. However, it is important to clarify that this is done subject to Royal Decree No.1709/M dated 19.7.1405H, (1985), which mandates in its third paragraph that "*the government departments may not accept any proposals except from bidders whose qualifications are in compliance with the classification made by government departments concerned.*" We shall address this issue in detail in the next item.

ii) Classification of Contractors

"The Contractors Classification Agency" is the governmental department which classifies contractors. The validity of the classification is two years and shall be renewed prior to expiry.

The Contractors are classified under two main categories: Saudi Contractors and non-Saudi Contractors and based on their types of activity.

* Saudi Contractors

Saudi construction contractors are classified into five categories and twelve different "scopes of work". A maximum limit in millions of Saudi Riyals was established for the value of a single project that can be awarded to a Saudi contractor in each of the categories and scope of work. The latest regulation issued on this subject was the Contractors Classification Agency's/Ministry of Public Works

and Housing no.255/Kh dated 21.4.1412H (1992) Table 3-1.

*** Non-Saudi Contractors**

Non-Saudi construction contractors are classified into four categories and twelve different scope of work. A maximum limit in millions of Saudi Riyals was established for the value of a single project that can be awarded to a non-Saudi contractor in each of the categories and scope of work. The latest regulation issued on this subject was the Contractors Classification Agency's/Ministry of Public Works and Housing no.255/Kh dated 21.4.1412H (1992) Table 3-2.

**Table 3-1 : Saudi Contractor's Classification
Categories and scope of Work**

Scope of Work	Classification Categories				
	1 st	2 nd	3 rd	4 th	5 th
Buildings	> 200	200	50	15	5
Roads	> 300	300	100	30	10
Hydraulic and Sewer Works	> 300	300	100	30	10
Electrical Works	>200	200	50	15	5
Mechanical Works	>200	200	50	15	5
Electronic Works	>200	200	50	15	5
Industrial Works	>300	300	100	30	10
Marine Works	>300	300	100	30	10
Dams	>100	100	50	15	5
Well Drilling	>10	10	2	0.3	0.1
Landscaping	>100	100	30	15	5
Abattoirs	>100	100	30	15	5

**Table 3-2 : Non-Saudi Contractor's Classification
Categories and scope of Work**

Scope of Work	Classification Categories			
	A	B	C	D
Buildings	> 600	250	250	75
Roads	>500	500	200	50
Hydraulic and Sewer Works	>500	500	200	50
Electrical Works	> 600	250	250	75
Mechanical Works	>500	500	200	50
Electronic Works	>500	500	200	50
Industrial Works	> 600	250	250	75
Marine Works	>500	500	200	50
Dams	>500	500	200	50
Well Drilling	---	---	---	---
Landscaping	>500	500	200	50
Abattoirs	>500	500	200	50

*** Classification Factors and Standards (48)**

FACTORS AND STANDARDS

CAUSES OF EVALUATION

A. TECHNICAL ASPECT	The technical aspect is evaluated to assess the contractors overall capabilities and organization in the required contracting classification field.
B. PERSONNEL	Evaluation of numbers of personnel, their practical experience and educational qualifications, to include:
- Executives	Who set policies, objectives as well as current and future relations with owners.
- Engineers	Employment of engineers is an indicator that the contractor's performance is in compliance with approved technical standards.
- Technicians	A complementary support staff that reflects the contractor's efficiency and ability.
- Equipment	A general indicator of the contractor's ability to carry out projects.
C. Projects	The most important indicator of the contractor experience, capability and size. It includes:

- Project Value Shows the extent of the contractor's involvement in the applied field.
- Monthly Load Shows the maximum extent of the contractor's ability to carry out workloads in single project.
- Highest Average Yearly Load Indicates the contractor's ability to handle a maximum continuous workload over an extended time period
- High Value Projects Shows the extent of large project commitments.
- Continuity is considered an indicator of the contractor's uninterrupted commitment to contracting works.
- Site Inspection Evaluates the performance of contractors on site and allows a real assignment of the contractor's ability and efficiency.
- Client Survey Validates data on projects submitted by the contractor and shows the owner's opinion in the quality of works performed and the contractor's compliance with contract stipulations, organization, efficiency, cooperation and progress of works.

D. Financial Side	Evaluates the contractor's solvency, profitability, cash flow, funding sources, and financial control of the contractor. This includes:
D.1. Balance Sheet	Evaluates the financial position at the end of fiscal year, it includes:
- Total Assets	Shows assets strength and efficiency of contractor's operations.
- Owners Equity	Shows the paid up capital and accrued retained earnings.
- Working Capital	Shows the ability of settling short term loans at maturity.
D.2. Profit and Loss Statement	Evaluates the overall results for the year, it includes:
- Total Revenues	Ability to obtain significant revenues necessary for continuity.
- Contracts Revenue	Shows the contractor's speciality and the volume of revenues in the bid for field.
- Gross Profit	Shows the ability and efficiency of the executive management in realizing profits.

- Net Income Shows the increase in the net worth of the organization as a result of its operation during the fiscal year.

- Net Cash Income Shows the net cash flow resulting from all operations during the year.

D.3. Financial Ratio Indicators do not related to absolute amounts, these include:

- Acid Quick Test Ratio Shows ability to reply short term loans.

- Indebtedness Shows extent of relying on debtors outside the organization.

- Leverage Shows ability to use assets to produce income.

- Inspection of Head Office Evaluation of accounting systems and procedures management accounts, budgets, cash controls, authorities and delegations of responsibility, internal control, accounting staff and verification of information.

iii) **Other Tender Procedures**

Similar to other tender procedures already explained under design tenders, as follows:

- Delivery of tender documents
- Bid opening
- Technical analysis
- Selection of successful bid

d) **Contract Award**

Similar to the procedures already explained under design tenders.

e) **Project Execution**

The contractor shall commence performance of works immediately upon contract signature. The contract award letter specifies the site takeover date which is the actual date of commencement of project works and the date the contractor starts its phase-in and mobilization activities.

3-5 **Summary**

This Chapter focused on studying the construction sector in the Kingdom of Saudi Arabia. The most important points which this Chapter touched upon can be summarized as follows :

- All contracts in the Public Sector in Saudi Arabia (design, supervision and execution) are governed by the Government Procurement Regulations and their Rules of Implementation. All contracts must contain a clear clause to this effect. The regulations and their Rules of Implementation have been discussed in some detail.
- Projects in the public sector of the Kingdom undergo three phases :
 - Preliminary Studies phase.

- Design phases.
- Execution phase.
- The Preliminary Studies Phase usually comprises the following :-
 - Determination of requirements/scope of work.
 - Determination of project procurement system.
 - Selection and provision of site.
 - Cost Estimation.
- There are many resemblances between the design and execution phases procedures, each includes :
 - Preparation of tender documents.
 - Tender procedures.
 - Contract award.
 - Undertaking the design, supervision or execution based on the individual phase's nature. The design phase in addition includes preparation of execution documents.
- There are no uniform contracts for design or supervision works. Each government department drafts a contract as it sees fit. However, there is a uniform contract for the execution of works, which is applied to all public sector projects during the execution stage.
- Design and supervision contracts are lump sum contracts. The uniform contract for execution is a re-measurement contract.
- The tendering type for design and supervision phases is a selected tender , whereas for the execution phase it is an open tender.
- There is no classification of consultant offices in the Kingdom, while execution contractors are classified for the purposes of tendering.
- For classification purposes, contractors were divided into two categories:
 - Saudi contractors.

- Non-Saudi contractors
 - Saudi contractors are classified into five categories and twelve different 'scopes of work'.
 - Non-Saudi contractors are classified into four categories and twelve different 'scopes of work'.
- A maximum limit in millions of Saudi Riyals was established for the value of a single project that can be awarded to a Saudi contractor or non-Saudi contractor in each of the categories and scopes of work .

CHAPTER 4

Survey of Public Sector Construction Projects

4.1 General

We have introduced in chapter 3 of this research the building procurement systems, tender and contract types that are used in public sector projects in Saudi Arabia . In this Chapter we shall introduce the following:

- a) The applicability of these procurement systems , tender and contract types in public sector projects in Saudi Arabia
- b) The extent to which specified costs of project execution are adhered to.
- c) The extent to which the specified period of project execution is adhered to.
- d) The causes of delay (if present).

The survey was carried out using a questionnaire incorporating two restriction on the information provided, namely that information must cover:

- a) Projects completed during the period from 1982 to 1992.
- b) Building projects or projects that consist of at least 50% building works.

The following was taken into consideration in designing this questionnaire:

- * Applicability to public sector projects in the Kingdom.

- * That it was as simple as possible to complete.
- * That it covered all of the various project phases.

4.2 Contents of the Questionnaire

This questionnaire was divided into 13 sections as follows, full details can be found in Appendix A :

- * Question 1
seeks general information on the project including:
 - Project name
 - Total project value
 - Project starting date
 - Project completion date

- * Questions 2,3,4,5,7,8, 11:
Seek information on procurement systems applied in project execution including: determination of project parties and determination of the contractual and management relations between those parties, as well as their roles .

- * Questions 6, 9:
Seek information on types of contracts used in project execution and the contents of such contracts.

- * Question 10:
Seeks information on types of tenders used in project execution for the various phases.

* Question 12:

Seeks information on project costs to find whether the project was executed within the specified cost, and if not, whether costs were higher or lower than specified .

* Question 13:

Seeks information on whether the project was completed within the specified period or whether there was delay in execution. Information was also sought on the causes of such delay if they happened.

In order to ensure the comprehension of persons in the various public departments who filled in the questionnaire, and in order to ensure the accuracy of information the following procedure was used .

- a) Upon preparation of the initial draft questionnaire, a number of project managers from various government departments were selected to fill in the questionnaire and to discuss their contents. This was done in order ensure that the questionnaire was comprehensive and covered all the required information, as well as to facilitate its preparation and clarity. Their comments were taken into consideration before the final version of the questionnaire was prepared .
- b) The questionnaire was hand delivered to each of the persons selected to fill in the questionnaire.
- c) The questionnaire was discussed with those persons item by item.
- d) Follow up on the telephone and by personal visits to ensure required care was given.
- e) Filled in questionnaire was collected by hand.

4.3 Results

The results of the survey are summarised below.

4.3.1 General Project Information

A total of 80 questionnaires were sent out to eight different government department at a rate of 10 questionnaires per department such that each questionnaire covered a separate project. Replies were received covering 70 Projects with a total cost of approximately 21,375,000,000 SR (3,816,964,285 Pounds Sterling).

The projects were classified by cost into four different categories:

Category (1) :projects with a construction cost of less than SR (100) million .

Category (2) : projects with a construction cost of SR 100 million to SR 300 million .

Category (3) : projects with a construction cost of SR 300 million to SR 500 million .

Category (4) : projects with a construction cost of over SR 500 million .

Figure 4-1 depicts the different percentage of each category by number of projects .

Projects were classified into six different groups (Housing - Educational - Military - Governmental offices - Health and others) . Table 4-1 shows the different percentage of each project type by the total number of projects .

4.3.2 Building Procurement Systems

Survey results show that two main procurement systems were used during the period, as follows:

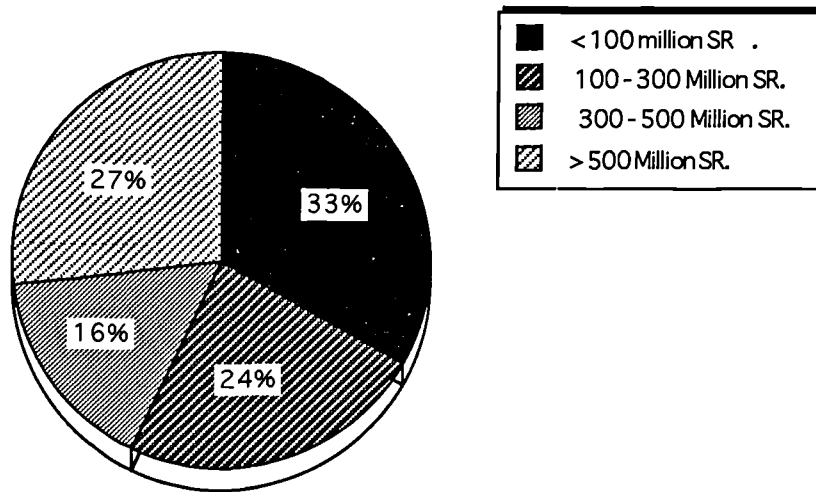


Figure 4.1 : Cost range by percentage of projects

ITEM	PROJECT TYPE	%
A	HOUSING	21%
B	EDUCATIONAL	17%
C	MILITARY	34%
D	GOVERNMENT OFFICES	9%
E	HEALTH	14%
F	OTHERS	5%

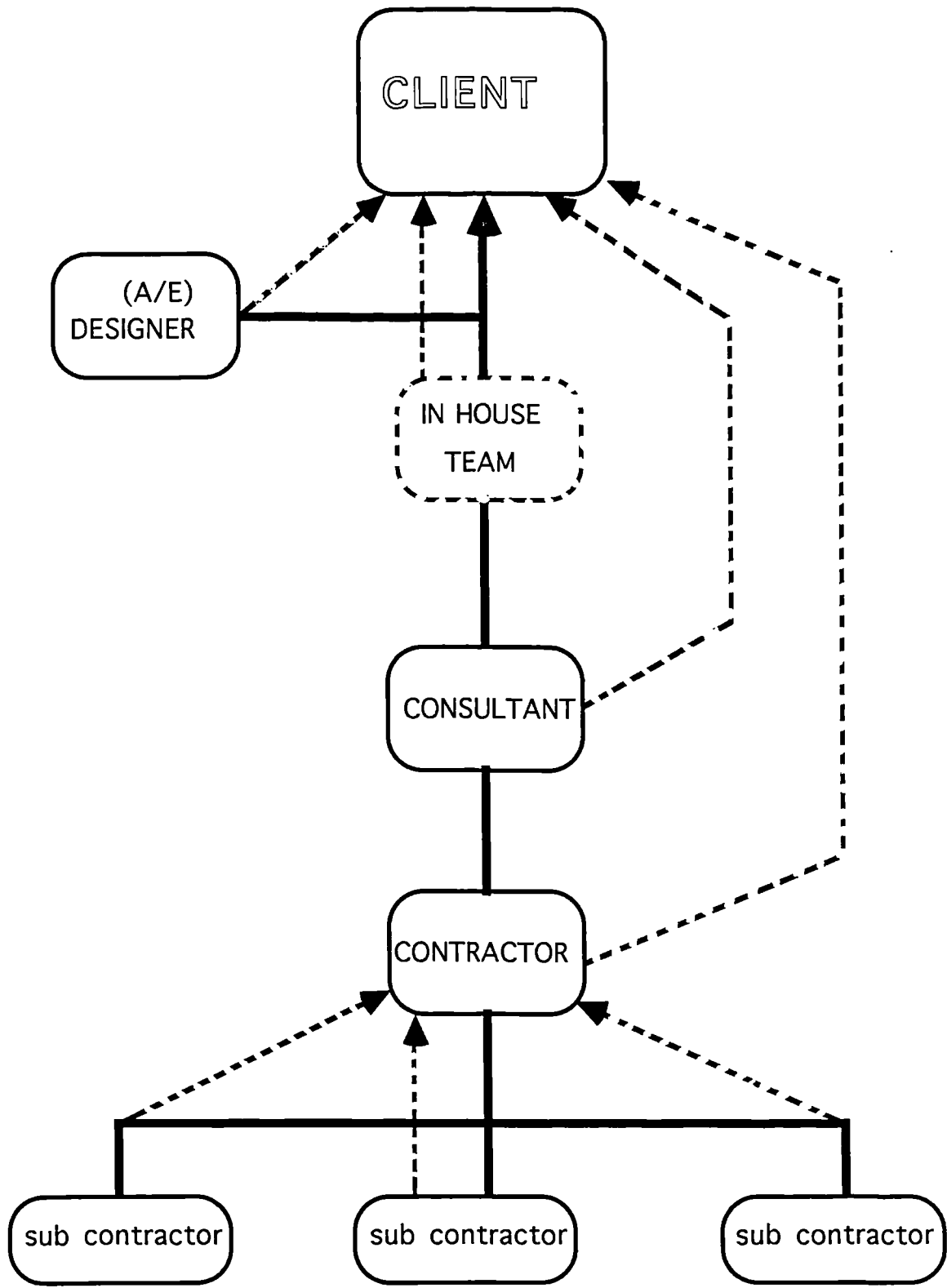
Table (4-1)

Percentage of project type by number of projects

Traditional system

This system was used in majority of the projects surveyed. The ratio of projects procured by this system is 80% of the total number of projects. The traditional system used in the Kingdom is briefly described as follows and is illustrated in Figure 4-2 :

- * The government department contracts a specialized engineering office whose major functions are to prepare designs and construction documentation as referred to in Article (3.4.2) of Chapter 3 . This office has a direct management and contractual relationship to the project owner.
- * Upon completion of design works, the government department contracts a specialized engineering office to supervise project construction works and to assist the government department in technical and management supervision of the works as referred to in Article (3.4.3.1) of Chapter 3 . This consultant has a direct management and contractual relationship to the project owner. In most of the projects the owner has his own staff on site who report directly to the Head Office of the government department. These staff are assigned to assist the owner in management and technical supervision of the project. In this case the consultant is managed by the owner's staff on site .
- * The government department contracts a construction contractor to perform project works as referred to in Article (3.4.3.2) of Chapter 3. The contractor relates contractually to the government department and is managed by the supervising consultant.
- * The contractor assigns subcontractors as stipulated in the contract. The subcontractors have direct management and contractual



Notes

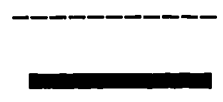


Figure 4.2: Traditional procurement system

responsibilities to the main contractor. The Contractor has the freedom to select all its subcontractors, as required to perform the works.

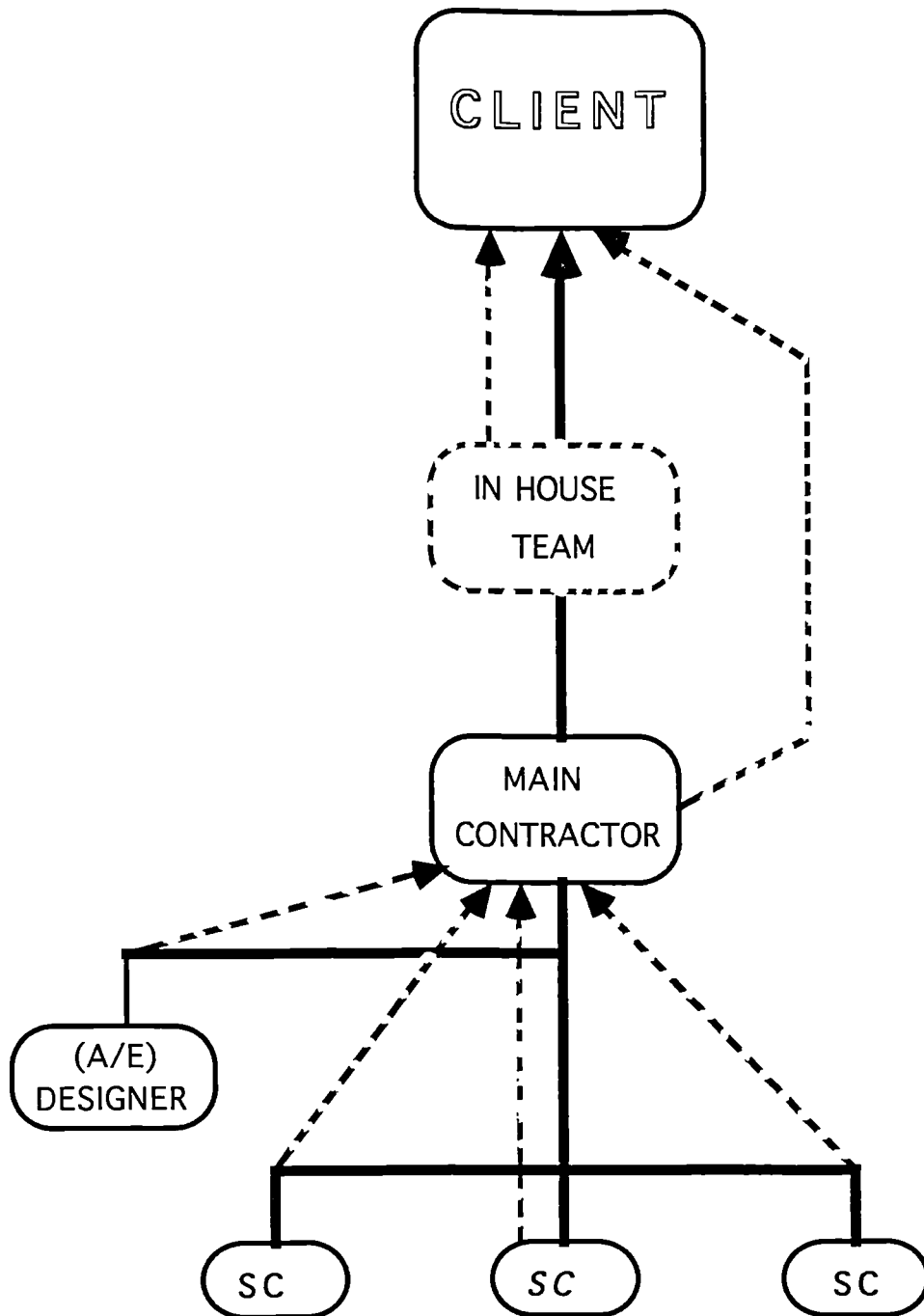
Design and Construction system

Survey results show that this system was used on 20% of the surveyed projects. This system is briefly described as follows and illustrated in Figure 4-3 :

- * The government department enters into a contract with a main contractor to carry out project design and construction works. This contractor relates contractually and for purpose of management to the government department. In the event that the government department has its own staff on site, the contractor is managed by these staff.
- * Main contractors, who are not technically capable of carrying out design works, enter into a sub-contract with a specialized engineering office to prepare project designs. This engineering office has a direct management and contractual responsibilities to the main contractor.
- * The main contractor enters into contracts with subcontractors to carry out parts of the project works. Subcontractors have direct management and contractual responsibilities to the main contractor.

4.3.3 Tendering Type

Survey results show that construction project tenders, during the period covered by the survey, were carried out using two different methods: 44% were carried out using open tenders, 56% by selected tenders.



Notes

- Indicates contractual relationships
- Indicates management relationships

Figure 4.3: Design- Construct procurement system

4.3.4 Types of Contracts

Survey results in Figure 4-4 show that three types of contracts were used during the subject period for the subject projects.

- * 50% were awarded on the basis of a lump-sum contract, where the two parties have agreed that the contractor shoulders all projects costs, including costs of materials, manpower wages, profits and other direct and indirect costs in lieu of a lump-sum to be paid by the owner.
- * 27% were awarded on the basis of a Re-Measurement contract, where the contractor determines project cost based on a bill of quantities that is prepared by the project designer selected by the owner, and the contractor is paid based on the measurement of actually executed quantities.
- * 23% were awarded on the basis of a Re-Measurement contract with a ceiling-price. This contract is similar to the re-measurement contract that was previously explained, however, the two parties agree that the project cost on which award is based represents a maximum project cost. In the event that the actual cost, as determined through re-measurement, is larger than the project cost, the contractor is paid only the agreed project cost. If the actual cost is less, the contractor is paid that cost.

4.3.5 Number of Projects that were delayed beyond schedule

Results show that 75% of the completed projects were delayed beyond schedule. They also show, see Figure 4-5, that :

- 23% of the delayed projects were delayed by a period less than 20% of the original construction period .

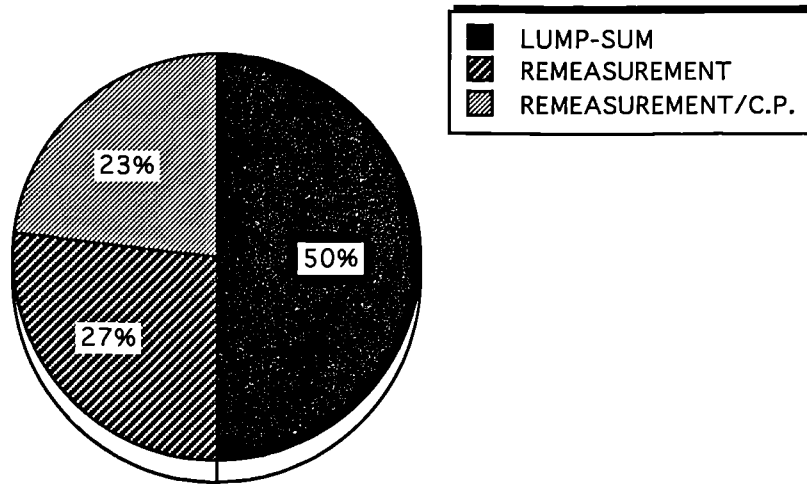


Figure 4.4 : Contract type by percentage of projects

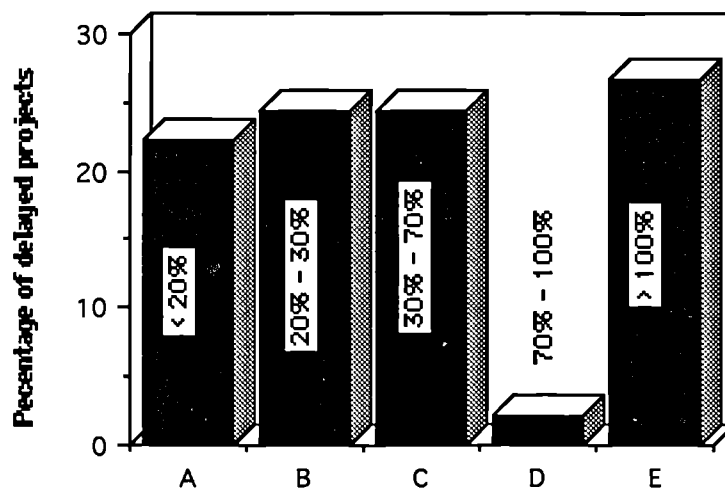


Figure 4.5 : Percentage of delayed period to the total construction period.

- 24% were delayed between 20% and 50% of the original construction period .
- 24% were delayed between 50% and 70% of the original construction period .
- 2% were delayed between 70% and 100% of the original construction period .
- 27% were delayed by a period more than 100% of the original construction period.
- The maximum delay period was 167% of the original construction period.

4.3.6 Causes of Delay

Table 4.2 show the percentage of causes of delay reported by project managers , by total number of delayed projects. It shows that 52% of the projects were delayed due to the Contractor's poor management ability 44% were delayed due to changes and modifications during construction 40% were delayed due to incomplete and incorrect contract documents, and 34% due to the contractor's poor technical and financial capabilities.

4.4 Analysis and Discussion of Results

4.4.1 Tendering type

Figure 4-6 depicts the percentage of projects that were awarded by open and selected tenders during the period from 1982 to 1992. The figure shows that the trend of contract award using selected tender gradually declined since early 1982 and stopped completely in 1989.

Table 4-2 : Percentage of causes of delay by total number of delayed projects

ITEM	CAUSES OF DELAY	% by no. of total delayed projects
A	Contractor's poor technical ability	34%
B	Contractor's poor management ability	52%
C	Contractor's poor financial ability	34%
D	Incomplete and Incorrect contract documents	40%
E	Design complexity	8%
F	Changes and modification	44%
G	Inaccuracy of scheduled time estimations	16%
H	Delay in disbursement of contractor's entitlement	26%
I	Client's lengthy administrative procedures and delay in decision making on requirements/ Lack of an effective communications system	12%
J	Other government departments	18%
K	Poor technical/management abilities of the owner's staff.	0%
L	Poor technical/management abilities of the consultants.	2%
M	Poor abilities of subcontractors	8%
N	Weather conditions	2%
O	Failure to select a suitable site	22%
P	Unforeseen conditions	4%

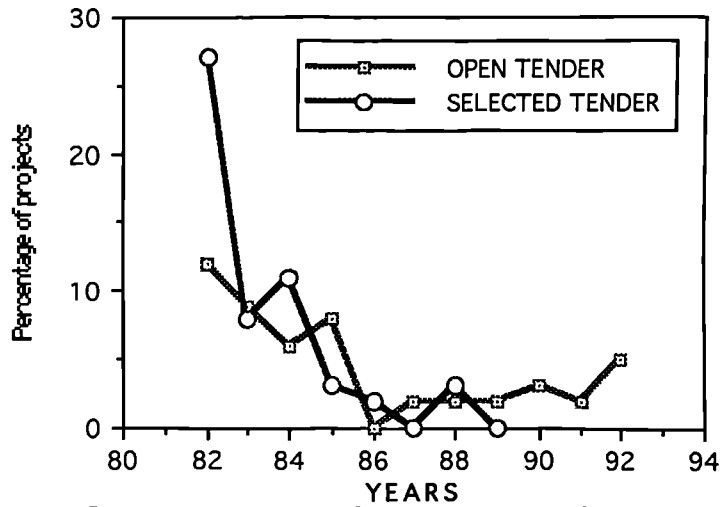


Figure 4.6 : Percentage of projects awarded by open and selected tenders during period 1982-1992

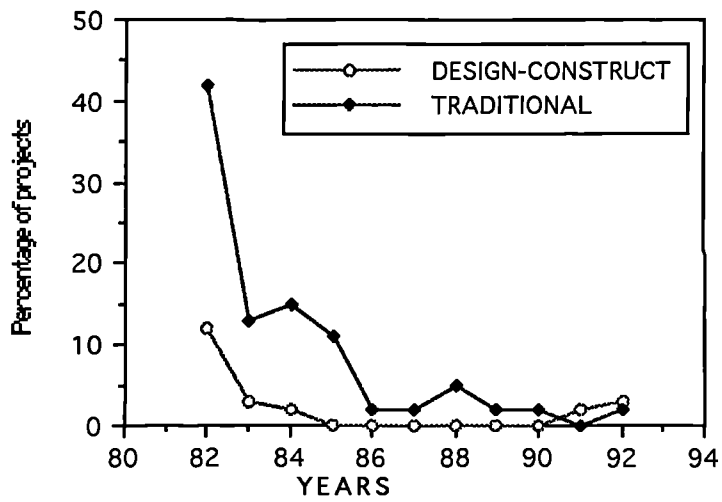


Figure 4.7 : Percentage of projects managed by Des-Const. and trad. systems during period 1982-1992

This was a result of Royal Decree No.9751 dated 9/12/1988 which mandated that invitations to contractors to bid for government projects shall only be in the form of open tenders. We also notice that open tender procedures were put into effect even before the announcement of this Royal Decree. The figure also depicts a decrease in contracts signed after 1982 . The reason for that is attributed to the completion of most of the infrastructure projects in addition to the world wide economic stagnation during that period (64) .

4.4.2 Building Procurement System

Figure 4.7 depicts the percentage of projects that were managed by the design and construct Procurement system as well as the traditional procurement system during the period from 1982 to 1992. There is greater emphasis on using the traditional system in project management as this was the only system used during the period from 1986 to 1990, while use of the design and construction system declined during the period from 1982 to 1984 until it stopped completely, but was readopted in 1991 and 1992. Referring to the data provided in the questionnaire, it become clear that these projects are owned by only one of the departments surveyed. Upon contacting the officers of that department it was found that these projects were exempted from the traditional system given to the need for quick design and execution of the projects.

4.4.3 Types of Contract

Figure 4.8 depicts the percentage of projects that were awarded by lump-sum contracts, remeasurement contracts and remeasurement

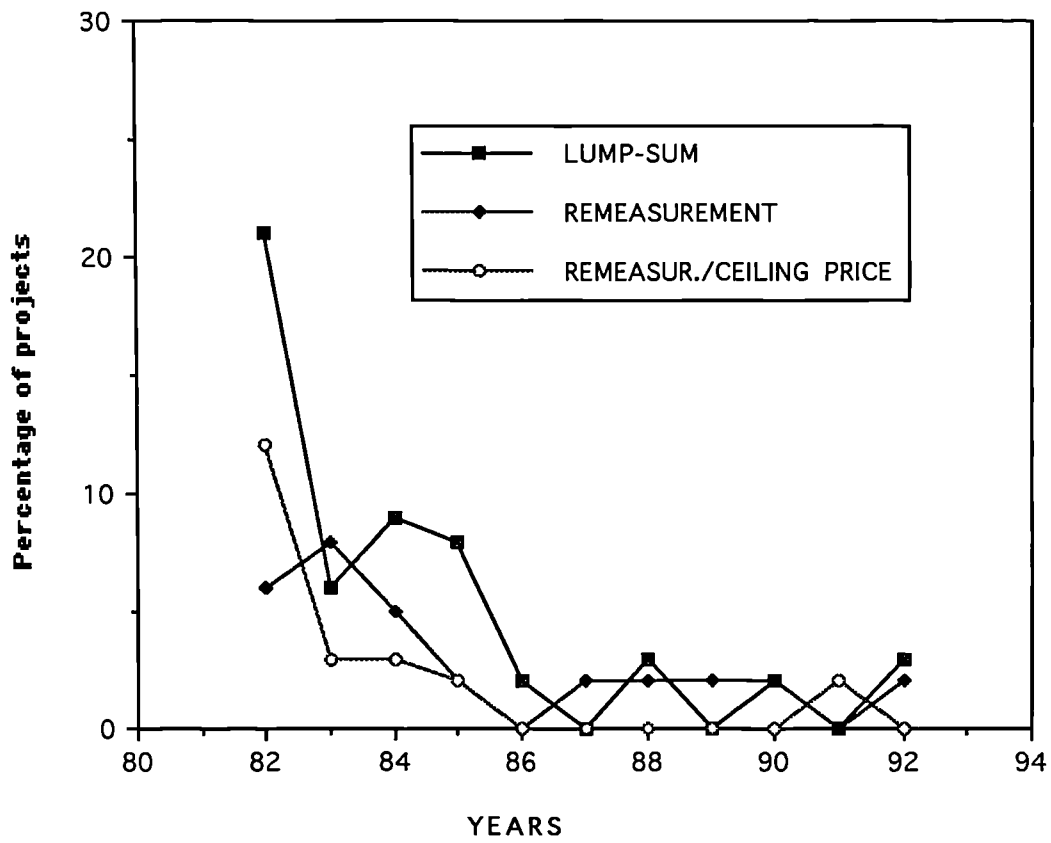


Figure 4.8 : Percentage of projects awarded with Lump-sum, Re-measurement and Re-measurement Ceiling Price during the period 1982-1992

contracts with a cost ceiling, during the period from 1982 to 1992. The figure shows large acceptance of the lump-sum contract between 1982 and 1986, with a fluctuation between 1987 and 1992, while the use of re-measurement contracts remained constant between 1987 and 1990. The lump-sum contract continues to be used to date despite Royal Decree No.136 dated 1/2/1988 which ratifies the uniform contract for use in government projects. This uniform contract is defined as a remeasurement contract. We also note that the use of a remeasurement contract with a cost ceiling was stopped between 1986 and 1990 and was reused in 1991 before it stopped again in 1992.

4.4.4 Delay of Project Completion Beyond Scheduled Date

Figure 4.9 shows that the ratio of delayed projects which were awarded by selected tender is higher than the ratio of delayed projects which were awarded by open tender. This is contrary to the anticipated result. The reason is that most government departments who have announced tenders do not prequalify and select their bidders based on clear cut pre-qualification standards. Thus the selection is made based on other inaccurate considerations and unqualified contractors are therefore allowed the opportunity to bid.

Figure 4.10 shows that the ratio of delayed projects that were awarded by a lump-sum contract is less than the ratio of delayed projects that were awarded by a remeasurement contract or a remeasurement contract with a ceiling-price. This demonstrates the poor management abilities of the staff that represent government departments because both types of re-measurement contract require a managerial and organizational role to be played by the project owner or his

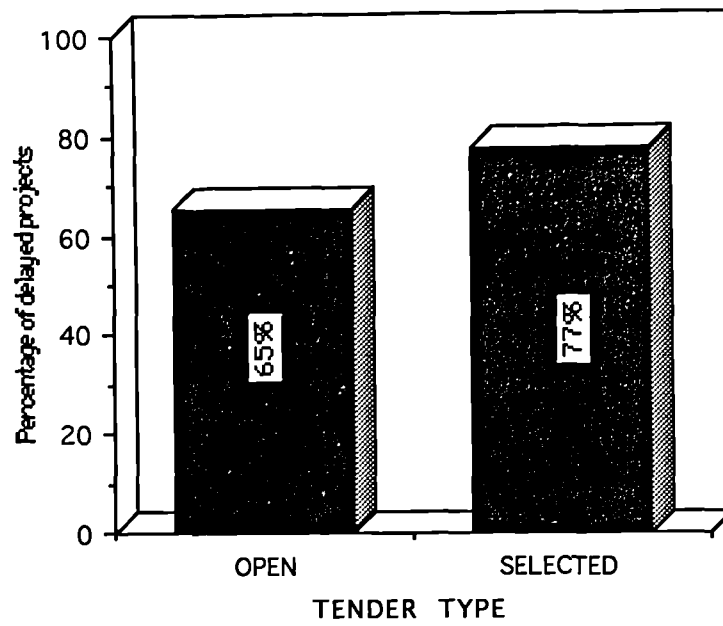


Figure 4.9 : Percentage of delayed projects by tendering type

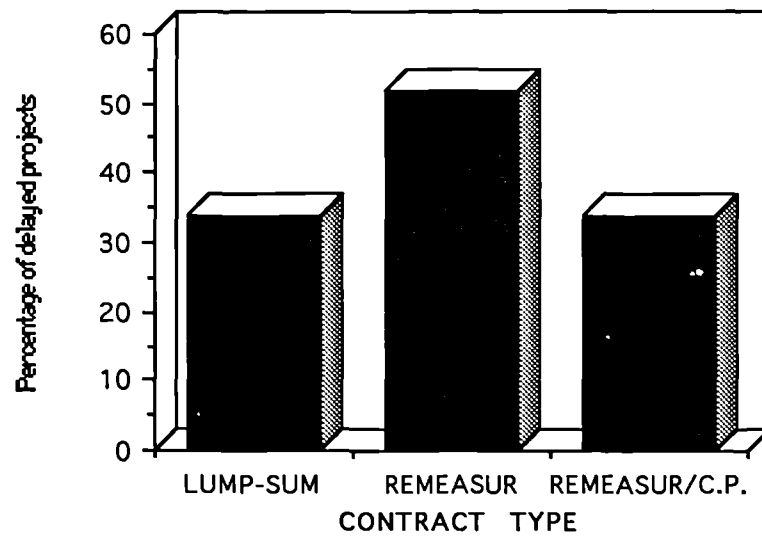


Figure 4.10 Percentage of delayed projects by contract type

representative that exceeds the role required in lump-sum contracts. The poor management capabilities cause impediments to project execution.

Figure 4.11 shows that the ratio of delayed projects that were managed traditionally is higher than the ratio of delayed projects that were managed by the design and build system. This result also shows the poor management abilities of government department staff. The design and build system does not require extensive managerial participation by the owner's staff, when compared to the traditional system. The traditional system requires more management participation by the owner or its representative because of the separation between the design and execution phases.

Figure 4.12 shows that 16% of the delayed projects were completed with a cost greater than the contract cost and that 16% of the delayed projects were completed at the original contract cost, while 68% of the delayed projects were completed with a cost less than the contract cost. This is surprising but may be explained as follows: due to the delay in project performance, the owner's staff, in an effort to improve the project's image and status, endeavour to cut down on construction cost by the deletion of many projects items during the construction phases, see Chapter 5 - example 16 - case study 1.

In the overview of major causes (as seen by government department representatives) of delay in government projects, we note that the most frequently cause of delay was the contractor's poor management ability. This shows that the managers surveyed believe in the importance of management to project success. Two other common reasons were project delay due to altered designs and lack of clarity and inaccuracy of tender documents. If a qualified management staff is provided, the

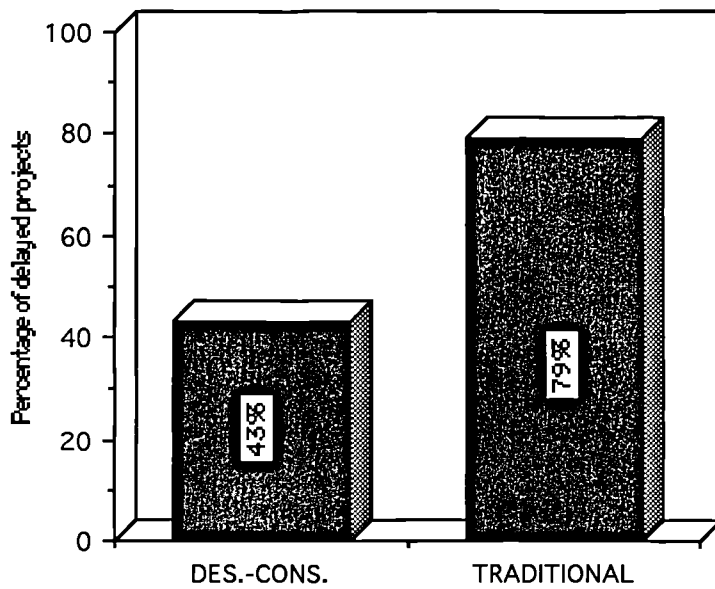


Figure 4.11 : Percentage of delayed projects by building procurement system

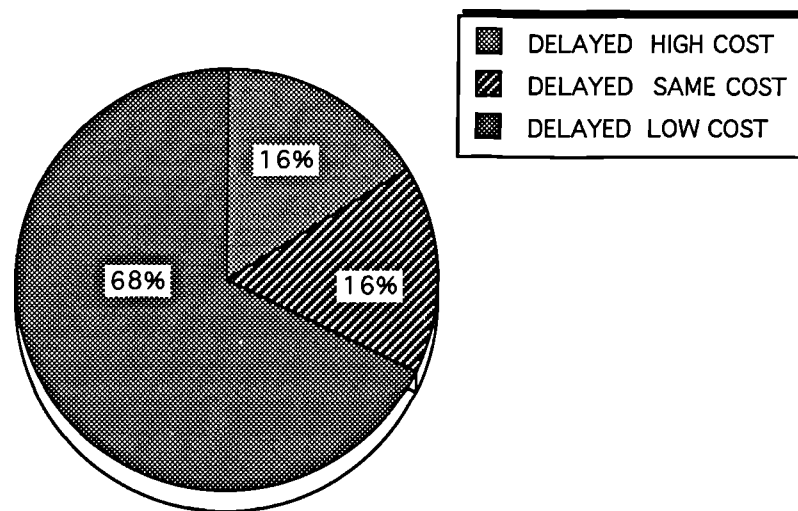


Figure 4.12 : Percentage of delayed projects with different cost by no. of delayed projects

effects of these two causes can be reduced. Good management, if available as early as the commencement of preparation of the preliminary study phase through to completion, will make it possible to reduce the magnitude of variation orders during the execution phase. Moreover, it will provide a greater ability to control and handle them with flexibility. The same applies to the lack of clarity and inaccuracy of tender documents. Good management in the phase of preparation of such documents will yield better documents, in terms of clarity and accuracy, and therefore reduces the impact of this cause of project execution delay.

An important point should be clarified here. Although the questionnaire covers causes of delay in performance of projects work, including the poor technical/management supervision by the owner's staff, it was noted that, not surprising, no government departments that have filled-in the questionnaire stated this as a cause of delay.

4.5 Summary of Results

The results can be summarized as follows :-

4.5.1 Building Procurement Systems

Public sector projects were carried out as follows:

- * Traditional Systems: 80% of projects.
- * Design and Build System: 20% of projects.

4.5.2 Tendering Type

Government tenders during that period were divided into two types as follows:

- * Open Tender: 44% of projects.

* Selected Tender: 56% of projects.

The selected tendering procedures were discontinued in 1989 and all government projects, from that moment on, were subject to open tendering procedures only.

4.5.3 Types of Contracts

There are three types of contracts that are used between government departments and contractors. The three types were used during that period as follows:

- Lump-Sum Contract: 50% of projects.
- Re-Measurement Contract: 27% of projects.
- Re-Measurement with a Ceiling Price Contract: 23% of projects.

4.5.4 Delayed Projects

- A large percentage (75%) of government projects suffered during that period from delay beyond the scheduled construction period.
- (27%) of the delayed project were delayed a period more than 100% of the construction period.
- A higher percentage of Projects procured through selected tender suffered delay than projects that were announced as open tenders.
- The number of delayed projects that were carried out with a re-measurement contract with a ceiling price represent a higher percentage than delayed projects that were carried out with lump

sum or remeasurement contracts.

- 79% of projects performed in accordance with the traditional system and 43% of projects performed in accordance with the design-build system suffered delay beyond the scheduled time period.
- A high percentage of delayed projects were carried out at costs less than contract value.

CHAPTER 5

Obstacles and Problems Encountered in Performance of Public Sector Projects

5.1 Introduction

In Chapter 4 of this Research we have clarified through a survey of public sector projects that were executed during the period from 1982 to 1992 that most of these projects have suffered extensive delay in execution beyond the scheduled time period. We have also clarified the viewpoints of the persons surveyed vis-a-vis causes that led to such extensive delay.

We shall attempt in this chapter to provide a comprehensive study of all impediments to the execution of government projects in the Kingdom of Saudi Arabia, to do so we shall:

- a) Overview problems encountered during each of the project phases separately, including the Preliminary Studies Phase, the Design Phase and the Construction Phase.
- b) Our overview of each problem separately will include the following:
 - * Definition and description of the problem.
 - * Determination of causes that lead to the emergence of the problem.
 - * Determination of negative impacts that may result as a consequence of the problem .
- c) To accurately determine the problem and obstacles and reflect real life situations in public sector projects, we shall quote a number of

viewpoints voiced by many organizations and individuals directly related to such projects. In this respect, we have referred to the research and studies that were prepared by :

- * The government entity in charge of settlement of disputes (Board of Grievances).
- * Government officials including legal experts, engineers and key personnel.
- * Consulting offices involved in design and supervision of such projects.
- * Chambers of Commerce and Industry who are involved in the discussion of the problems and conditions of contractors.

d) To ensure a more realistic study of these problems, we have referred to three case studies that represent three different government projects. This information was obtained through extensive research of previously executed government projects and a study of actual problems that they faced during execution in order to be able whenever possible to give realistic examples of the problems.

These projects consist of various project components. They include housing units, schools, kindergartens, mosques, shops, recreational clubs, administration buildings, education buildings, water treatment plants, sewage treatment plants, sports playgrounds, roads, landscaping, power generation plants, etc. The total cost of these projects is approximately SR. 17,670,000,000 or 3,133,357,143 Pound Sterling. Details of these projects are given in Appendixes C,D and E.

5.2 Problems Encountered During the Preliminary Studies Phase

5.2.1 Inadequate Preliminary Planning

One of the major problems which is encountered in public sector projects is the overlooking of proper planning in preliminary studies by the public bodies in charge of those projects . In fact, the concept of planning for such bodies is limited and this affects the future phases of the projects and results in problems and difficulties that impede proper performance . Dr. A. Al-Kawari stated in an analytic study of management of projects in oil producing countries in the Arabian Peninsula: *"Perhaps the element responsible for many of the difficulties and problems encountered in projects carried out in the region is the inadequate conceptual study at the outset, therefore, the planning consideration should be paid proper attention"* (49). EL-Abdeen acknowledges this viewpoint and states that *"One of the causes of problems encountered in construction projects is the lack of a systematic approach and advanced and organized plan of works"* (50).

To demonstrate the consequences of overlooking planning, we cite the following example :

Example (1) - Case Study (3)

Because of insufficient conceptual study and inadequate planning, it was resolved not to supply electrical power to those projects via the local electricity power plants, but by means of a special power plant, the cost of which was to be included in the project cost. Mid-way through project construction , the issue of how logical and how realistic this decision was addressed and it was resolved that the decision was invalid. It was therefore resolved to eliminate the supply and installation of the special plants and connect power to the projects from the electricity companies

operating in those regions. This decision was implemented and the contractor was notified of the omission of such requirements. The contractor then submitted a claim in the amount of US\$ 11,000,000 as compensation for works performed including purchase order, supply and manufacturing of those power plants. The dispute remains unsettled to the date of preparation of this Research.

5.2.1.1 Causes of the Problem

- * Lack of appropriate project management skills within the project owner's staff. Also lack of understanding of the important role project management plays, this has negatively *affected* the project owner's staff understanding of what is involved and required in the preliminary study stage .
- * Lack of understanding of the construction process within the owner's staff assuming that any negative consequences of poor planning may be avoided through amendment during subsequent stages .

5.2.1.2 Negative Consequences

- * Large financial losses incurred thereafter by the government .
- * Impeded project construction in the form of time delay, *unsatisfactory* quality and increased cost .
- * Rise of disputes and financial claims which may lead to costs through legal and administrative action required .
- * Unclear future outlooks for the subsequent stages .
- * Prolonged estimated time to complete the project in its three phases.
- * Numerous amendments and variations in the subsequent stages of the project.

5.2.2 Inaccurate and Incomplete Project Programme (Project Brief)

The inaccurate and incomplete determination of the project programme including project needs, requirements, components and cost estimates is a certain outcome of the lack of due care on the part of the public sector department carrying out the preliminary studies . This is one of the major mistakes of those bodies and results, during subsequent project phases, in large financial losses as project performance and quality are impaired due to amendments of project scope. This often leads to disputes and results in financial claims. A local consultant describes impediments encountered by consultants during the design phase: *"the consultant faces great difficulty in obtaining a final programme showing project requirements and the estimated budget allocations approved by the government bodies concerned prior to commencement of the design process. This leads to continued amendment and change in the project schedule through the final phases,"*(51). Another work paper states *"There are numerous changes that emerge during project performance; changes that are required by the project owner's staff who were not consulted during the stages of study and assessment of project requirements and needs."*(52) To demonstrate the importance of accuracy and comprehensiveness in determination of project needs, requirements and components we give the following example:

Example (2) - Case Study (2)

Due to the lack of accuracy in the determination of the project's requirements , it became apparent that the floor areas of the housing units did not meet actual needs. This is because the design did not take into consideration the social aspects of users of these housing units such as the need for a female lounge that is separate from the male lounge, as well as the need for a separate entrance for women This *necessitated the* amendment of such areas at a cost of over US\$ 15 million .

5.2.2.1 Causes of the Problem

- * Lack of understanding on the part of the owner's staff of the importance of the conceptual phase. This results from their lack of belief in the importance of project management and planning in general , and that any negative consequences of the incomplete determination of project , requirements may be avoided through amendment during subsequent stages.
- * Lack of specific standards to regulate preparation of this study and ensure comprehensive analysis.

5.2.2.2 Negative Consequences

- * Incomplete and inaccurate design documents that do not cover actual project needs, including future requirements anticipated during the estimated life of the project.
- * Numerous project amendments.
- * Delay of performance beyond the specified time frame.
- * Giving rise to disputes and financial claims between the two parties as^a result of the variations.
- * The project owner incurs heavy financial losses.

5.2.3 Failure to Select a Suitable Site

Failure to select a site suitable for the project is one of the errors of owner's staff which results in disputes and financial claims and may lead to a delay in performance of project works, substandard quality or higher costs. The disputes may arise because of any of the following causes:

- * The project owner awards design works without first selecting a suitable site. This means that the design consultant has to prepare

design without prior knowledge of the site, terrain conditions and soil structure, and may therefore commit a design error in the event soil structure is not compatible with the hypothesis on which the design was developed.

- * The project tender is announced and bids are invited without first obtaining the land. Thus the contractors are forced to adopt the hypothesis devised by the design consultant. However, following contract signature and handover of the site to the contractor, the nature of the soil is found to be different than that hypothesised. This may lead to dispute and financial claims⁽⁵³⁾.
- * The project is awarded but site hand over to the contractor is delayed. This subjects the contractor to financial losses and subsequently, results in claims against the project owner for compensation. A paper submitted by the Board of Grievances, (the government entity in charge of settlement of disputes), has stated that *"the delay of site hand over to the contractor is one of the problems that gives rise to disputes and claims"* (54).

A paper which addressed the study of problems encountered in performance of government project stated that *"in a public project following contract signature and upon site hand over, it was discovered that the land was not suitable. Search for a new site took over one and a half years. Then it was discovered that the design was not suitable and required modification - while another organisation had prepared the designs in an effort which took over three years to discover that the authorities concerned would not allow the construction of the project on the selected site"* (52).

The study included in Chapter 4 of this research showed that 22% of the project managers surveyed cited the failure to select a suitable site as one of the causes of project delay.

To demonstrate the consequences of failure to select a site, we cite the following example:

Example (3) - Case Study (3)

The project owner could not provide all of the required sites during the design phase, and two sites remained to be selected. The designer assumed that all sites would be similar to one of the actual sites. The tender was announced and bids were invited. It was assumed in tender documents that the hand over of the two sites not yet selected would be delayed for up to one and a half years. After a delay of about two years in the hand over of the two sites, the contractor discover differences in soil structure and terrain to those originally assumed . This gave rise to disputes and financial claims by the contractor in an amount of US\$ 2,000,000 . The dispute remains unsettled to the date of preparation of this Research.

5.2.3.1 Causes of the Problem

- * Neglect of proper planning and adequate preparation for the project .
- * The project owner's haste in finalizing project documentation and commencement of construction without consideration of other vital project requirements .
- * Lengthy administrative procedures involved in obtaining the required land when not part of the property of the project owner . The land being obtained either by purchasing from the private sector or by transferring its title from one government department to another .

5.2.3.2 Negative Consequences

- * Differences between the nature, conditions, terrain and soil structure of the site from what is originally assumed by the designer in the tender documents and bid for by the contractors and based on which their total costs were calculated . This may result in increase in cost, creation of disputes and raising of claims.
- * delay in site hand over to the contractor which may lead to disputes and financial claims.
- * Cancellation of tenders and/or re-invitation of proposals. This may result in losses by both parties due to the substantial delay in performance of project works .

5.3 Problems Encountered During the Design Phase

5.3.1 Contractual Contract Documentation

5.3.1.1 Lack of Clarity and Consistency of Contractual Documents

This lack of clarity is considered one of the major problems encountered during project design and construction supervision phases. Lack of legal specialists in most government departments has led to lack of clarity of such documentation₍₅₅₎ and to the inclusion of provisions contrary to codes, regulations and rules of implementation₍₅₆₎. Referring to article (v) of item (3-4-3-1) of Chapter 3, which specifies the obligations and responsibilities of the supervision consultant, it becomes apparent that the regulations are neither logical nor reasonable and that they contain repetition and

almost complete restatement of the designer's scope of work.

The basic question here is who is responsible for amendment in case of error and who shoulders the cost? The contrast between this requirement and the uniform contract for construction works (item 5.4.2.1 of this Chapter) which states the contractor's responsibility vis-a-vis review of plans and specifications, should else be noted.

Since consulting works contracts are prepared by every department separately, it is natural to have differences and variations in such documentation and particularly in the nature of duties, obligations and authority of each party. This reduces the standard of services provided by consulting offices. A local consulting office has clarified this matter saying that *"this variation and difference is reflected on consulting works in the form of difficulties in the preparation of tender bids and in the preparation of the technical studies themselves"* (57).

5.3.1.2 Causes of the Problem

- * Lack of legal specialists in each government department.
- * Lack of a uniform contract for consulting works.
- * Lack of familiarity of the owner's staff with laws and regulations which cover building procurement.

5.3.1.3 Negative Consequences

- * Lack of clarity of consulting contract documentation.
- * Inclusion of stipulations contrary to rules and regulations.
- * Variation and differences in contract documents.
- * Negative impact on the standard of services provided by consulting offices.

5.3.2 Lack of Clarity of Technical Documents

Poor planning and lack of accuracy and comprehensiveness in determination of requirements reduce the clarity of the scope of required works. This contributes to submission of incomplete and unclear documentation. A local consultant states in this respect that *"an invitation to bid is often incomplete particularly where the scope of consulting work is concerned. There often is no specific scope of work. Work items may be expressed in a method that is not readily comprehended by the consultant; add to that the lack of clarity of prices schedule, determination of design phases and replies to queries which may take a long time. Sometimes new instructions are received a short time prior to bid submission and this does not allow for fully comprehending instructions or making required amendments"* (51), while another consultant states that *"most public projects do not specify the scope of required work accurately and such scope is often vague"* (57).

Following is an example of problems that may arise due to the lack of clarity of the scope of work:

Example (4) - Case Study (3)

Following signature of the design contract, changes in the scope of work were introduced by the owner's representatives which resulted in a radically different scope of work. As the contract between the two parties was a design and supervision contract, the problems surfaced during the supervision phase. The staff skills required for supervision of construction *were* completely different than what was proposed in the original contract signed at the outset of project design. This *led* to legal disputes and financial claims of US\$ 8,000,000.

The dispute remains unsettled to the date of preparation of this Research.

5.3.2.1 Causes of the Problem

- * Poor initial planning.
- * Poor management capabilities of the owner's staff.

5.3.2.2 Negative Consequences

- * Lack of clarity in design documentation.
- * Numerous amendments during the design phase.
- * Numerous queries by bidders during tendering . This reduces the amount of time available and results in poor familiarity of bidders with actual requirements and may impair their proposals in terms of cost or thoroughness of the bid.
- * Creation of disputes and financial claims.

5.3.3 Unrealistic Design Time Frame

The owner's desire to complete design works in a very short period (50) makes the estimation of such period incompatible with the volume of required work.

This is particularly apparent when we take into consideration the failure of both parties to comply with the time frame in completion of required works .This is caused by the following:

- * The long review time by the owner.
- * The long period of time it takes the consultant to incorporate the owner's comments and resubmit the designs.

Matters grow worse when numerous amendments are made on the scope of work. A consultant expresses his viewpoint saying: *"The consultant takes into consideration during design preparation minimum construction costs and suitable project standards. This formula requires adequate time for research and study. Nevertheless, government departments strictly adhere to a specific time frame for completion of required tasks without*

consideration of any other changes. Work is usually carried out within a specific time which is estimated through unclear methods" (51).

5.3.3.1 Causes of the Problem

- * The project owner's desire to complete designs as quickly as possible.
- * Neglect of proper planning.
- * Lack of clarity of the scope of work.
- * Lack of accuracy and comprehensiveness in determination project requirements.

5.3.3.2 Negative Consequences

- * Incomplete, incorrect and unclear design documents.
- * Creation of legal disputes vis-a-vis the imposition of delay penalties.

5.3.4 Lack of Uniform Consultant Pre-Qualification Regulations

The Government Procurement Regulations and their Rules of Implementation provide for circulating selected invitations to bid for consulting works. The regulations do not contain specific constraints for prequalifying consultants. Each government department is given a free hand to select and invite whatever consulting offices it deems appropriate and in the manner it deems appropriate. A consultant wonders in this respect saying *"what are the standards that are taken into consideration when evaluating prequalification documentation submitted by the consultant? What are the constraints that govern nomination? What basis is adopted for prequalification? What regulations or principles are followed for submission of prequalification documentation? What is the basis for selection, prequalification or selection of government staff who are authorized to make the*

decision on selection? All of these are questions that need to be answered by government officials concerned to enable the consultant to prepare its prequalification documents in a manner commensurate with the requirements of government departments” (51).

5.3.4.1 Causes of Problem

Perhaps the cause of this problem is the lack of understanding on the part of government departments concerned of the importance of establishing specific standards for qualification of consultants.

5.3.4.2 Negative Consequences

- * Discrepancies in the standard of services provided by consulting offices in the form of incomplete design documents or incorrect supervision.
- * Many of the good consulting offices refrain from tendering and this negatively impacts the different capabilities of these offices.
- * Invitation and subsequent appointment of a number of less able consulting offices which may lead to poor performance of projects.

5.3.5 Lack of Clear-cut Standards for Technical Analysis

The lack of specific and clear-cut standards for technical bid evaluation in some government departments has led to unsatisfactory technical analysis of consultants bid proposals⁽⁵¹⁾⁽⁵⁷⁾. Add to this the possible participation of substandard consulting offices mentioned above, and the probability of awarding works to a technically weak office becomes significant.

5.3.5.1 Causes of the Problem

Lack of emphasis on the importance of technical aspects by bid analysis committees that are charged with project award.

5.3.5.2 Negative Consequences

- * Projects are awarded to technically weak consulting offices .
- * Some good consulting offices refrain from participation in government tenders.

5.3.6 Award to the Least Bidder

This issue is discussed in detail, in section 5.4.3, in relation to contractor appointment. The causes and resulting problems of awarding to the lowest design bidder, are similar to those discussed later.

5.3.7 Problems in Co-ordination with Other Public Departments

Problems in co-ordination with public departments concerned with projects such as local government organization, civil defence, electricity companies, etc are considered one of the problems that impedes performance of project works₍₅₀₎₍₅₅₎. The study included in Chapter 4 showed that 18% of Project managers surveyed cited this problem as one of the causes of project delay. The problems in co-ordination with other public departments are manifested in either of the following forms:

- * When the contractor contacts such bodies to obtain their approval of the design prior to or during performance of works, it may be faced with rejection because the design may not comply with the

requirements of that body. This dictates extensive modifications, creates disputes and gives rise to financial claims.

- * Lengthy administrative processes in some public departments to approve designs or to connect required services. This leads to disputes between the client and the contractor over time extensions.

Following is an example of such obstacles which arose from interactions with other public bodies.

Example (5) - Case Study (2)

To commence construction of a project, a building license was sought from the local municipality. The contractor received a rejection from the municipality because the project was designed as 3-storey housing units (villas) while the number of storeys in that area was limited to two. This problem led to:

- * The need to seek a new plot of land.
- * The need to redesign based on the nature of the new site .
- * Delay in completion of the project by more than 66% of the specified time.

A claim was raised by the contractor in excess of US\$24 million. The two parties could not reach a mutually agreeable settlement and therefore have agreed to refer the case to the Board of Grievances as provided for in their contract. To date the Board ~~does~~ not reach a final resolution.

5.3.7.1 Causes of the Problem

- * Lack of effective communications between the local government departments concerned with the projects.

- * Some public departments do not prepare and supply specialized information on projects on a regular basis, which would insure that information available to the parties concerned with the execution of the projects is up to date.
- * The design consultant does not ensure that the design is in compliance with the requirements of public departments concerned.
- * Delay in announcing the project tender following completion of design, during which requirements may change.
- * Long time periods required by some public departments to grant approval.

5.3.7.2 Negative Consequences

- * Delay in performance of project works beyond the specified time schedule.
- * Creation of legal disputes and generation of future claims for compensation by the contractor (50) due to:
 - Additional works that none of the parties agrees to accept responsibility for.
 - Extension of contract time period to make up for resulting delay.

5.3.8 Poor Capabilities of Some Consulting Offices

This issue is discussed in section 5.4.8.3, in relation with the discussion of the capabilities of the project parties.

5.3.9 Poor Management Capability of the Owner's Staff

This issue is discussed in section 5.4.8.1, in relation with the discussion of

the capabilities of the project parties.

5.4 Problems Encountered During Construction Phase.

Problems Related to Contract Documents

Some of the problems which are encountered and negatively affect all aspects of project performance are related to contract documents. The study included in Chapter 4 showed that 40% of Project managers surveyed cited this problem as one of the causes of project delay. This is one of the most complicated and difficult aspects. To clarify this issue, we shall divide these problems into two different categories:

- Problems related to technical contract documents.
- Problems related to contractual contract documents.

5.4.1 Problems Related to Technical Contract Documents

These problems can be classified according to their causes into two categories: contradictions in and between documentation, and incomplete and incorrect documentation.

5.4.1.1 Contradictions Between Technical Contract Documentation

Contradictions Between One Document and Another

Foremost among contradictions the contractor has to deal with in technical contract documents are:

- Contradiction between drawings and/or specifications and bill of quantities. Such contradiction usually takes one of the following forms.

- Items stated in drawings and/or specifications but not included in the bill of quantities this leads to new items in the bill of quantities that are non-existent in the original bill of quantities.
- Items stated in drawings and/or specifications as well as bill of quantities but in different quantities this leads to differences in items quantities in the bill of quantities.

For further clarification, see Example (8), Case Study (1).

- * A contradiction may exist sometimes between drawings and/or specifications and the bill of quantities with a different nature. This is related to the places of quantities in the bill of quantities. To clarify this, we list the following example:

Example (6), Case Study (1)

The quantities related to the stadium to be built as part of this project included a total item for food supply requirements. However, the specification indicated that this item was part of the requirements of the Messhall and other buildings. The contractor's bid price for this item was US\$ 1,980,080. Due to this contradiction, the contractor did not price this item as part of the stadium but submitted it in a separate list attached to the original bill of quantities. A dispute arose between the two parties and the owner requested the contractor to abide by the bid price submitted with the original bill of quantities and withdraw the list attached to its proposal. The contract was signed by and between the two parties on the basis of the originally bid price without adding the amount contained in the list attached to the

submitted bid. However, the contractor, at the end of the project period and prior to calculation of final entitlement, claimed the amount contained in the list that was attached to its contract. It is worth mentioning here that in case study 1, both parties have agreed to form a committee to arbitrate disputes that have arisen between them. The committee found that the contractor is not entitled to this amount because the signed contract did not contain any indication or reservation in respect of this amount . The contractor agreed to withdraw his claim.

Contradiction Within the Same Document

It is sometimes the case that documents are not internally consistent. To clarify, we cite the following example:

Example (7), Case Study (1)

The contractor noticed during construction that there were contradictions between electrical drawings and architectural drawings pertaining to the requirements for control and monitoring equipment in one of the buildings. The resolution of these contradictions dictated additions to the electric drawings at a cost of US\$ 39,013. A dispute arose between the two parties with the contractor requesting approval for the additions as a change order. The request was denied by the owner's representative. The committee has resolved that the contractor is not entitled to such claim based on an item provided for in the contract by and between the two parties which stipulated that *"the contractor shall check all drawings prior to bid submission and shall notify the owner of any contradiction and that the contractor shall be held liable for any*

faults that it could have avoided ". the contractor agreed and withdraw his claim.

5.4.1.2 Incomplete and Incorrect Technical Contract Documentation Incomplete Bill of Quantities

This is caused by inaccurate calculation of quantities and leads during construction to a need for the addition of new items not included in the original contract, and increased quantities over what was stated in the original bill of quantities.

In both cases the items are not stated in any of the technical contract documents but are dictated by work requirements. Following is an example of new items and additional quantities due to contradiction between the drawings and/or specifications and the bill of quantities, see 5.4.1.1, or due to incomplete bill of quantities.

Example (8), Case Study (1)

- * At completion of this project, the value of new items claimed by the contractor, but not contained in the contract due to contradiction between drawings and/or specifications and the bill of quantities and due to incomplete bill of quantities was US\$6,929,844.
- * The increase in the value of original bill of quantities for the same causes was US\$ 50,914,596.

A dispute arose between the two parties in both the aforementioned cases since:

- * The contract did not specify a method for calculation of costs of new items when the two parties disagreed on the method to be used.

- * The contract stipulated that *"the contractor may not exceed the quantity of any items without the owner's prior written approval."* As the contractor did not obtain the owner's prior written approval during construction, and given the difficulty involved in obtaining such approval, a dispute arose between the two parties.

The committee has resolved that the contractor is entitled to this financial claim as the supervising consultant ascertained that the contractor has actually executed the items concerned. The consultant has also taken actual measurements of such items. In order to determine the cost of the new items, the committee asked the supervising consultant to prepare specifications for those items and obtained a price quotation from the local market. The quotation was approved after deduction of 10% of its value given to the time variance between the period of execution of new items and the date of obtaining the price quotations from the local markets. The committee approved an amount of US\$ 6,362,842 as a cost for new items. As for the cost of increase in the original bill of quantities amounting to US\$ 50,914,596 , this increased was approved by the committee after the supervising consultant submitted proof of validity of this claim and after actual measurements were taken using unit prices submitted by the contractor in the original bill of quantities. The owner agreed to the committee's findings in this respect.

Incorrect and Incomplete Drawings

Incorrect and incomplete drawings are one of the major problems encountered in project construction. It impede progress of work, causes disputes and give rise to financial claims between the two parties. To clarify, we cite the following examples:

Example (9), Case Study (1)

The contractor noticed during construction that the storm drainage system shown on the drawings was incomplete and construction in accordance with drawings and specifications would not achieve the intended purposes. The contractor thus proposed some additions and modifications to the system and obtained the approval of the owner's representative.

The contractor applied for approval of this action as a change order with a value of US\$ 308,835. However, a dispute arose between the two parties when the owner's representative stated that the contractor was not entitled to consider this as a change order . The committee which was formed to settle the conflict between the two parties has resolved that the contractor is not entitled to this claim based on the consultant's view which are in turn based on an item provided for in the contract by and between the two parties which stipulates that "*the omission in the drawings and specifications, or faulty specifications of work details which are required to clarify the objectives of the drawings and specifications do not relieve the contractor from his obligation to perform omitted and poorly specified project details and such details shall be executed as if they were fully and accurately described in the drawings and specifications*". The contractor agreed and withdrew his claim.

Example (10), Case Study (1):

This project involved supply and installation of security control cameras at the project site. Drawings however did not indicate such cameras to be connected to the emergency power generators at the project. Thus a conflict arose between the two parties, where

the owner stated that one of the priorities in operation of security cameras is to ensure operation during power failures. The contractor refused claiming that the drawings did not refer to the subject. The cost of connecting the cameras to emergency power amounted to US\$ 203,100. The committee has resolved this dispute based on the contract stipulation referred to in example (9) , and as a compromise to connect some of these cameras which are located in security sensitive areas. Both parties have agreed to this resolution.

Incomplete Specifications

Incomplete specifications may lead to the same negative consequences as incomplete bills and drawings. To clarify we cite the following example:

Example (11), Case Study (1)

Specifications provided for the supply of a central control and monitoring system on this project to serve two purposes, Building Management System and an Energy Saving System.

The specification contained a detailed description of requirements for the Building Management System, but without any mention of the details of the Energy Saving System. A dispute arose between the two parties vis-a-vis the determination of the requirements of the latter system. The owner was of the opinion that the system should play a distinct and active role in the service of the project. The Contractor did not agree, stating that the specifications contained no mention of the system and its requirements. Total value of additional requirements claimed by the owner was US\$ 587,851.

The committee has resolved, based on the contract stipulation referred to in example (9), that the owner is entitled to this claim .
The contractor has agreed to this resolution.

5.4.1.3 Causes of the Problem

- * Lack of accurate and comprehensive details of project requirements .
- * Unclear scope of work in design documentation.
- * Poor management and technical capabilities of the owner's staff during the design phase which have led to a lack of good supervision and follow-up on its part.
- * Poor technical performance of the design consultant.

5.4.1.4 Negative Consequences

- * Numerous modifications of contract documents.
- * Increased project cost.
- * Poor quality of project works.
- * Creation of disputes and claims.
- * Delay in performance of project works.

5.4.2 Problems Related to Contractual Documents

As public departments have started to use a uniform contract for public construction projects, it may be useful to limit our discussion in this item to the ambiguous stipulations of the uniform contract and their effect on the execution of projects.

5.4.2.1 Contractor's Responsibility for Review of Technical Contract Documents

Article 10.2 of the general conditions of the uniform contract stipulates that *"the contractor shall be responsible for review of engineering and technical designs in all their details and notify the owner and consultant of any errors or comments that are discovered in the drawings during construction."*

It is apparent that this stipulation is vague and incomplete and may lead to different interpretations thus giving rise to disputes between the two parties during construction. Several questions regarding the contractor's responsibility in this area may arise in relation to the review of drawings, specifications and bills.

Errors in Drawings and Specifications

- * What are the limits of the contractor's responsibility vis-a-vis review of designs? Where does it start? Where does it end?
- * What is included in the phrase "errors or comments"?
- * What is the procedure that follows notification of the owner and engineer by the contractor that errors were found?
- * What errors and comments entitle the contractor to raise a claim for compensation and/or extension and which do not ?

There is a clear contradiction between what is stated in this article and what is stipulated in supervision contracts pertaining to the responsibility for review of construction documents. Item 3-4-3-1 in Chapter 3 shows that these contracts place the responsibility of full review of technical project documents on the shoulders of the supervising consultant. Who is then, responsible for the review of design

documents and ascertaining their accuracy? Is it the supervising consultant or is it the contractor? And how can such contradiction between the stipulations of the contracts be remedied?

Finally, an important question has to be asked. Who is responsible for the accuracy and validity of technical project documents? Is it the design consultant, the supervising consultant or the contractor? These questions remain without a clear and specific answer and lead to dispute and claims and affect the progress of work. To clarify, we cite the following example:

Example (12), Case Study (1)

- * Claims submitted by the contractor arising from his review of drawings amounted to US\$ 609,911. This led to a dispute between client and contractor due to unclear limits of the contractor's responsibility vis-a-vis review of such documentation. The committee found that the contractor is not entitled to this claim based on a contract item which stipulates that *"the bidder shall review the drawings, specifications and bill of quantities as well as all other requirements thoroughly and to ensure their validity from a technical point of view. The contractor shall also ensure that they are sufficient to achieve the goals and objectives of the project . In the event the contractor discovers fault or technical discrepancy, the contractor shall notify the owner of its viewpoint within the period specified for bid acceptance. The contractor shall also propose the alternative it deems appropriate and the owner may agree or disagree as the owner deems necessary. Submission of a bid without giving the owner any such proposal is deemed as an acknowledgement by the contractor of the validity of drawings "* . The contractor agreed and withdrew his claim.

Review of Bill of Quantities/Contradictions Between Documentation

- * Why does article 10.2 of uniform contract not refer to the review of the bill of quantities?
- * Are contradictions between contract documents part of the review concept? Who is responsible for contradictions between the bill of quantities and/or drawings and specifications ?.
- * Is the contractor required to review bill of quantities and ascertain compliance with drawings, and vice versa ?

If the answer is no, who is responsible? and how can the matter be dealt with?

- * Article 2.3 of the form of agreement document of the uniform contract states that *"in the event of a contradiction between contract documents and provisions, the document mentioned first on the list takes precedence"*.

Drawings and specifications appear on the list before the bill of quantities and therefore take precedence. However, what happens if a contradiction is found between the drawings and/or specifications and the bill of quantities and it turns out that the bill of quantities is correct.

Will the contractor be paid for those quantities or not?

To clarify the above points we cite the following example:

Example (13), Case Study (1)

Based on the stipulation referred in example (12) the contractor attached to his proposal an affidavit stating that **he** had reviewed contract documents and proposed an additional amount of US\$ 2,417,910 broken down as follows:

- a) US\$ 513,483 cost of new items which appear in the drawings and/or

specifications but not in the bill of quantities.

b) US \$ 1,904,427 cost of additional quantities due to contradictions between drawings and/or specification and the bill of quantities.

A dispute arose between the two parties with respect of owner's approval to the above amount. The result of this dispute was the same as the result of the dispute in example 6 .

5.4.2.2 Contractor's Responsibility for Site Inspection

Article 10.1 of the general conditions of the uniform contract stipulates that *"the contractor shall at its own expense examine and inspect the site and surrounding areas and obtain first hand information prior to bid submission on the shape of the site, the nature of the soil. The contractor shall also review quantities and nature of work, materials required to complete works, means of access to the site and facilities required, and shall in general obtain all necessary information on all factors that may affect its bid."*

Here also are several issues ^{that} may lead to disputes in the future :

- * What if the contractor during construction finds that the nature and type of soil is different than on which the design of the project was based ?
- * Will the contractor redesign and modify and add at its own expense? The stipulation does not clarify this aspect.
- * Do we deduce from this stipulation that the contractor shall carry out soil analysis ? If true, will all bidders be expected to carry out a soil test separately at their own expense knowing that it is likely they may not be awarded the project. Naturally this is an unrealistic assumption particularly when we know that contractors bid for different tenders and that the cost involved in soil tests for these bids would be too large. Moreover we have

to consider the time it takes to carry out such tests and the short time period allowed for bid preparation. To clarify some of the problems here we cite the following example:

Example (14), Case Study (1)

The contractor discovered at the commencement of construction that the nature of the soil in certain areas of the site was different than that on which project designs were based. The contractor had to take some technical measures to resolve the problem. However, due to the high cost involved and the time taken, the contractor carried only part of the required measures. After preliminary hand over of the project, the owner noticed cracks in some buildings. As a result a comprehensive study was made which revealed the action taken by the contractor and a dispute arose between two parties which led to a delay in final hand over of more than three years. The committee has deemed it necessary to study these cracks from a structural aspect by a specialized organization and to report whether such cracks pose a hazard to buildings. Both parties have agreed to this resolution.

5.4.2.3 Method of Measurement

Item 1 of Article 48 of the general conditions of the uniform contract stipulates that *"works are measured on a net basis unless otherwise expressly stipulated in the contract"*. This stipulation is obviously incomplete and will lead to disputes between the two parties as remeasurement methods are not specified. In a study prepared by the Board of Grievances, it was stated that one of the causes of dispute between government departments and contractors is the *choice* of measurement

method for completed works⁽⁵⁴⁾. To clarify we cite the following example:

Example (15), Case Study (1)

* Contract documents did not contain a stipulation which specified a quantity remeasurement methodology and this has led to a dispute between the contractor and the owner's representative as to the method to be followed. Each party wanted to adopt a different method that serves its best interest. The Contractor submitted a claim for the difference in cost between the method it chose and the method the owner selected. The claim was for an amount of US\$ 10,834,050. Given to the fact that the points of dispute between the two parties include numerous items, the committee which was formed to settle the dispute between the two parties has submitted its findings for each item separately. For further clarification, and in respect of one of the disputed points between the parties pertaining to the method of measurement adopted relating to the measurement of excavation and backfilling quantities, for which the company claimed an amount of US\$ 1,120,974, the points of dispute in this respect emphasize that the owner has estimated excavation and backfilling quantities based on the actual dimensions and measurements of work to be executed while the contractor claims additional excavation and backfilling quantities based on the dimensions and measurements to be executed as follows:

- * 0,60 metre for any work that requires wooden boards to a depth of over one meter below the pre-excavation level.
- * 0,25 metre for any work that requires wooden boards to a depth less than one meter below the pre-excavation level.

Therefore, the committee has resolved to adopt a compromise between the two parties whereby half of the dimensions submitted by the contractor are paid for, and thus the committee approved payment of half the cost claimed by the contractor for this item. Both parties have agreed to this resolution.

5.4.2.4 Evaluation of Change Orders Cost

Item 1 of Article 44 of the uniform contract describes the method for calculation of change order costs as *"the engineer shall determine the value if any to be added or deducted from the bid price due to additional or omitted works. The work shall be carried out in accordance with contract provisions if the consultant deems them practicable. If the contract does not contain any rates that apply to the additional work, the owner and contractor shall reach a mutual agreement on fair prices."* The question here is "what if a mutual agreement cannot be reached?". The result will definitely be a dispute and financial claims and perhaps a delay in project completion, see example 16.

5.4.2.5 Warranty and Maintenance Period

Article 41, Item 1 of the uniform contract demonstrates that the warranty period shall mean the period specified in the contract starting at preliminary hand over and ending at final hand over. Article 41, Item 2, stated that *"the contractor shall carry out any repair works, amend, reconstruct or remedy faults as required by the owner or consultant in writing during the warranty period or at final hand over."* This stipulation is incomplete and does not describe the concept of maintenance. The individual who has written this stipulation apparently sees maintenance as mere repair. Many questions may be asked here, foremost among them are:

- * What about building and equipment operation during this period?

- * What about periodic maintenance of the equipments ?

That such questions may lead to disputes was acknowledged in the research prepared by the Board of Grievances which cites the extent of the contractor's obligations during the warranty and maintenance period as one of the problems leading to disputes between the parties concerned (54).

5.4.2.6 Causes of the Problems Related to Contractual Documents

- * Lack of a uniform contract for consulting works and the consequent lack of cohesion and coordination between the current consulting works contract and the uniform construction works contract.
- * Lack of a clear cut uniform method for remeasurement in the uniform contract.
- * Vague stipulations in the uniform contract.

5.4.2.7 Negative Consequences

- * Contradictions with consulting works contracts.
- * Heavy financial losses are incurred by the project owner.
- * Delay in completion of project works.
- * Creation of disputes and financial claims.

5.4.3 Award to the Least Bidder

The rules of implementation of government procurement regulations stipulate in ~~their~~ Article (16) that *"the bid examination committee shall ensure compliance of bids with terms and conditions and specifications and shall enlist for that purpose technical assistance as it deems appropriate and shall recommend the best bid in respect of both financial and technical*

aspects after discarding bids that do not comply with the conditions and specifications as stipulated in Article (5) of the regulations." Nevertheless we find many public projects being awarded just because their values are the lowest, (54)(55). In a study, of 20 public projects, aimed at finding out the ability of the least bidder to carry out contract works, the following was discovered (63).

- * 19 projects were awarded to the least bidder. Only one project was awarded to the second least bidder. In the latter case, the least bid was 28% lower than the pre-tender estimate.
- * In reply to a question put through to managers of such projects regarding contractor performance, they stated that 55% of contractors perform from poor to satisfactory, 25% perform from satisfactory to good, and 20% perform to a level of very good .
- * 60% of the managers of those projects stated that the low bid price was a causes of low performance standards .

Overlooking the technical viewpoint at award is a natural result of the limited understanding of the nature of the construction project and problems which may arise, on the part of individuals who make the award.

The study by the Board of Grievances shows the importance of emphasizing the technical aspect during bid analysis and award, *"it is apparent from disputes judged before this Board that the government has stressed the financial aspect of the bid and neglected the technical aspect and has awarded the bid to contractors who lack technical experience simply because their bids were lowest. The result was severe technical violations in construction that severely affected the contractual relationship and negatively impacted the facilities which were the subject of the contract"* (54).

5.4.3.1 Causes of the Problem

- * Lack of insight on the part of some members of bid selection committees as to the importance of the technical aspects of the project and the role they play in smooth execution of the project.
- * Lack of clear cut standards for the evaluation of the technical and financial aspects of projects renders committee reports poor and unconvincing. Add to that the poor technical and financial capabilities of some of the members of technical evaluation committee which results in unclear reports.
- * Lack of clear cut standards for award determination to be adopted by the bid selection committee members in the preparation of their report and recommendation for award.
- * Negation of the role of the technical evaluation committee in the event that its opinion is not taken into consideration.

5.4.3.2 Negative Consequences

- * Possible award to technically weak contractors which may lead to losses, delays, technical problems, dispute and claims.
- * In awards to technically weak incompetent contractors the owner may incur direct or indirect losses that far exceed the apparent amount saved at award.
- * Contractors firmly believe that the technical aspect is not an important criteria for those who make the award decision in public departments. They thus submit low bids and risk loss and impediment in the future.
- * Some contractors submit low bids due to an implicit agreement

with small companies such that this company or companies carry out project works. However, due to the limited capabilities of such companies the project is impeded and the greater loss is incurred by the owner.

5.4.4 Changes and Modifications

Perhaps changes and modifications whether in the form of omission or addition are one of the biggest problems that impede project performance and lead to disputes and claims (54). The study included in Chapter 4 of this research showed that 44% of the project managers surveyed cited extensive changes and modifications as a major cause of delay. Changes and modifications are used to remedy problems which arise during the design or tender stage. This typically causes a rise in cost and may change the nature of the project due to the extent of additions and deletions (49). Major causes of dispute on change orders are:

- * Unclear procedures to be followed by the parties.
- * Performance of the change order on the verbal approval of the supervisory staff without obtaining the prior written approval of the project owner.
- * Lack of a contract conditions which clearly specifies what constitutes a change order.
- * Lack of a method of pricing new items that are not included in the contract.
- * Delay in granting approval by the project owner.
- * Lack of complete study by the contractor of the financial and technical aspects of change orders.

Variations and changes in projects are a heavy burden because of their frequent use and the high cost of work covered by them . Also they are a major cause of dispute. Matters become worse when supervisory bodies try to offset increased cost and time delay by:

- * Omission of some project items and components.
- * Change of original specifications of some project components to make savings.

On the other hand, we find that some contractors endeavour to obtain change orders when they think they can make a profit on them. This is done through:

- * Proposing changes of specifications to make savings on the project, while, in fact, the greatest benefit accrues to the contractor. For instance, suppose that the contractor discovers the prices for some items in his tender are too low. The contractor may request a change of specifications for those items, submit a new price, and avoid the loss he would incur if the original items were supplied and installed.
- * Maximise financial gain from any change order by giving exaggerated prices for that order.
- * Verbal undocumented approvals are granted from the contractor to allow for savings in the event of change but at later stages the contractor refuses the savings and raise financial claims.
- * Manipulation of change orders to create a dispute with the owner as a justification for delay in completion of work . This is followed by a request a time extension in orders to avoid a delay penalty.

Example (16), Case Study (1)

- * Following final remeasurement, the total cost of additions resulting from change orders amounted to US\$ 55,696,609, or 15.3% of total original contract cost.
- * Total cost of omission due to change orders amounted to US\$ 61,550,050 or 16.91% of total original contract cost. Thus the result of the variation orders was a saving of US\$ 5,852,441.
- * Total cost of new items included in the additions mentioned above amounted to US\$ 26,999,108 or 48.48% of the cost of change orders.
- * Total cost of change orders subject to dispute by the contractor amounted to US\$ 11,188,132; these claims were rejected by the owner and a dispute arose as a result of the following causes:
 - The owner's representative found the contractor's cost estimates for the new items were exaggerated.
 - Differences between the two parties on the method of measurement of some of the change items.
 - Differences between the two parties on what could be considered a change order and what could not be.
 - The contractor claimed that the owner's representative gave verbal approval to carry out the change order, at additional cost. The owner's representative claimed that the contractor agreed to carry out the variation works at a saving or at no additional cost.

The committee which was formed to settle the dispute has studied the subject matter and reviewed all letters and

correspondence exchanged between the two parties during the execution phase. The committee has also reviewed the final re-measured project quantities. As for the new items, a price quotation was obtained from the local market and the committee has agreed to an amount of U.S\$ 48,460,074 as a cost of variation orders due to the contractor. The owner agreed to the committee's findings in this respect.

Example (17), Case Study (3)

- * Project specifications stipulate that windows should be made of timber. The contractor agreed verbally to provide the owner with savings of SR 2,000,000 if the windows were changed to aluminium. Upon completion, the savings promised changed into a claim of S.R 4,000,000 by the contractor, as loss incurred due to the change. The dispute remains unsettled to the date of preparation of this research.

Example (18), Cause Study (1)

- * It was agreed to change specifications of some landscaping items without additional cost. The contractor sent a letter, to that effect, to the owner. At project completion, the contractor submitted a claim of US\$ 1,848,474 claiming that the actual changes were more costly than what was agreed upon. The committee which was formed to settle the dispute between the two parties has resolved that the contractor is not entitled to claim such cost because the contractor had submitted a written undertaking to perform required alterations within the original cost of this item. Moreover, the consultant has resolved that the

cost of works executed in respect of this items is within the original cost of this items. The contractor agreed and withdraw his claim.

Example (19), Case Study (1)

- * Some of the furniture specifications were changed. The contractor submitted a claim for US\$ 1,257,527 claiming that the owner's representative gave verbal approval for the increase. The owner's representative rejected the claim, stating that the contractor agreed to the change at no additional cost. The committee which was formed to settle the dispute between the two parties has found that the contractor is not entitled to this amount as it could not obtain any official correspondence that took place between the two parties in respect of this variation, that in addition to what the supervising consultant has stated pertaining to the agreement of the contractor to carry out the variation without additional cost to the owner. The contractor agreed and withdraw his claim.

5.5.4.1 Causes of the Problem

- * Poor planning at the time of preparation of preliminary studies of the project.
- * Lack of accuracy and comprehensiveness in determination of project requirements .
- * Lack of clarity in the scope of works stated in design documents.
- * Poor technical performance of the design consultant.
- * Poor management and technical capabilities of the owner's supervisory staff during the design stage. This made them unable

to provide good supervision and follow-up of design documents to discover faults and contradictions in the scope of work.

- * Incorrect and incomplete project documents.

5.4.4.2 Negative Consequences

- * Change of the nature of some projects, due to extensive omission and addition.
- * Delay in project completion.
- * Increased cost.
- * Creation of disputes and claims.

5.4.5 Delay in Disbursement of Contractor's Invoices

Delay in payment of contractor's invoices is perhaps a leading cause of confusion and retards the progress of work, particularly when the financial position of the contractor is not strong enough to withstand the difficulties caused by the delay. The study included in Chapter 4 showed that 26% of the project managers surveyed reported the delay in disbursement of contractor's invoices as one of the causes of project delay.

A study (55) conducted to investigate problems encountered in construction of public projects shows that:

- * 61.7% of public officials controlling projects think that delay in payment to contractors is a cause of delay in completion of works.
- * 58.1% think that delay in payment is a cause of substandard quality of the projects.
- * 33.5% think that delay in payment slows contractor's performance.

Delay in payment may also cause legal disputes, since some contractors claim compensation for damage resulting from delay in payment. To clarify we site the following example:

Example (20), Case Study (2)

The contractor submitted a claim at project completion, stating that he had suffered damage due to delay of payment during the course of the project. The claim for interest charges amounted to SR 2,000,000. This dispute remains unsettled to the date of preparation of this research.

5.4.5.1 Causes of the Problem

A study of causes of delay in payment to contractors (55) showed that the major causes as seen by project staff were :

- * Failure of contractors to fulfil their contractual obligations - 76%.
- * Delay of payment by some public department personnel - 24%.
- * Other causes were given (13.2%) as follows:
 - Lack of documents required to complete disbursement.
 - Increased volume of work at finance departments.
 - Delay of disbursement of payment during transition period between fiscal years.
 - Lengthy administrative procedures, such as extensive review and audit, and numerous signatures required to authorise payment vouchers.

5.4.5.2 Negative Consequences

- * Confusing the contractor financially resulting in negative impacts on compliance with time schedule and proper performance of work.
- * Creation of disputes and claims resulting in additional costs incurred by public departments.
- * Lack of confidence between the contractor and client in the future.
- * Increased construction cost, since some contractors may raise their prices in the future as a safeguard against delay in payment.

5.4.6 Unclear Responsibilities and Authorities of Concerned Parties

Lack of clarity of relationships, responsibilities and authority of all parties (owner, owner's staff, supervisor consultant and contractor) as a result of unclear contract stipulations. Such lack

of clarity of financial, administrative and technical procedures lead to interference and cause organizational and managerial confusion that affect the project and result in disputes, claims and delay. At times we find the contractor complaining of the consultant's authority and at other times we find the consultant complaining of the interference of the owner's staff.

Research prepared by the Chamber of Commerce and Industry in Jeddah, Research Centre⁽⁵⁸⁾ describes problems which are encountered by contractors: *"the contractor is subject to numerous pressures as a result of many consultants exceeding their authority. This problem grows more extensive due to the lack of clear cut stipulations in the*

contracts that regulate the authorities of the consultant. Thus the consultant exceeds its authority by taken decisions individually and cause the contractor to remain confused from the beginning through to the end of the project term." While a consultant (51) states that "the interference of the owner's staff in its affairs and authority, in approval of a given structural system for example or the use of a particular material may cause a conflict of decisions between all parties concerned."

In this respect, Dr. EL-Abdeen(59) states that "*one of the most important contractual problems is the dual supervision of construction. The contractor's work is brought to a halt and it may incur new losses if the consultant approves one thing and the contractor proceeds to procure it while the owner rejects it and requests replacement. The relationship between the consultant, the contractor and the owner remains unclear and requires further detail and organization.*"

The lack of clear determination of authority, responsibility, technical, managerial and financial procedures is one of the greatest faults of public departments and it leads to numerous problems which impede performance of project works.

5.4.6.1 Causes of the Problem

- * Unclear and incomplete contractual documentation.
- * Lack of a uniform guide for financial, administrative and technical procedures
- * Poor management ability of the owner's staff.
- * Poor management ability of the consultant's staff.

5.4.6.2 Negative Consequences

- * Delay in project completion due to unclear management, financial and technical procedures which result is delay in submission and approval of samples and shop drawings and delay in submission, approval and performance of change orders.

- * Making decision which may not be in compliance with contract provisions.
- * Chaotic management which impedes project works and create disputes and claims.

5.4.7 Lack of a Spirit of Confidence and Cooperation

Some owner's staff still regard the contractor as a manipulative and greedy entity that attempts to obtain money from the owner through fraud and should therefore be made to suffer the greatest loss possible and provide much more than is strictly required of it. Dr. Omran (60) describes this point of view saying: *"this concept, if fully comprehended by owner staff, as much as they comprehend the public interest they protect, they would not look at the contractor as a greedy manipulative entity and would instead deal with it based on mutual confidence and mutual interest and shun the view that the interests of the contractor and the owner are conflicting."* On the other hand we find the contractors and consultants regarding the owner's staff as individuals who are always trying to make them sustain losses and refuse dealing with them. Dr. EL-Abdeen(50) states in this respect that *"the owner, contractor and consultant deal usually out of lack of confidence and fear and each tries to entrap the other and force the responsibility onto the other party's shoulders."*

5.4.7.1 Causes of the Problem

- * Shortsightedness of some of the owner's staff in the way they regard contractors and consultants, and vice versa.
- * Poor management abilities of the parties concerned.
- * Limited outlook of the parties concerned by failing to cooperate, attempting to make profit from the other parties and rejecting a cooperative relationship that reflects positively on all parties.

5.4.7.2 Negative Consequences

- * Increasing problems and disputes instead of amicable settlement of differences.
- * Losses are incurred on both sides.
- * Delay of project performance due to numerous disputes.

5.4.8 Poor Capabilities of Parties Concerned

The success or failure of any project is closely related to the capabilities of all major parties concerned (owner's staff, consultant, contractor, subcontractor). Any weakness in the capabilities of any of the parties will have an impact on all other parties and ultimately the project itself.

5.4.8.1 Poor Management Capability of the Owner Staff

One of the biggest problems which is encountered in construction of public projects is the poor management ability of the owner's staff charged with managing and supervising the project. We shall address this issue in detail on Chapter 6.

5.4.8.2 Poor Capabilities of Some Local Contractors

Among the enormous number of contractors in the Kingdom, there is a large percentage of local contractors who have substandard capabilities, a matter which directly affect the progress and completion of work.

The study included in Chapter 4 showed that 34% of project managers surveyed cited the contractor's poor technical and financial abilities as one of the causes of project delay, while 52% reported the contractor's poor management ability as the cause of project delay.

The Chamber of Commerce and Industry in Jeddah (58) describes this problems from the viewpoint of the local contractors. It states that *"it is unfortunate that the abilities of some local contractors are substandard who are unable to control management, technical and organizational obstacles due to their lack of ability to comprehend modern building technologies and take advantage of them in their operations."* Dr. EL-Abdeen (50) states that *"the contracting sector still suffers the existence of a number of local contractors who are still unable to develop their firms in an objective and organized fashion."* Lack of management capability is considered to be of the main problems that local contractors suffer from. It should also be noted that the above comments also applies to some foreign contractors operating in the Kingdom.

5.4.8.3 Poor Capabilities of Some Consulting Offices

The poor management and technical abilities of some consulting offices (whether designers or construction supervisions) is a cause of problems and obstacles which impede the desired level of project performance. The study included in Chapter 4 showed that 2% of project managers surveyed cited this problem as one of the causes of project delay. A consulting office (57) refers to this fact saying. *"there is severe variation in the level of engineering services provided by the various offices. Such variation may extend even within the same office."*

5.4.8.4 Poor Capabilities of Subcontractors

The poor capability of subcontractors is considered to be one of the problems in public projects. The study included in Chapter 4 showed that 8% of the project managers surveyed cited this problem as one of the causes of project delay. Problems related to subcontractors are due to the following:

- * Lack of standards and constraints to assist in approval of subcontracting. Although the contract stipulates that the main contractor shall obtain the owner's prior written approval before entering into a subcontract, lack of standards and constraints to be followed by the owner in evaluation has rendered the owner's approval a routine formality and has increased the risk of award to incompetent subcontractors.
- * The prime contractor's assignment of the contract without obtaining the owner's prior written approval contrary to contract stipulations. This may occur due to one of the following causes:
 - Poor capabilities of the subcontractor to an extent that it may not be approved by the owner.
 - Advance preparation between the main contractor and a subcontractor in order to include low prices in the tender bid to secure the contract award.
 - Inaccurate calculation on the part of the main contractor of the cost of construction. During execution of the works, the prime contractor stands to incur heavy losses and is therefore obliged to subcontract to reduce loss. In this respect, it is worthwhile mentioning that a large percentage of reports that are received by the Committee on Fraud and Resolutions to Withdraw Works (which is a panel that is charged with study and investigation of complaints on fraud and deception as well as review of resolutions to withdraw works from contractors) reports on assignment of contract. Such action is not discovered by the owner until after completion of works and preliminary or final

hand over⁽⁵⁶⁾. This shows the poor management capabilities of the staff representing the owner in management of such projects, such poor management capabilities have resulted in a lack of control over the project and a lack of follow up of the various project aspects.

* A study ⁽⁵⁵⁾ conducted to assess causes of possible problems due to subcontracting found :

- The main contractor does not monitor performance of the subcontractor. This view was held by 64.7% of the study subject.
- Lack of understanding of the nature of the contract by the subcontractor. This view was held by 64.7% of the study subject.
- Substandard qualifications of subcontractors. This view was held by 55.1% of the study subject.
- Lack of specialization of subcontractors in the field of subcontract works. This view was held by 40.1% of the study subject.

5.4.8.5 Causes of the Problem

Causes leading to poor management abilities of the owner's staff will be addressed in Chapter 6 of this research. The causes of poor capabilities of other parties (prime contractor, consultant, subcontractors), will not be addressed here as they require separate research of the numerous factors involved.

5.4.8.6 Negative Consequences

- * Increased cost whether directly or indirectly.

- * Poor technical quality of works.
- * Incorrect and incomplete project documents.
- * Extensive modifications and changes during project performance.
- * Delay in performance beyond the time schedule and creation of disputes and problems.

5.4.9 Lack of an Effective Communications System

Public projects suffer the lack of an effective communications system between the parties concerned. This contributes to minor problems being blown out of proportion. It increases the gap between the parties because of the confusion it results in. Problems of this kind which affect projects may be summarized as being a result of lack of effective communications between the parties concerned to reconcile differences in viewpoints and coordinate efforts in the best interest of the project (50) (55) (58) (61). The study included in Chapter 4 showed that 12% of project managers surveyed cited this problem as one of the causes of project delay.

5.4.9.1 Causes of the Problem

- * Lack of an effective information exchange system between the various public departments.
- * Lack of periodicals containing updated instructions, requirements and specialized information from the departments which could be placed at the disposal of parties related to the project.
- * Lack of internal coordination between public departments related to the projects.
- * Difficulty in easily obtaining information on projects.

5.4.9.2 Negative Consequences

- * Difficulty in decision making.
- * Confusion and impediment of the project time schedule
- * Lengthy administrative procedures.

5.4.10 Inaccuracy in Contractor's Project Cost Estimation

Inaccurate project cost estimates are considered one of the biggest faults of the contractor, as it affects all parties to the project. The problem is worsened when the contractor bids low without adequate study and is awarded the contract simply because it is the least bidder (see Item 5.4.3). Lack of accuracy in cost estimation by the contractor is a result of poor management capability.

The research conducted by the Chamber of Commerce and Industry⁽⁵⁸⁾ on this subject states that *"evidence shows that numerous construction projects are priced by many contractors without realistic and accurate evaluation and subsequent detailed studies of materials, circumstances, liquidity, foreseen and unforeseen objectives, something which can in most cases be attributed to competition among contractors in getting as much as possible of number of projects. Then find ultimately that the actual cost of projects is higher than the bid prices which have caused confusion among contractors and limited their ability to complete works on time."*

5.4.10.1 Causes of Problem

- * Poor management abilities of the contractor which reflect negatively causing poor cost estimates
- * Unclear contract documents.
- * Some contractors need to maintain continuity of work for their equipment, machinery and manpower and are obliged therefore to bid low.

- * There are contractors who are not serious and submit prices without a realistic study, intending to assign the project after award and obtain a commission.

5.4.10.2 Negative Consequences

- * Contractor's inability to complete the project and higher probability of stopping work or withdrawal of works.
- * Creation of disputes in an effort on the part of the contractor to seek justification for reducing its loss or for stopping work.
- * Poor quality, as the contractor seeks inferior quality to cut down its losses.
- * Delay of project completion due to the negative effects of inaccurate cost estimates on the contractor's ability to complete works.

5.4.11 Long Time Interval Between Bid Submission and Commencement of Works

One of the problems that gives rise to dispute is the long time interval between bid submission and commencement of work. Contract documents usually specify the validity of the proposal at 120 days. However, award is sometimes not made until long after that period. The contractor here runs a risk of higher material and equipment prices, rendering its bid prices low.

The contractor, out of need for the work, may accept the risk and agree to sign the contract based on prices bid a long time earlier. Things grow more complicated when the owner asks the contractor to lower its price as the funds allocated for the project are lower than the bid price. This is a big mistake that both parties later pay for.

The Board of Grievances (54) have classified the problem of fluctuation of market and currency prices during the period from bid submission to award as one of the problems which give rise to dispute between public departments and contractors.

Dr. Jeshi (52) states in his research on problems encountered by public projects *"that one department took over one year to analyse bids while the tender documents stated that award would be granted within 3 months after bid submission. While another department awarded another project in principle, but award negotiations lasted over six months thereafter, while the contract should usually be signed within six weeks after the initial agreement to award"*.

5.4.11.1 Causes of the Problem

- * Lengthy administrative procedures.
- * Bid prices exceed allocated funds.
- * Negotiation to lower bid prices.
- * Unavailability of the site and delay in hand over.
- * Hesitation on the part of the bid award committee in rendering a decision on award.

5.4.11.2 Negative Consequences

When the time interval between bid submission and commencement of work is prolonged, inflation may cause the bid prices submitted by the contractor to become too low, not reflecting actual project costs. In this case, negative impacts that arise are similar to those stated in Item (5.4.10) pertaining to the contractor's inaccurate cost estimation.

5.4.12 Unreasonable Construction Period

There must be compatibility between the cost and duration of construction project. The study included in Chapter 4 showed that 16% of project managers surveyed cited this problem as one of the causes of project delay. The construction period is determined by the owner and stated in contract documents or is left up to the bidders to specify in their bids. In both cases a great deal of inaccuracy occurs in estimating time periods due to the following reasons:

- * The owner usually estimates the time period when it needs to complete the project rapidly.
- * If estimation is left up to the contractors, they attempt to minimize the period, knowing that it may be considered as one of the bid analysis parameters.

5.4.12.1 Causes of the Problem

- * Owner's desire to complete some projects as soon as possible.
- * Time period is sometimes considered as a parameter for award, and contractors opt to assume the shortest possible time period.
- * Unclear contract documents.
- * Poor capabilities of the contractor.

5.4.12.2 Negative Consequences

- * Poor quality resulting from hasty performance to comply with the time schedule.

- * Creation of dispute when the contractor seeks justification for time extension and avoidance of delay penalty.
- * Delay in performance of project works.

5.4.13 Lack of Adequate Funds

This problem may take either of the following forms:

- * The bid price is higher than allocated funds.
- * The tender is announced without securing fund allocations.

5.4.13.1 Bid Price is Higher Than Allocated Funds

This problem arises from poor cost estimates by the owner or designer. The owner in such cases is forced to adopt one of the following strategies :

- * Cancel the tender and reannounce it after amendment of design.
- * Ask contractors to reduce their bid prices to match the allocated funds.
- * Delete some project components to reach allocated funds.

In all the above cases time is wasted and this causes large losses to the project owner.

In the case of one of government project, the bids were higher than funds allocated and consequently the project was delayed for a period of ten years (52).

5.4.13.2 Tender is Announced Without Securing Fund Allocations

Because of the urgent need for a project, the owner may announce the tender before fund allocations are secured, assuming that the

amount would be obtained following tender award. However, funds may not be available at the time assumed by the owner.

This results in the following:

- * Long time interval between tender announcement and bid award, in order to gain time until funds are secured.
- * Cancellation of tender.

A study prepared by the Board of Internal Audit, the government body charged with monitoring projects⁽⁶²⁾, shows that there are cases where government departments are entered into contracts without allocation of necessary and adequate funds. The study points out that this is one of the problems that have to be dealt with in the course of execution of government projects.

5.4.13.3 Causes of the Problem

- * Inaccurate estimate of project cost by the owner or designer.
- * Poor planning by owner's staff.
- * The owner's desire to commence construction without taking the provision of basic requirements into consideration.
- * Vague, unclear and incomplete tender documents.
- * Modifications and changes of the project during the tender period.
- * Lack of accuracy and comprehensiveness in determination of project requirements.
- * Unclear scope of work in design documents.

5.4.13.4 Negative Consequences

- * Cancellation of tender at a loss to both parties.

- * Delay of award which may lead to dispute as a result of currency, materials, tools and equipment price fluctuations during that period.
- * Change of nature and purpose of the project as a result of deletion of some components.

5.4.14 Design Complexity

Some public departments wish their project to have a unique architectural design. This may entail a complex design that is difficult to construct and requires a great deal of experience, efficiency and skill. This may not be readily available, particularly through a public tender. The study contained in Chapter 4 of this research showed that 8% of project managers surveyed cited this problem as one of the causes of project delay.

5.4.14.1 Cause of the Problem

- * Desire of the owner to obtain a unique architectural design.
- * Poor technical abilities of the designer which may render the design complicated.
- * Unclear scope of work in design documents.

5.4.14.2 Negative Consequences

- * Bid prices are higher than approved project costs and the negative impacts involved as described in Item 5.4.13.
- * Low bid prices and the negative impacts involved as described in Item 5.4.10.
- * Difficult performance of works may cause delay in completion and poor quality.

5-5 Summary

This Chapter discussed the problems and obstacles summarized in, Table 5-1, which cause impediments to the projects in the public sector during their preliminary studies, design and execution phases. This was achieved through solicitation of various view points reflecting opinions of organizations and individuals directly involved in the execution of these projects and through realistic examples of such projects presented under the three case studies referred to in this Chapter. Also the various causes giving rise to these problems and consequential negative impact were discussed.

Through a review of the diverse opinions and view points of individuals and organizations, examples of the case studies covered by this Chapter and viewpoints of managers collected in the first questionnaire, as well as my personal view point based on the experience I gained while working in this area, the most important of the problems can be summarized as follows :-

- **Problems related to the technical and contractual documentation of the design and/or execution phases.**

These problems are diverse, numerous and interrelated . By referring to our findings when we presented these problems, the size of the problems and the various negative effects which arose therefore becomes evident. What emphasizes the importance of this problem is the fact that 40% of the participants in the first questionnaire considered these problems as important causes of execution delays.

- **Problems related to changes and modifications**

These problems represent one of the paramount difficulties which hinder project execution. This is due to its direct impact on all three major components of the project , time, cost and quality . Examples

presented to highlight the problem showed that the cost of additions due to change orders amounted to 55.696.609 US\$ or 15% of total original contract cost on one project. The amount of reductions due to change orders amounted to 61,550,05 US\$ or 16.91% of total original contract cost . The importance of this problem is emphasized and its bearing on the project's success or failure is illustrated by the fact that 44% of participants considered it a major cause of project execution delay.

- Problems related to substandard abilities of participating parties, both during the design or execution phases

The various weaknesses of these parties have a direct impact on the success of any project. The lack in abilities of any party will have a negative impact on the performance of other parties and inevitably, the project as a whole. As regards the issue of weakness of the management abilities of the owner's staff, which is directly related to the research subject and which is seen as vital, this issue has been studied and discussed in detail in chapter 6. Concerning other parties, the weakness of any party's potential influence depends on the role it may exercise. Because the contractor exercises a major role in execution of the project, any lack in abilities thereof will have significant negative impact on the project . Results of the first questionnaire in Chapter 4 pinpoint the importance of this role to the success or failure of the project. 34% of the participants indicated that poor technical capabilities of the contractor were a major cause of execution delay . 52% of the participants attributed the delay to poor management capabilities of the contractor whereas 34% stated that delay in execution was due to poor financial capabilities of the contractor.

8% of the participants attributed the delay to poor capabilities of subcontractors whereas 2% attributed it to poor management and technical abilities of the consultant supervising the project execution.

- **Problems related to delayed in disbursement of contractor's invoices**

Delayed payment of contractor's invoice causes severe disturbance to the contractor's financial standing. It will therefore negatively affect his ability to perform the works properly whether in terms of compliance with the project schedule or ability to perform works to the required standards. Delay of contractor's invoices indirectly means a corresponding delay in payment of workers' wages. Productivity of workers will drop as well as their ability to perform works in a proper manner. If the delay in payment continues for a considerable period of time, this may cause the contractor to completely stop the works. As a result the owner will face the probability of project failure, increased cost and legal, financial conflicts with the contractor. Results of the first survey indicate that 26% of the participants considered delayed payment of contractors' invoices is one of the causes for delayed execution of projects in the Public sector. The study mentioned under article 5.4.5 of this Chapter also shows that 61.7% of the participants believe that delay in disbursement of contractors' invoices leads to execution delays.

- **Problems related to failure to select a suitable site during the preliminary study phase**

This problem is importance because the designer will be forced to design the project based on specific assumptions concerning the terrain conditions and soil structure of the site on which the project will

be implemented. Therefore, the project will subsequently face, at the time of commencing execution, the probability that the soil structure of the site will be different from initial assumptions. This will potentially impede progress of the project, increase the cost and give rise to financial and legal disputes with the contractor. Results of the first survey pinpoint the importance of this problem, since 22% of the participants considered it a cause for execution delay.

- Problems related to the lack of an accurate and complete determination of project programme (project brief)

These requirements constitute part of the initial studies phase requirements, which is the first phase of the project and the lack will, therefore, affect subsequent phases. An incomplete project program which does not cover all project requirements needs and components, means that vague and incomplete design documents and inevitably an elongated design stage. Too many changes and modifications will have to be made during execution and will adversely impact time, cost and quality factors of the project.

Table 5-1 : Summary of problems encountered during the phases of the projects in the public sector.

Problem	Case study1	Case study 2	Case study 3	Survey of Project Managers	other Sources
Preliminary Studies Phase					
Inadequate Preliminary Planning	---	---	See Appendix E.3.1	---	Kawari ⁽⁴⁹⁾ and Abdeen ⁽⁵⁰⁾
Inaccurate and incomplete Project Programme	---	See Appendix D.3.1	---	---	Faiz ⁽⁵¹⁾ and Jeshi ⁽⁵²⁾
Failure to Select a Suitable Site	---	---	See Appendix E.3.2	22% of Project managers surveyed reported this problem as one of the causes of project delay.	Board of Grievances ⁽⁵⁴⁾ Abdulkarim ⁽⁵³⁾ and Jeshi ⁽⁵²⁾ .
Design Phase					
Lack of clarity and consistency of contractual and technical documents	---	---	See Appendix E.3.3	---	Nujeim ⁽⁵⁵⁾ , Wehaibi ⁽⁵⁶⁾ Shuaibi ⁽⁵⁷⁾ and Faiz ⁽⁵¹⁾
Unrealistic design time frame	---	---	---	---	Abdeen ⁽⁵⁰⁾ and Faiz ⁽⁵¹⁾
Lack of uniform consultant pre-qualification regulations	---	---	---	---	Faiz ⁽⁵¹⁾
Lack of Clear-cut standards for technical analysis	---	---	---	---	Faiz ⁽⁵¹⁾ and shuaibi ⁽⁵⁷⁾
Award to the least bidder	(See the same problem in the construction phase)			---	-----

Problem	Case study 1	Case study 2	Case study 3	Survey of Project Managers	other Sources
Problems in co-ordination with other public departments	----	See Appendix D.3.2	----	18% of Project managers surveyed reported this problem as one of the causes of project delay.	Abdeen ⁽⁵⁰⁾ and Nujjeim ⁽⁵⁵⁾
Poor capabilities of some consulting offices	(See, the	(See, the poor capabilities of parties concerned problem,		in the construction phase).	----
Poor Management capability of the owner's staff	(See, the	(See, the poor capabilities of parties concerned problem,		in the construction phase).	----
Construction phase					
Incomplete and incorrect contract documents	see Appendix C.3.1	----	----	40% of Project managers surveyed reported this problem as one of the causes of project delay.	Board of Grievances ⁽⁵⁴⁾
Award to the least Bidder	----	----	----	----	Board of Grievances ⁽⁵⁴⁾ , Nujjeim ⁽⁵⁵⁾ and General directorate of military works ⁽⁶³⁾ .
Changes and modifications	see Appendix C.3.2	----	See Appendix E.3.4	44% of Project managers surveyed reported this problem as one of the causes of project delay.	Board of Grievances ⁽⁵⁴⁾ and Kawari ⁽⁴⁹⁾ .

Table (5-1) : Continued

Problem	Case study 1	Case study 2	Case study 3	Survey of Project Managers	other Sources
Delay in disbursement of contractor's invoices	---	See Appendix D.3.3	---	26% of Project managers surveyed reported this problem as one of the causes of project delay.	Nujeim (55)
Unclear responsibilities and authorities of concerned parties	---	---	---	---	Chamber of commerce ⁽⁵⁸⁾ Faiz (51) and Abdeen ⁽⁵⁹⁾
Lack of spirits of confidence and co-operation	---	---	---	---	Omran ⁽⁶⁰⁾ and Abdeen ⁽⁵⁰⁾
Poor Capabilities of Parties concerned	---	---	---	34% of managers surveyed reported the contractor's poor technical and financial abilities as one of the causes of project delay while 52% reported the contractor's poor management ability, 2% reported the poor technical/management abilities of the consultants and 8% reported the poor abilities of sub-cont ractors as part of the causes of project delay.	Chamber of commerce ⁽⁵⁸⁾ , Abdeen ⁽⁵⁰⁾ , Shuaibi (57), Wehaibi (56) and Nujeim ⁽⁵⁵⁾

Table 5-1 : Continued

Problem	Case study 1	Case study 2	Case study 3	Survey of Project Managers	other Sources
Lack of an effective communication system	---	---	---	12% of Project managers surveyed reported this problem as one of the causes of project delay.	Abdeen ⁽⁵⁰⁾ , Nujeim ⁽⁵⁵⁾ Chamber of commerce ⁽⁵⁸⁾ and Mousa ⁽⁶¹⁾
Inaccuracy in contractor's project cost estimation	---	---	---	---	Chamber of commerce ⁽⁵⁸⁾
Long time interval between bid submission and commencement of works.	---	---	---	---	Board of Grievances ⁽⁵⁴⁾ and Jeshi ⁽⁵²⁾
Unreasonable construction period	---	---	---	16% of Project managers reported this problem as one of the causes of project delay.	---
Lack of adequate funds	---	---	---	---	Jeshi ⁽⁵²⁾ and Bureau of internal Audit ⁽⁶²⁾
Design complexity	---	---	---	16% of Project managers surveyed reported this problem as one of the causes of project delay.	---

PART - II

Introduction

It is time for change; change to meet challenges, change to re-build. The march to growth is long and painstaking and mistakes might occur along the way. It may be acceptable for us to err, but what is not acceptable is to persist in error. It is the time to learn from the errors of the past and capitalize on our past experience to lay down foundations for a better future that would yield a great civilization.

For the development and rebuilding in the field of project management to be practical, based on solid foundations and a step in the right direction, it must incorporate two important approaches:

- * Development of management abilities of Public Sector's Project managers.
- * Development of systems that govern the performance of public sector projects.

In Chapter 6 we shall address proposals and viewpoints that contribute to development of management abilities and qualification of public sector's project managers, while in Chapter 7 we shall address proposals that would contribute to development of systems that govern the performance of public sector projects.

CHAPTER 6

Measuring and Improving the Management Capabilities of the Public Sector's Project Managers

"People are the cause of a project's problems, therefore these problems can be solved only by people" (Dinsmore) (91).

This Chapter aims at determining of the proposal and view points that can improve management abilities and effectiveness of the people directly involved in solving such problems, namely project managers. It should be noted that the scope of study is limited to public sector project managers only. To achieve this objective, it is important to:

1. Clarify whether there are deficiencies in the management abilities and qualifications of public sector project managers. Their qualifications and management abilities must be evaluated and existing weaknesses identified.
2. Formulate appropriate practical solutions that may be adopted to achieve the aspired objective.

To that end, the following was carried out:

- * Preparation of a questionnaire addressing various aspects of the management abilities of project managers. Analysis of findings led to the establishment of discrepancies between their abilities and the requirements of project management.
- * Establishment of minimum standards of essential qualifications that characterize an efficient and successful project manager.
- * Interviews were held with senior managers working in public departments to obtain information that could not otherwise be

gathered through the questionnaire.

This Chapter is divided into two main sections:

Section (1): Evaluation of the qualifications and management abilities of public project managers.

Section (2): Proposals and views which contribute to development of qualification and management abilities of project managers.

6.1 Evaluation of Qualification and Management Abilities of Public Sector's Projects Managers

6.1.1 Questionnaire Design

The questionnaire aimed to:

- * Evaluate the management abilities and qualifications of public sector project managers.
- * Establish concepts to assist in determination of best methods that can improve the management abilities and qualifications of those managers.

The following was taken into consideration in questionnaire design:

- * The need to reflect the real management abilities and qualification of public sector project managers commensurate with circumstances surrounding their business environment.
- * The need for the questionnaire to conform to our established standards for evaluation of the management abilities and qualifications of project managers. The questionnaire was divided into four parts, including, in addition to a part covering general information, three parts covering the three major sources which contribute to the development of project managers, namely education, training and experience (35)(13)(66)(39).

- * To include information that assists in the formulation of the best possible approaches to enhance the management abilities and qualification of project managers.

Testing the Questionnaire:

In order to ensure the comprehension of persons in the various public departments who filled in the questionnaire, and in order to ensure the accuracy of information gathered, the following procedure was used :

- a) Upon preparation of initial draft questionnaire, a number of project managers from various government departments were selected to fill in the questionnaire and to discuss the contents in order ensure that the questionnaire was comprehensive and covered all required information, as well as to facilitate its preparation and clarity. Their comments were taken into consideration before the final version of the questionnaire was prepared.
- b) The questionnaire was hand delivered to each of the persons selected to fill in the questionnaire.
- c) The questionnaire was discussed with those persons item by item.
- d) Follow up on the telephone and by personal visits to ensure the required care was given.
- e) Filled in questionnaire were collected by hand.

6.1.1.1 Questionnaire Contents :

Full details of the questionnaire are given in appendix B. The questionnaire is divided into four parts as follows:

- General information

- Educational Qualifications
- Training
- Experience

General Information :

General information on the person filling in the questionnaire included :

- * Name
- * Employer
- * Age
- * Date of completion of the questionnaire

Educational Qualifications

This part aimed to shed light on the university education of the project managers through questions on degree courses, the benefit derived from university education as a preparation for project management, causes of lack of full benefit, and opinions on actions required where courses taught in universities are inadequate. Therefore, this part is divided into four sections :-

1) Education Certificates

This section shows education certificates obtained, major subject, date and place of graduation.

2) Self Evaluation of Extent of Benefit

The project manager is invited to make a self evaluation of the extent of the benefit from his university education as a basic preparation for becoming an efficient and successful project manager. This evaluation is made through scores representing benefit in this area, assuming that 100% represents full benefit.

3) Causes of Lack of Benefit

In cases where full benefit of university education is not realized, the project manager is invited to identify causes . The causes

mentioned in this section and in the training and experience sections are the results of the interviews held with project managers before preparing the questionnaire (see the section on testing the questionnaire) .

4) Actual and Proposed Courses

This section describes courses covered by university education related to the basic preparation of a successful project manager, (the course many define as number of credit-hours given in each semester, generally, each credit-hour is equivalent to a one-hour lecture per week, and the duration of each semester is fifteen weeks) . The subject is asked to list the number of courses studied in the university in each of the following disciplines:

- Business Management
- Project Management
- Computer Science
- Finance and Accounting
- Legal subjects

Where the project manager deems that the number of these university courses is inadequate, this section allows the project manager to propose changes and additions to university courses. The above subjects were selected in view of their vital importance to the preparation of a successful project manager and upon the view points of some references related to this subject. In this respect Kerzner (92) stated that "*Future project managers will require general business skills, knowledge of the man-machine interface with computers, knowledge of governmental restraints and a feeling for how public policy decisions are made, a*

global view of business economics and a general understanding of human behaviour" .

A study⁽³⁹⁾, which surveyed 110 project managers in United Kingdom concluded that "From the findings of our survey, it is very clear that the technical background must be associated with other financial , managerial , legal aspects" .

A study⁽⁸⁹⁾, which surveyed 185 members of the US Project Management Institute on the required courses for a project management curriculum, the results showed that the most important courses were ; project management , planning and control , accounting and finance, organizational behaviour , systems management , law and information systems.

Training

To assess all training related aspects, this is divided into three sections as follows:

1) Training Sources

This section aims at determination of major training sources that have effectively contributed to the development of the management skills of public project managers. The questionnaire covers a number of training sources and subjects were invited to rate those sources on a scale from 1 to 10, where 10 reflects the most important, and 1 reflects the least important.

Training sources include:

- * Short course (1 to 14 days)
- * Medium course (2 to 20 weeks)
- * Lectures and Seminars

- * Post graduate
- * Self education
- * Preparation of specialized research
- * On -the-job training.

2) Actual Training

This section reflects training obtained and the benefit from such training, causes of lack of full benefit and the type and number of training opportunities that were allowed to him.

This section includes three sub-sections:

2.1) Self Evaluation of Extent of Benefit from Training

In this sub-section, project managers self evaluated the extent of benefit from training opportunities by marking them on a percentage scale, assuming that 100% depicts full benefit.

2.2) Causes of Lack of Benefit

In cases where full benefit of training opportunities were not realized, the subject is invited to mark cause(s) listed in this sub-section and state whether there are other causes.

2.3) Type and Number of Previous Training Opportunities

This sub-section aims at identification of the type and number of previous training opportunities allowed to the project manager. Training opportunities include:

- * Short courses

- * Medium term courses
- * Lectures and Seminars
- * Specialized research
- * On-the-job training

While subjects include:

- * Business Management
- * Project Management
- * Finance and Accounting
- * Computer Science
- * Engineering subjects in the field of their speciality
- * Legal subjects

3) Needs of Future Training

To determine subjects project managers believed they required future training on, the following subjects were listed:

- * Business Management
- * Project Management
- * Computer Science.
- * Finance and Accounting
- * Engineering subjects in the field of speciality
- * Legal subjects.

Project managers were asked to evaluate the aforementioned subject on a scale from 1 to 10, where 10 depicts greatest need and 1 depicts lowest need.

Experience

To determine experience obtained by project managers in the field of project management, this part was divided into five sections :

1) Number of projects participated in before becoming a project manager.

2) Approximate date of first appointment as a project manager.

3) Management and Technical Assignments

This section depicted the ratio of management assignments to technical assignments undertaken by the subject throughout his post graduate experience .

4) Self Evaluation of Extent of Benefit from Experience

In this section, project managers self evaluated the actual benefit from past experience by marking on a percentage scale, assuming that 100% depicts full benefit.

5) Causes of Lack of Benefit

In cases where full benefit of experience was not realized, the project manager was invited to mark causes included in this section and state whether there were other causes.

6.1.1.2 Distribution of the Questionnaire

The questionnaire was initially distributed to the project managers employed by public departments who completed the first Questionnaire (see Chapter 4), i.e. a total of 8 departments. However, it should be mentioned here that one of the departments underwent functional reorganization and was subsequently no longer engaged in supervision of projects and its project management staff were reassigned to other public or private organizations. We therefore were unable to circulate the second questionnaire to its staff. The questionnaire was finally distributed to 41 project managers representing the other 7 public departments.

6.1.1.3 Response

The number of project managers who filled and returned the questionnaire was 40, or 97.56%. This very high ratio can be attributed to the following:

- * Intensive personal coordination with the departments concerned.
- * Hand delivery of the questionnaire to each manager personally in order to ensure adequate attention.
- * The contents of the questionnaire were discussed with each manager separately to ensure his comprehension of requirements.
- * Constant personal follow-up to reply to any possible query.
- * The questionnaires were personally collected from each of the project managers.

6.1.2 Results

6.1.2.1 Educational Qualifications

As depicted in Figure 6.1, the survey revealed that 93% of managers surveyed held a Bachelor Degree in Engineering and 7% held a Masters Degree in Engineering. None of the managers surveyed held a Master's Degree in Project Management.

6.1.2.2 Benefit from University Education

As depicted in Figure 6.2, the survey revealed the results of self evaluation of extent of benefit from university education as basic preparation for project management .It showed that 65% of the project managers believed they have benefitted by less than 50%, 30% believed they have benefited by 50% to 75%, and only 5% believed that they have benefited by over 75%.

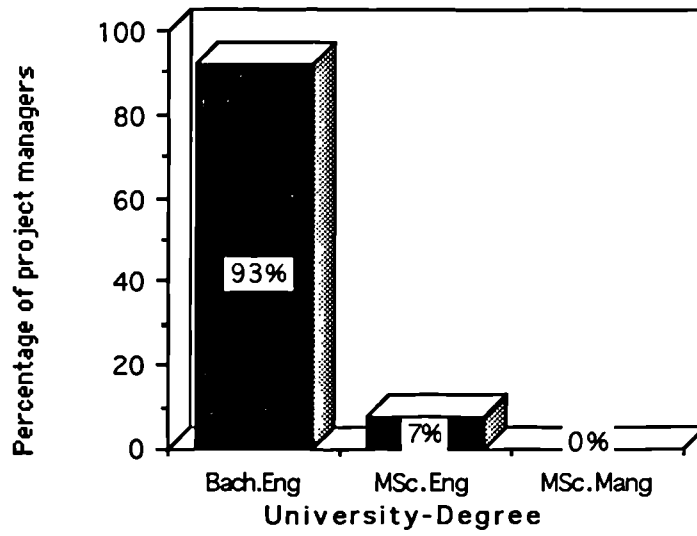


Figure 6.1 : University degree type by percentage of project managers.

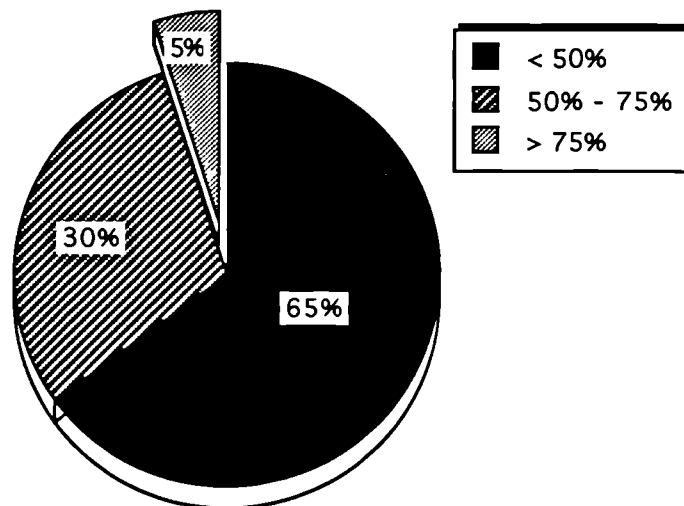


Figure 6.2 : Self-Evaluation of extent of Benefit from Education by percentage of project managers

6.1.2.3 Causes of Lack of Full Benefit of University Education

Three principal causes were identified, Figure 6.3 shows that 93% of managers surveyed believed that an inadequate number of university courses related to project management were taught during their university education.

Also, 68% believed that the cause of the lack of benefit from education was that courses taught emphasized theory while neglecting practical applications.

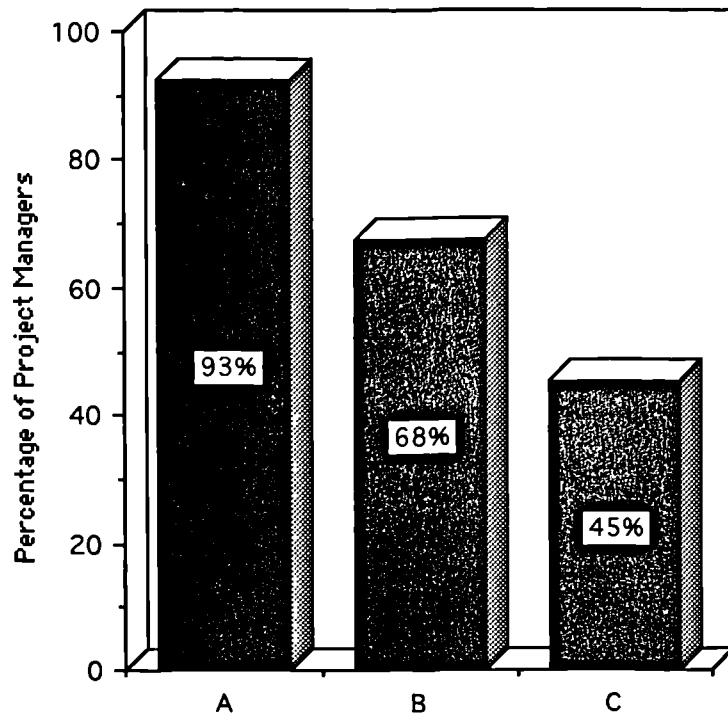
Furthermore, 45% believed that the cause was the incompatibility of courses taught with the project manager's actual needs.

6.1.2.4 Number of Actual Courses

To determine the number of actual courses taught in university in the subject areas identified previously, respondents were categorized into four groups for each subject as follows:

- * Group 1 - project managers who did not study any courses in that discipline.
- * Group 2 - project managers who studied one course in that discipline.
- * Group 3 - project managers who studied two courses in that discipline.
- * Group 4 - project managers who studied three or more courses in that discipline.

Figure 6.4 depicts these numbers and percentages and reveals the following: 71% of the project managers surveyed did not study any Business Management course, 32% did not study any Project Management course, 28% did not study any computer science course.



Causes of lack of Education benefit.

Figure 6.3 : Causes of Lack of benefit from Education by percentage of project managers

- A - Inadequate number of university courses related to project management.
- B - Courses taught emphasize theory while neglecting practical application.
- C - Incompatibility of courses taught with the project manager's actual needs.

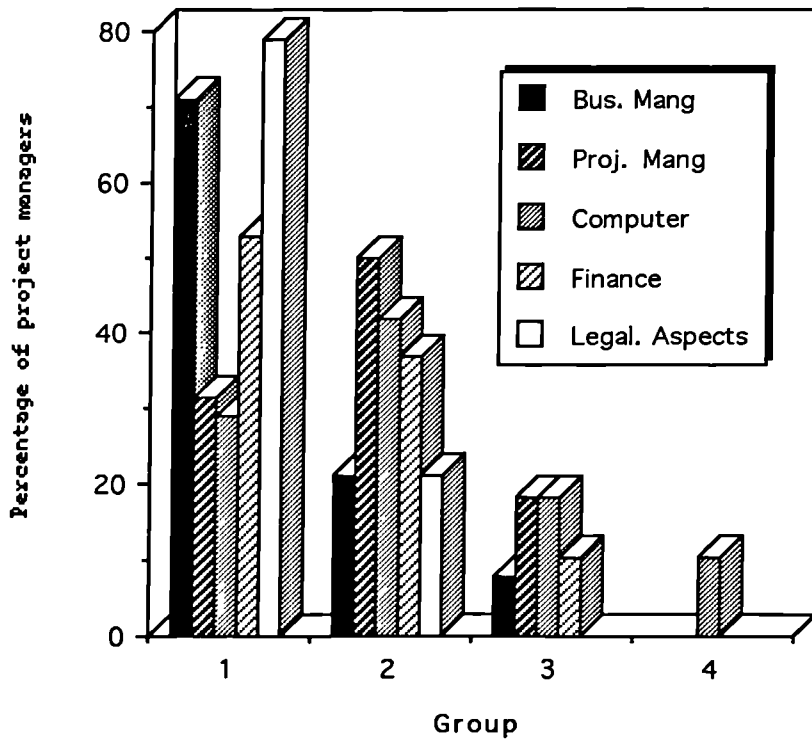


Figure 6.4: Actual courses for each subject by percentage of project managers

53% did not study any finance and accounting course and 79% did not undertake any law course .

6.1.2.5 Training Sources

To present the importance of training sources in the development of the management abilities of the surveyed project managers, the results were divided into three categories as follows:

- * Training sources marked 1-3 were categorized as least important.
- * Training sources marked 4-7 were categorized as of medium important.
- * Training sources marked 8-10 were categorized as of high importance.

Figure 6.5 depicts that :

- 92% of project managers rated on-the-job training as an important training source in development of their management skills.
- 56% believe that medium duration training courses are an important source .
- 38% believe that short courses and self education are important training sources.
- 33% believe that lectures, seminar and higher education are important sources.
- 28% believe that research is an important training source.

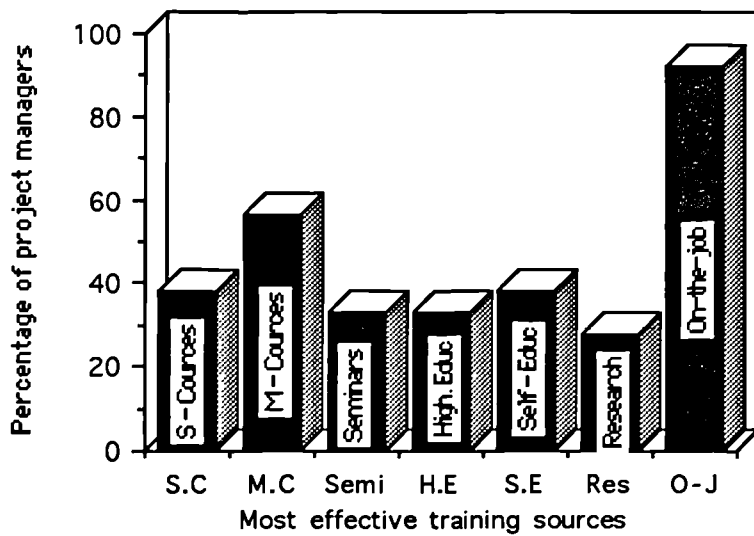


Figure 6.5 : The most effective sources of training by percentage of project managers

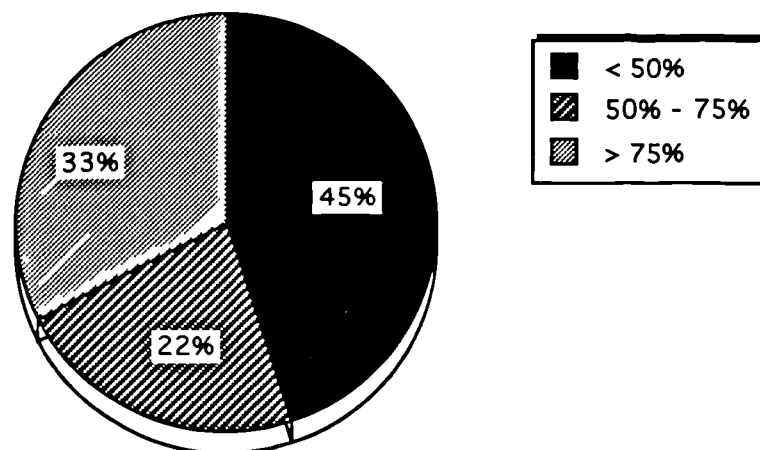


Figure 6.6 : Self-Evaluation of extent of benefit from training by percentage of project managers

6.1.2.6 Extent of Benefit from Training

Figure 6.6 depicts the results of self evaluation by each manager surveyed of the extent of benefit from training opportunities: 45% believed that they have realized benefits of less than 50%, 22% believed their benefits ranged between 50 and 75%; and 33% believed that their benefits exceeded 75%.

6.1.2.7 Causes of Lack of Full Benefit from Training

The principal causes given are illustrated in Figure 6.7 This shows that 50% of the managers surveyed believed that the lack of good preparation for training, from the department they work for, was the cause of lack of benefit. 47% attributed the cause to the lack of competence of the training organization. 50% believed that the training subjects were not compatible with the actual assignments of the project manager. 57% believed that the cause was the short duration of the training courses .

6.1.2.8 Actual Training

To reflect the surveyed project managers' actual training, the results for each training subject were categorized into five sections. The least trained managers, those who had not obtained any training opportunity from each source, were allocated to Section 1 ; the most trained managers, those who had obtained more than three opportunities from each source, were allocated to Section 5, Sections 2,3 and 4 represented equal increments of training opportunities between these two extremes.

Results reveal the following:

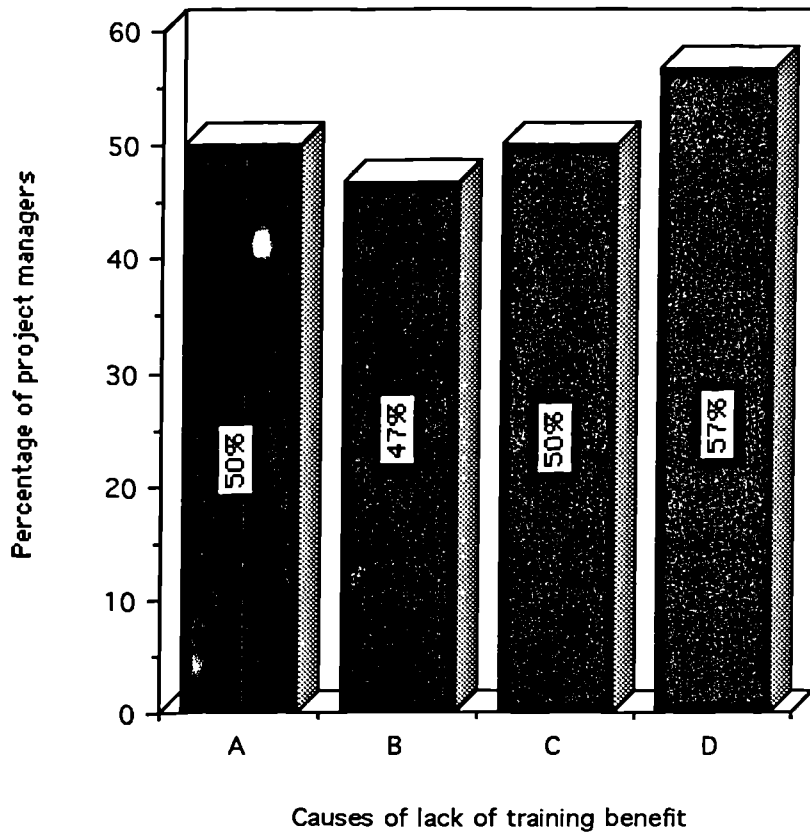


Figure 6-7 : Causes of lack of benefit from Training by percentage of project managers

- A - Lack of good preparation for training from the department they work for.
- B - Lack of incompetence of the training organization.
- C - Training subjects not compatible with the actual assignments of the project managers.
- D - Short duration of the training courses.

Business Management

Figure 6.8 depicts that :

- 78% of surveyed project managers did not participate in any short courses or seminars in Business Management.
- 83% did not participate in any medium duration courses.
- 98% did not carry out any research.
- none of the project managers surveyed has had any on-the-job training in the business management field.

Project Management

Figure 6.9 shows that :

- 20% of project managers did not participate in any short courses or seminars in project management.
- 25% did not participate in any medium duration courses.
- 83% did not participate in any symposia or lectures.
- 98% did not participate in any research.
- none of the project managers surveyed has had any on-the-job training in the field of project management.

Finance and Accounting

Figure 6.10 depicts that :

- 88% of project managers surveyed did not participate in any short courses in accounting and finance.
- 93% did not participate in any medium duration training courses.
- 98% did not participate in any symposia or lectures.
- none has submitted any research and none has had any on -the-job training.

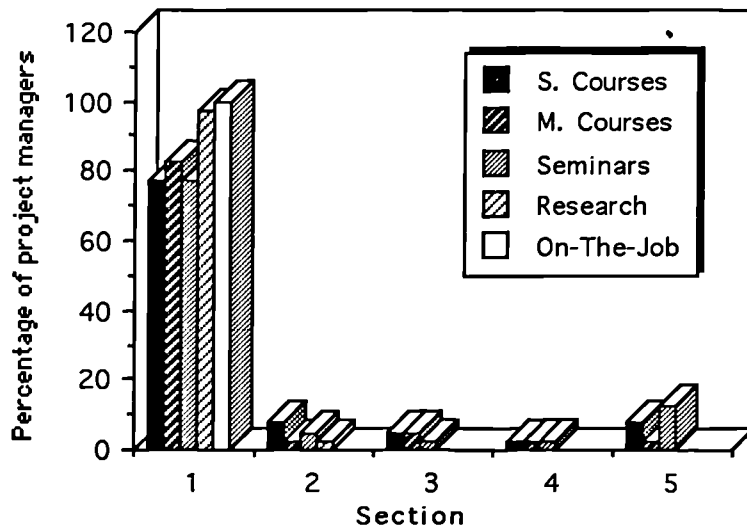


Figure 6.8 : Actual Business Management training from each training source by percentage of project managers

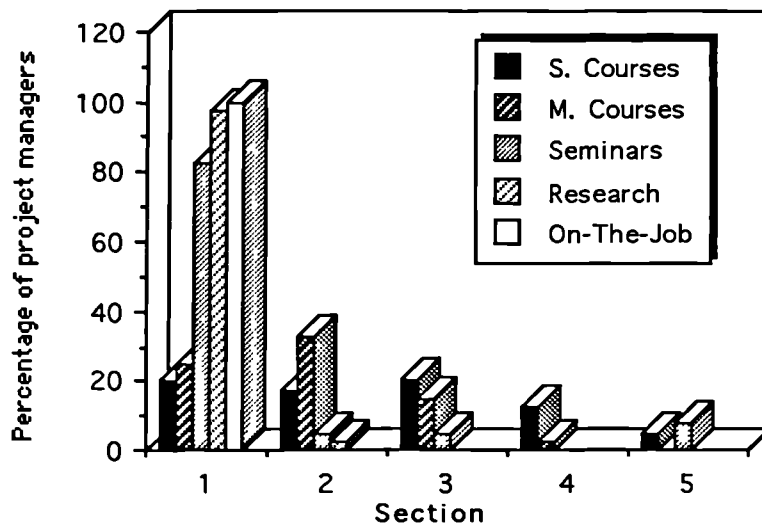


Figure 6.9 : Actual Project Management training from each training source by percentage of project managers

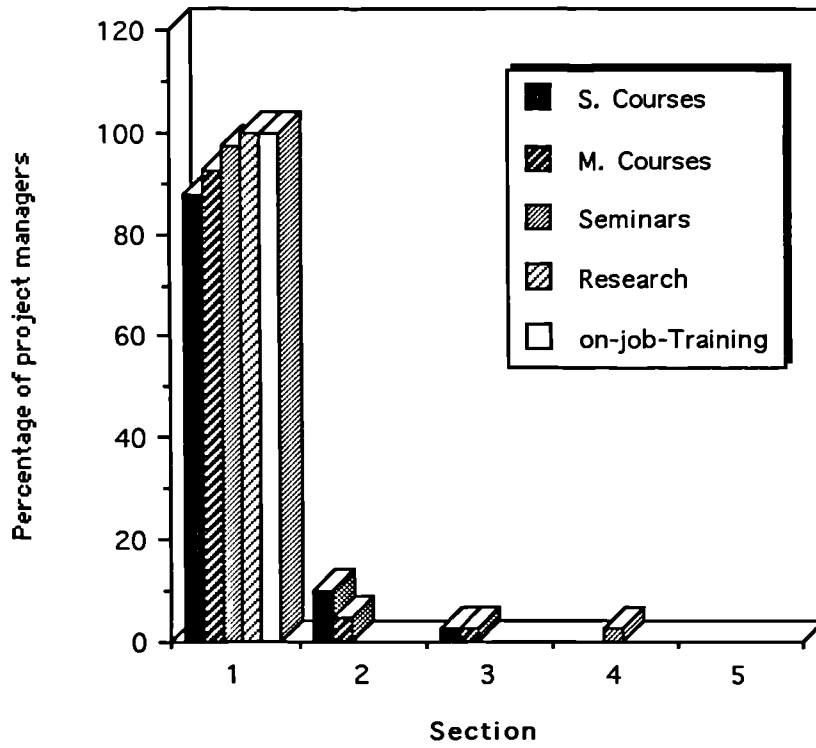


Figure 6.10 : Actual Finance & Account training from each training source by percentage of project managers

Computer Science

Figure 6.11 depicts that :

- 70% did not participate in any short courses on computer applications in project management.
- 88% did not participate in any medium duration training courses.
- 93% did not participate in any symposia or lectures.
- none has submitted any research. and none has had any on -the-job training.

Engineering Subjects

Figure 6.12 shows that :

- 60% of project managers surveyed did not participate in any short or medium duration courses on Engineering subjects related to their speciality.
- 68% did not participate in any symposia or lectures.
- none has submitted any research .
- 60% have had on the job training.

Legal Subjects

Figure 6.13 depicts that :

- 83% did not participate in any short course training seminars in legal subjects.
- 95% did not participate in medium duration courses.
- 88% did not participate in any symposia or lectures.
- none has submitted any research or had any on -the -job training.

6.1.2.9 Future Training Needs

The areas of training which project managers surveyed believed they needed were divided into three categories as follows:

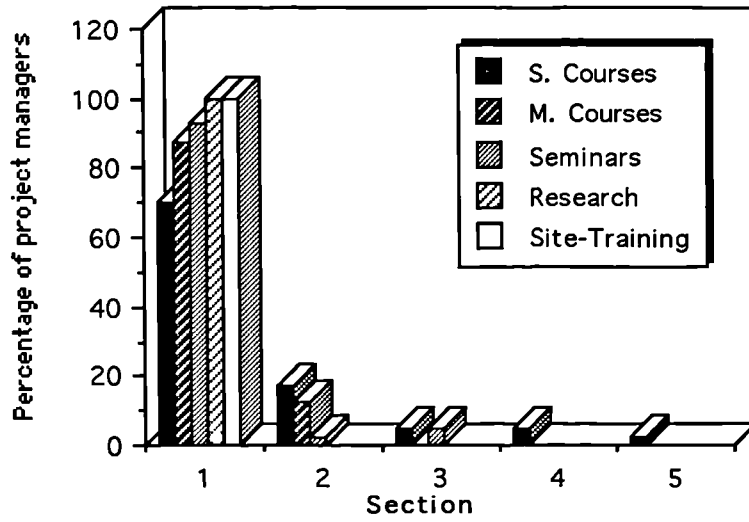


Figure 6.11 : Actual Computer training from each training source by percentage of project managers

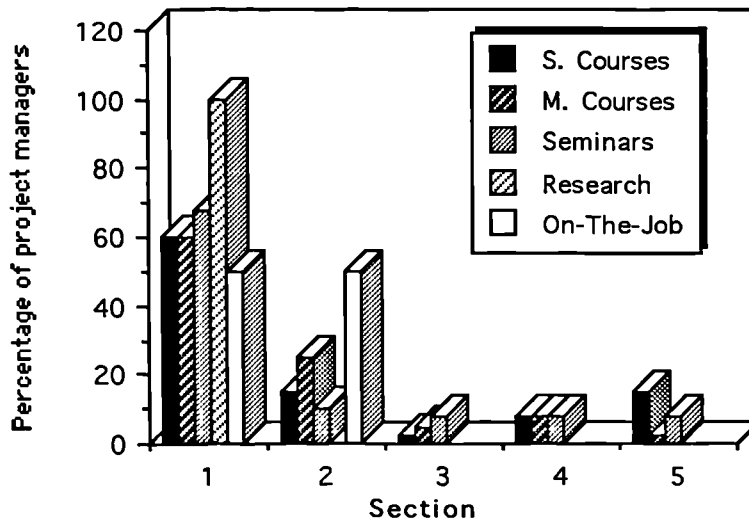


Figure 6.12 : Actual Engineering training from each training source by percentage of project managers

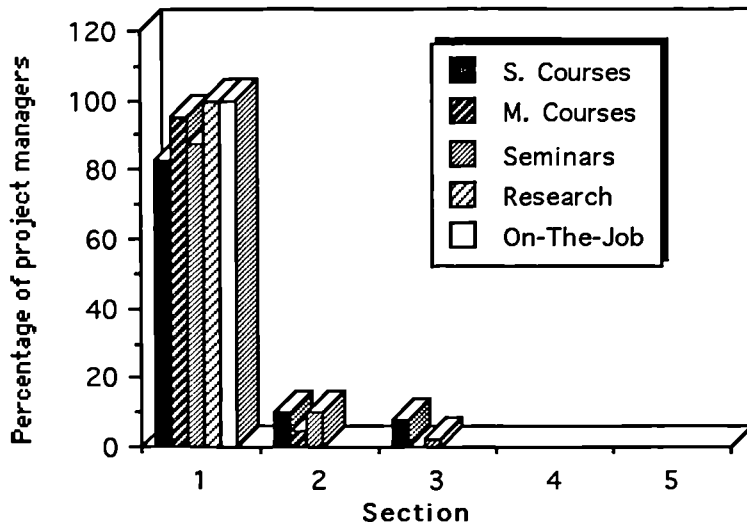


Figure 6.13 : Actual Legal Aspects training from each training source by percentage of project managers

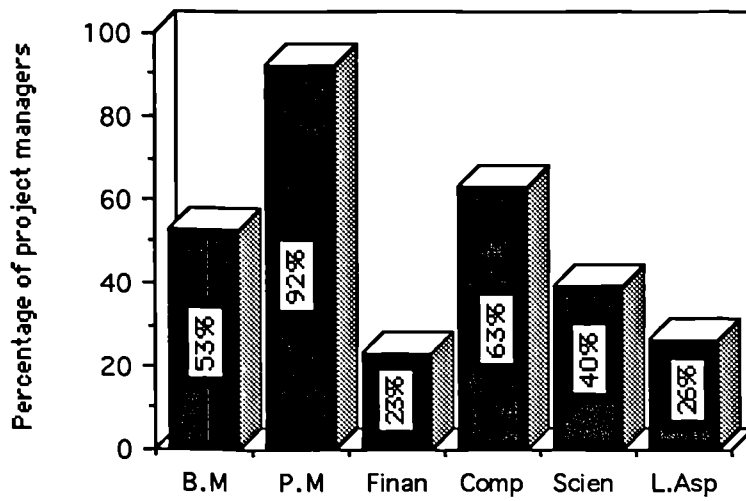


Fig (6-14) : Future training needs by percentage of project managers

- * Subjects rated 1-3 by the respondents are future training subjects least needed.
- * Subjects rated 4-7 are future training subjects with medium need.
- * Subjects rated 8-10 are future training subjects most needed.

Figure 6.14 depicts that :

- 92% of project managers surveyed believed they needed training in project management.
- 63% believed they needed training in computer applications.
- 53% needed training in business management.
- 40% needed training in engineering subjects related to their speciality.
- 26% needed training in legal subjects.
- 23% believed they needed future training in accounting and finance.

6.1.2.10 Number of Projects Participated in Before Appointment as Project Manager

The project managers were divided into five groups according to the number of projects they had participated in before appointment as project managers. The least experienced managers, those who had not worked on any projects prior to their appointment, were allocated to Group 1; the most experienced, those who had worked on more than three projects, were allocated to Group 5 . Groups 2,3 and 4 represented equal increments of experience between these two extremes.

Figure 6.15 displays some of the results of the survey and shows that

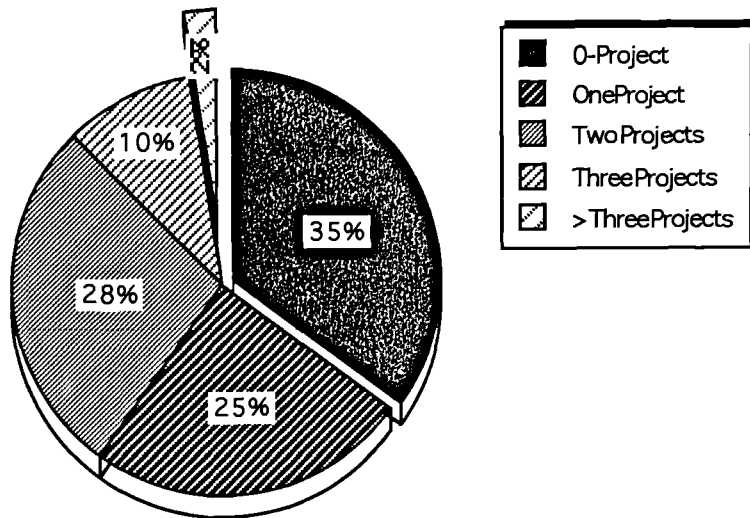


Figure 6.15: Projects participated in before appointment as project manager by percentage of project managers

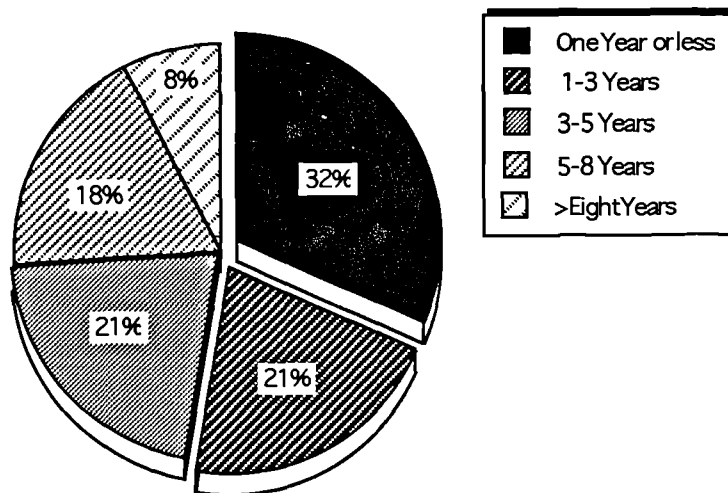


Figure 6.16 : Experience by percentage of project managers

35% of project managers surveyed did not work on any project before appointment as project managers, 25% had participated in one project only, 28% had participated in two projects only, 10% had participated in three projects only, and 2% had participated in over three projects.

6.1.2.11 Years of Experience Before Appointment as Project Manager

The length of post graduate experience of each manager before appointment as a project manager were calculated assuming that employment occurred immediately upon graduation. The managers were divided into five groups as follows:

- * Group 1 - One year experience or less.
- * Group 2 - One to three years of experience.
- * Group 3 - Three to five years of experience.
- * Group 4 - Five to eight years of experience.
- * Group 5 - Over eight years of experience.

Figure 6.16 depicts that :

- 32% of project managers surveyed had one year or less experience.
- 21% had 1-3 years of experience.
- 21% had 3-5 years of experience.
- 18% had 5-8 years of experience .
- 8% had over 8 years of experience.

6.1.2.12 Management Assignments Versus Technical Assignments

The project managers were categorized, based on actual assignments, into three groups, as follows:

Group (1) - Project managers who perform more management assignments.

Group (2) - Project managers who perform more technical assignments.

Group (3) - Project managers who perform an equal ratio of management and technical assignments.

Figure 6.17 depicts that:

- 80% of project managers surveyed performed more management assignments than technical assignments.
- 5% performed more technical assignments.
- 15% performed an equal ratio of management and technical assignments.

6.1.2.13 Extent of Benefit from Experience

Each project manager surveyed was asked to assess the extent of benefit derived from experience to prepare him as an effective project manager, Figure 6.18 depicts the results of this aspect of the survey and that 33% believed that they realized less than 50%, 27% believed that they realized 50-75% and 40% believed that they realized over 75%.

6.1.2.14 Causes of Lack of Benefit from Experience

Fig 6.19 depicts that :-

- 64% of project managers surveyed believed that the lack of good forward preparation by their employers was the cause of failure to realize the full benefits of experience.
- 86% believed that the cause lay in the lack of good planning to

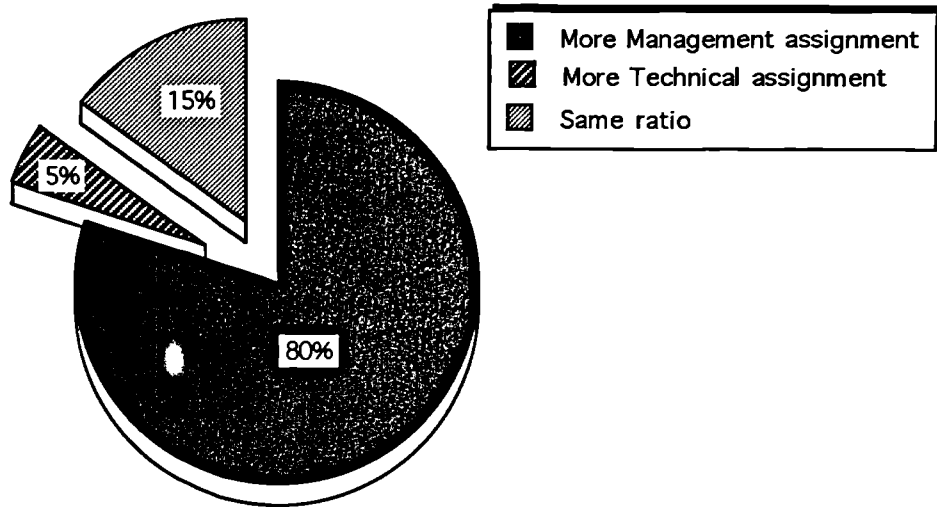


Figure 6.17 : Actual job assignment by percentage of project managers

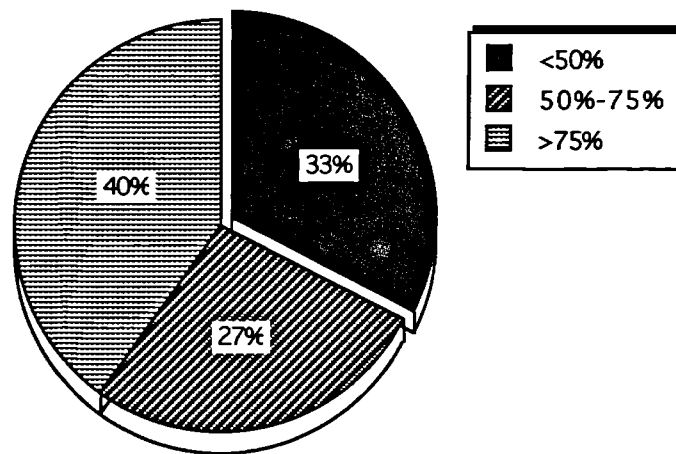


Figure 6.18 : Self-Evaluation of extent of benefit from Experience by percentage of project managers

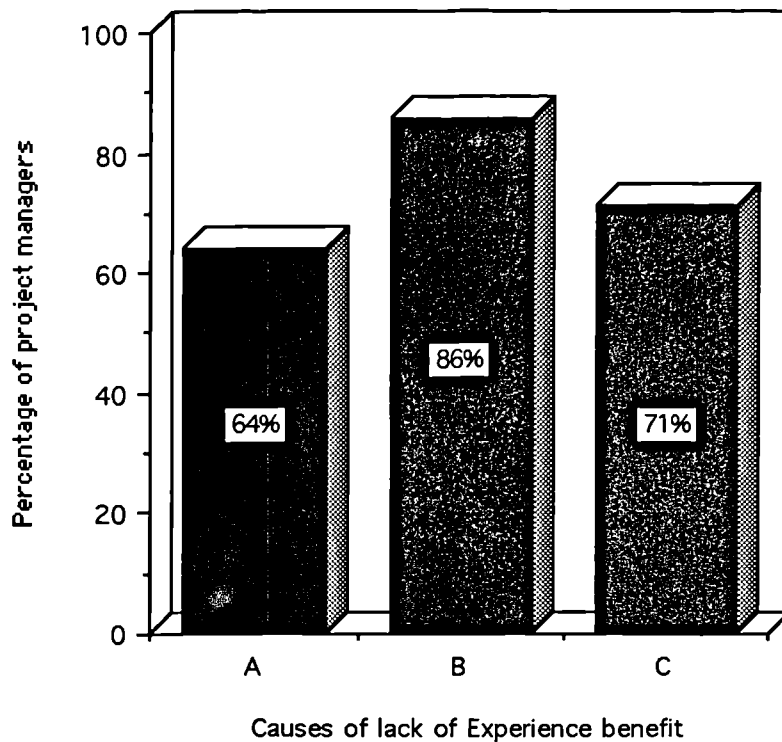


Figure 6.19 : Causes of lack of benefit from Experience by percentage of project managers

- A - Lack of good forward preparation by their employers for them to become project managers.
- B - Lack of good thought planning to provide for realizing full benefit of experience during project execution.
- C - Lack of an efficient organization to interconnect the parties of the project and provide a suitable environment for benefitting from experience.

provided by their employers for realizing full benefit of experience during project execution.

- 71% believed the cause to be lack of an efficient organization to interconnect the parties of the project and provide a suitable environment for benefiting from experience.

6.1.3 Standard Qualifications of the Successful Project Manager

6.1.3.1 General

To evaluate the management abilities and skills of the project managers surveyed, it was necessary to formulate specific standard qualifications of successful project managers. Several considerations were taken into account in the determination of those standards, as follows:

- a) That the standards represent minimum and not maximum or optimum qualifications.
- b) That the standards should be comprehensive. In order to achieve this the standards were divided into three main sections based on major components that contribute to the making of management abilities of a successful project manager (Education , Training and Experience see Item 6.1.3.2), which in turn were divided into different sub-sections.
- c) In order to render the standards as simple as possible, the following steps were taken:
 - i) Each of the main sections were allocated weightings such that aggregate weightings of all main sections totalled 100.
 - ii) Each subsection of the main sections was assigned a

weighting such that the aggregate weightings of all subsections totalled 100.

- iii) Each subsection of a subsection was assigned a weighting such that the aggregate weightings of all subsections of a subsection totalled 100.

6.1.3.2 Minimum Standards for Successful Project Managers

Woodward (35) states: *"perhaps the ideal route to becoming a top class project manager is to follow an initial technical degree course, followed by a period of a few years in industry as a practicing engineer or scientist. This should then be followed by a major course on project management leading to a master's degree, followed in turn by experience as a senior assistant on a major project. Throughout a project manager's working life, he should attend short courses in project management, partly to update his techniques, but also to re-sharpen his intellect."*

The standard qualifications of the successful project managers were divided into three main parts (shown in Figure 6.20), based on major components that contribute to the making of management abilities of a successful project manager—Education, Training and Experience.

The degree of contribution of each component to the making of management abilities of the project manager varies with the characteristics of that component.

Moreover, there is no accepted specification of the proportion represented by each component. Thus, the assessment of their importance may vary from one person to the next. However, for purposes of adoption of a specific ratio for each component, we have referred to a study by King Fahad University, Dhahran, Saudi Arabia⁽⁶⁶⁾ where it was found, through a survey which covered 137 Saudi engineers, that university education contributes 20% to the

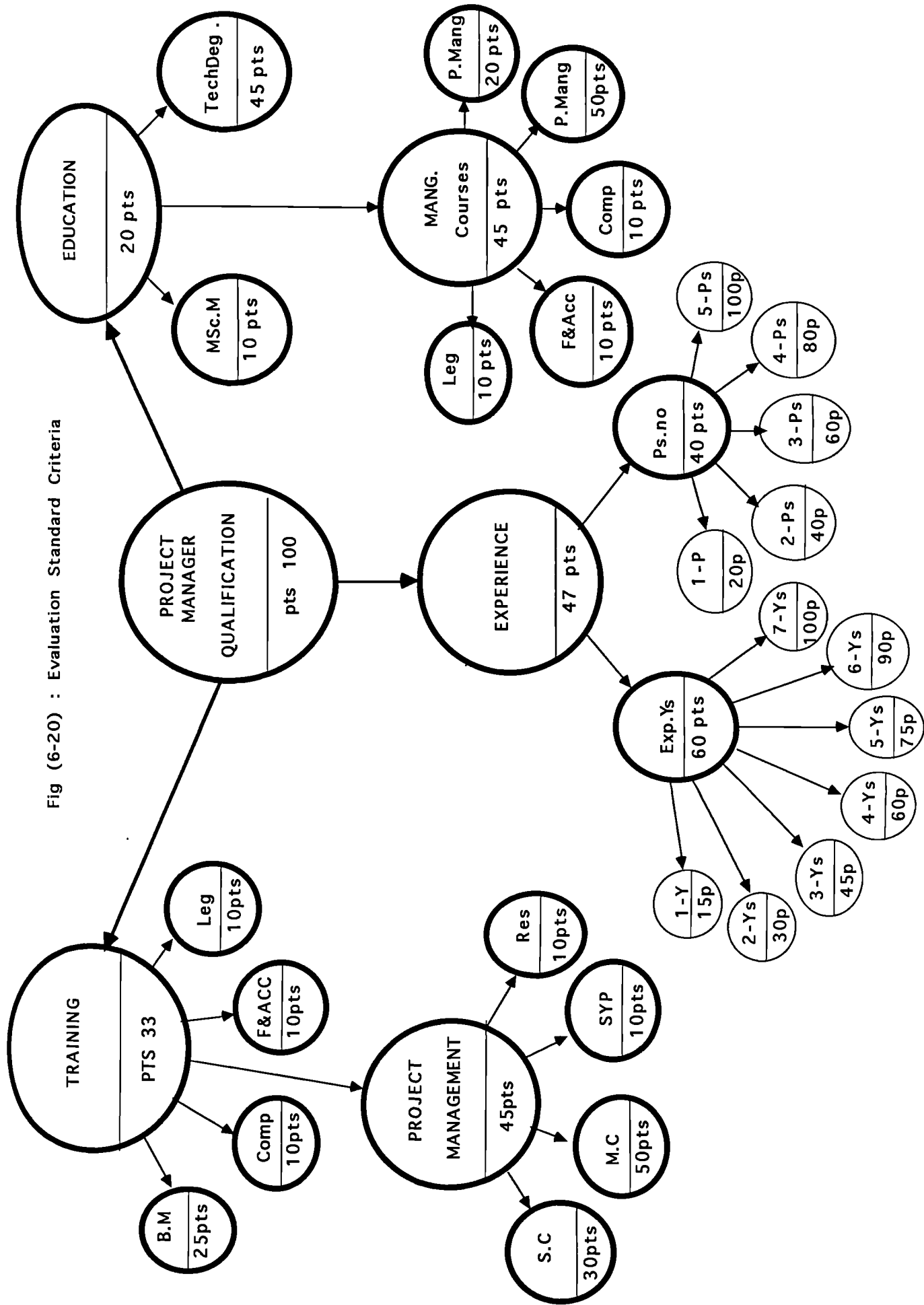


Fig (6-20) : Evaluation Standard Criteria

making of a Saudi Engineer's management abilities, while training contributes 33% and practical experience 47%. since this research relates directly to the situation we are studying, we have adopted the ratios contained therein as basis for evaluation.

We have prepared the standards and their weightings for each of the foregoing three components, bearing in mind that those standards were prepared to represent minimum qualification requirements of an efficient and successful project manager. In the following paragraphs we will clarify those standards.

a) Education

1) Standards for the evaluation of educational qualifications are divided into three sections.

weightings of each section were assessed as follows:

- Project manager holds a technical university degree	45	points
- University education course content related to project management.	45	points
- Project manager holds a Master's Degree in project management	10	points

Total	100	points

2) The second of the above sections pertaining to the course content of university education related to project management, is divided into five components. For ease of analysis, it is assumed that in order to obtain full points for each component, the minimum requirement shall be satisfied, that is study of one course only in the discipline represented by that component.

Division and assessment of points for each component were

carried out as follows:

- Business Management	20 points
- Project Management	50 points
- Computer Science	10 points
- Finance and Accounting	10 points
- Legal Subjects	<u>10 points</u>
Total	100 points

b) Training

Training assessment standards are divided into two sections; the first relates to subjects on which the manager was trained, and the second to training sources through which training was delivered:

1) The first section pertaining to subjects on which the manager was trained is in turn divided into five elements, and weightings are assigned to each element as follows:

- Training on Business Management	25 points
- Training on Project Management	45 points
- Training on Computer Applications	10 points
- Training on Finance and Accounting	10 points
- Training on Legal Subjects	10 points

Total	100 points

2) The second section pertaining to training sources through which training was delivered is divided into 4 elements. It is assumed that in order to obtain full points for each element, a project manager would have had the minimum requirement which is one training opportunity through the source

represented by that element. weightings were assigned as follows:

- Short course	30 points
- Medium course	50 points
- Lectures and Seminars	10 points
- Specialized research	<u>10 points</u>
Total	100 points

It is noted that on the job training is not listed as part of the aforementioned training courses. The reason is that the results of the survey have revealed that none of the project managers surveyed has had any on-the-job training except in the engineering subjects. Therefore the inclusion of this training source in this case as part of the standards will contribute to a reduction of the number of points that can be obtained by each project manager . Since we are looking for the minimum requirements to determine project manager efficiency, we have not included this source in the standards.

c) Experience

Standards pertaining to evaluation of experience are divided into two complementary sections. The weightings of each section were assessed as follows:

- Number of projects, manager participated in before first assignment as project manager	40 points
- Number of years of experience before first assignment as project manager	60 points

Total	<u>100 points</u>

c-1) Section 1 relates to the number of projects participated in before first assignment as project manager. Points were assigned at a rate of 20 per project up to a maximum of 100 points

c-2) Section 2 relates to the number of years of experience. Points were assigned at rate of 15 per year, up to and including 6 years, and 100 points for seven years experience

6.1.4 Evaluation

In an overview of survey findings, we can establish the extent of discrepancy between qualification of project managers surveyed and the requirements of their jobs.

We shall examine the extent of discrepancy through four different routes:

Route 1: Overall evaluation of survey findings.

Routes 2&3&4 : Numerical analyses of survey findings.

6.1.4.1 Discrepancy in Qualification Through Overall Evaluation of Survey Findings

The qualification and management abilities of project managers will be assessed through an overall evaluation of survey findings. Results will, where appropriate, be compared to the findings of a study which surveyed the qualification of project managers in the United Kingdom⁽³⁹⁾, Table 6-1 .

a) Education

1) Educational Qualifications

The results of the survey were that none of the surveyed

Table 6-1 : Comparison between the results of the survey carried out under this research on qualifications and abilities of project managers in Saudi Arabia and the results of a study of project managers in United Kingdom

Comparison Items	Project Managers in Saudi Arabia	Project Managers in United Kingdom
Educational qualification	none of the surveyed managers had Master's degree in management and only 7% has Master's degree in engineering.	45% of managers had Master's degree
University Education Content of management Courses	<p>82% of the sample studied 0-1 Courses related to Project management as part of their undergraduate university education</p> <p>90% of the sample studied 0-1 course related to accounting and finance as part of their undergraduate university education</p> <p>72% of the sample studied 0-1 course related to computer science as part of their undergraduate university education</p>	<p>59.1% of the sample studied undergraduate degrees on which, 0%-5% of the course was devoted to management</p> <p>85.5% of the sample studied undergraduate degrees on which, 0%-5% of the course was devoted to computer science subjects</p> <p>84.5% of the sample studied undergraduate degrees on which, 0%-5% of the course was devoted to finance and accounting subjects</p>
Number of projects participated in before first appointment as project manager	60% of Manager surveyed had not participated in any project or had participated in one project only , while 28% had participated in two projects only, before their first appointment as project managers.	63.6% of project managers surveyed had participated in up to 10 projects, while 25.5% has participated in 11 to 20 projects before their first appointment as project managers.
Years of experience	74% of project managers surveyed had had experience ranging from less than one year to five years.	20% of project managers surveyed had had 7-17 years of experience, 45.5% had had 18-27 years of experience and 33.6% had had 27-40 years of experience.

managers had Master's degree in management and only 7.5% had Master's degree in engineering. Comparing these results to the results of the UK study⁽³⁹⁾, which found that 45% of managers had Master's Degree, we find that the difference between the two results is very large. This supports the view that there are weaknesses in the educational preparation of project managers surveyed.

2) University Education Content of Management Courses

The results of the UK study ⁽³⁹⁾ which showed that:

- 59.1% of the sample studied degrees on which, 0%-5% of the course was devoted to management subjects
- 84.5% of the sample studied degrees on which, 0%-5% of the course was devoted to finance and accounting subjects.
- 85.5% of the sample studied degrees on which, 0%-5% of the course was devoted to computer science subjects.

Our survey results, as depicted in figure 6.4, show that:

- 82% of the sample studied 0-1 course related to project management as part of their university education.
- 72% of the sample studied 0-1 course related to computer science as part of their university education.
- 90% of the sample studied 0-1 course related to accounting and finance as part of their university education.

By comparing the findings of the two studies we find that they expose common weaknesses in these aspects of the content of university courses. In this respect, the UK study of project managers states:

"The overall impression is that construction project managers in U.K

are of shallow or even very shallow managerial, legal, financial and accounting background." (39)

3) Benefit from University Education

Figure 6.2 shows that 65% of project managers surveyed believed that the actual benefit they derived from their university education as a basic preparation for successful future project management was less than 50%. This high percentage demonstrates a confirmation by project management surveyed of the existence of weakness in this aspect of their undergraduate degrees.

b) Training

1) Actual Training

In viewing the results of actual training, shown in Figures 6.8, 6.9, 6.10, 6.11, and 6.13, and in consideration of training opportunities allowed to project managers through short courses (which usually represented the largest training source) we find:

- 78% did not participate in short training courses in business management.
- 20% did not participate in short training courses in project management.
- 88% did not participate in short training courses in accounting and finance.
- 70% did not participate in short training courses in computer science.
- 83% did not participate in short training sessions on legal subjects.

These percentages indicate a clear gap in these very important aspects. This is particularly so when we consider that the data included all training opportunities from the time of graduation to the date of completing the questionnaire, and not to the date of first appointment as project managers.

2) Realizing Benefits from Training

If we consider that 45% of project managers surveyed believed that the benefit realized from training opportunities was less than 50%, (see Figure 6.6), it becomes clearly evident that the training they obtained was not effective.

c) Experience

The experience results clearly demonstrate a large discrepancy between the skills and abilities of project managers surveyed and the requirements of their work.

c-1) Number of Projects Participated in Before First Appointment as Project Manager

Figure 6.15 shows that 60% of project managers surveyed did not participate in any project, or had participated in one project only, while 28% had participated in two projects only, before their first appointment as project managers. This result of this weakness is self evident. However, for purposes of comparison, the UK study finds that 63.6% of managers surveyed had participated in up to 10 projects, while 25.5% had participated in 11 to 20 projects before their first appointment as project managers. The vast difference between the two results confirms an obvious weakness in the project managers

surveyed in this vitally important component of preparation of project managers.

c-2) Years of Experience

Sir Alistair Frame stated at an Engineering Institution meeting in November 1985 that *"he would be surprised if anyone was appointed to run a major project much below the age of 45"* (67)

The UK study found that 20% of project managers surveyed had had 7-17 years of experience, 45.5% had had 18-27 years of experience and 33.6% had had 27-40 years of experience. By comparing the aforementioned results and the findings of our questionnaire in Figure 6.16 which depicts that 74% of project managers surveyed had had experience ranging from less than one year to five years; it becomes clearly evident that there is a huge discrepancy in the required experience of public sector in project managers in S.A .

3) Realizing Benefit from Experience

In view of the above comments pertaining to the experience of project managers surveyed, and knowing that 33% of project managers surveyed, (see Figure 6.18) found that their benefit from experience was less than 50%, we can further emphasise the extent of weakness in this aspect of preparation of project managers.

6.1.4.2 Discrepancy in Qualification Through Numerical Analysis

Based on survey results, and using the aforementioned standards in

section 6.1.3.2 we have assessed gaps in the qualification of project managers surveyed, through three different assumptions.

Section 6.1.3.2 states that the three major elements contribute to the making of project manager's management abilities and qualification, we can express relationship this by the following equation:

$$Q = E + T + X \quad \text{..... (6.1)}$$

Where:

Q : is project manager's qualification

E : is university education

T : is training

X : is experience

As qualification depends on the effectiveness of each of the three elements separately, and such effectiveness varies from one element to the next, we can state that qualification is:

$$Q = E_v(\text{eff}_E) + T_v(\text{eff}_T) + X_v(\text{eff}_X) \quad \text{.....(6.2)}$$

Where:

E_v : Estimated value of education element based on the standards and survey results.

T_v : Estimated value of training element based on the standards and survey results.

X_v : Estimated value of experience element based on the standards and survey results.

eff_E : Effectiveness of university education

eff_T : Effectiveness of training.

eff_X : Effectiveness of experience.

As stated in item 6.1.3.2 of this Chapter, contributions of each of the

three major elements in the making of a successful project manager are variable and unspecified. Assessment of their weightings may vary from one person to the next. By using the weightings listed in that item, we can say:

$$Q_A = E_v \cdot (\text{eff}_E) \cdot P_E + T_v \cdot (\text{eff}_T) \cdot P_T + X_v \cdot (\text{eff}_X) \cdot P_X \dots\dots\dots (6.3)$$

Where:

Q_A : Actual Qualification

P_E :% contribution of education in the making of the project manager's qualification = 20%

P_T : % contribution of training in the making of the project manager's qualification = 33%

P_X : % contribution of experience in the making of the project manager's qualification = 47%

Thus, a measure of the discrepancy between a project manager qualification and the job's requirements may be expressed as :

$$\text{Gap} = 100 - Q_A \dots\dots\dots (6.4)$$

Where:

Gap = Discrepancy in qualification.

By substitution of equation 6.3 in Equation 6.4:

$$\text{Gap} = 100 - [E_v \cdot (\text{eff}_E) \cdot P_E + T_v \cdot (\text{eff}_T) \cdot P_T + X_v \cdot (\text{eff}_X) \cdot P_X] \dots\dots\dots (6.5)$$

Based on equation 6.5, the discrepancy in qualification was calculated using three different effectiveness assumptions as follows:

Method (1):

By using each surveyed project manager's self evaluation of the effectiveness of each of the three elements - education, training and experience.

Method (2):

By assuming a single fixed effectiveness for each of the three element of 80%. This high percentage of efficiency was assumed and fixed in order to emphasise the extent of discrepancy in efficiency .

Method (3):

By assuming the highest possible effectiveness of each of the three elements, where a ratio of 100% is assumed. This is an unlikely condition but is intended for comparative use and to clarify the size of the existing Gap.

a) Assessment of Gap in Qualification Using the Self Evaluation

As mentioned above, the Gap in qualification will be assessed using the self evaluation of surveyed project managers of the effectiveness of each element by using equation 6.5.

After completion of the calculations , results showed as depicted in Figure 6.21 :

- 92% of project managers surveyed have a Gap in qualification of over 60%.
- 8% have a gap between 50% and 60% .

None of the project managers surveyed had a gap less than 50%. The minimum gap was 53%, while the maximum was 96%. These results confirm the existence of significant weakness in the qualification and management abilities of government project managers. This is particularly apparent if we bear in mind the assumption stated at the beginning of this Chapter that standards of assessment represent minimum requirements and not maximum or optimum qualifications.

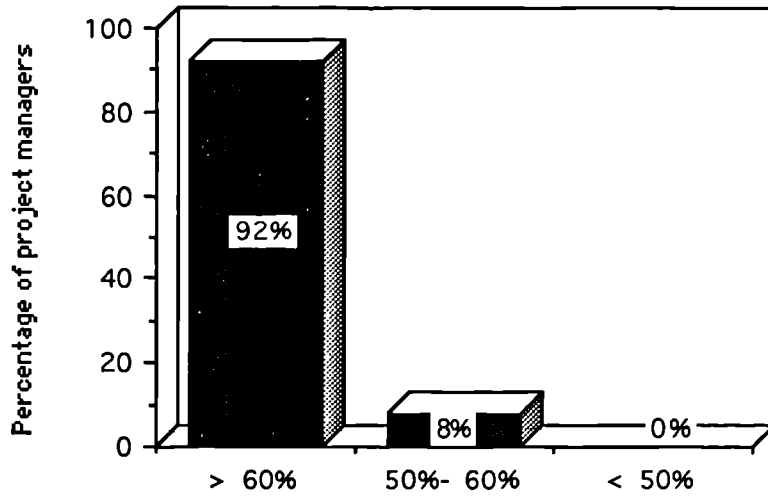


Figure 6.21 : Gap-Self Assessment-by percentage of project managers

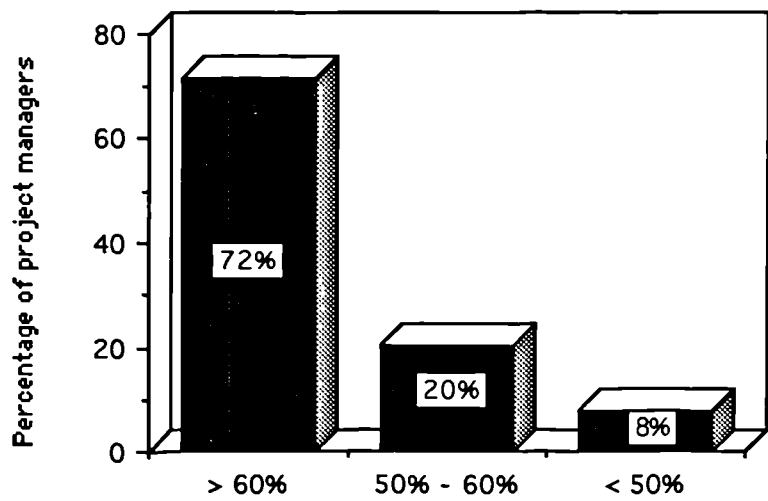


Figure 6.22 : Gap-80% Efficiency- by percentage of project managers

b) Assessment of Gap in Qualification using an Effectiveness Ratio of 80%.

This approach assumes that there is a single effectiveness ratio for each of the three major elements, namely 80%. Thus equation 6.5 becomes:

$$\text{Gap} = 100 - [E_V \cdot P_E + T_V \cdot P_T + X_V \cdot P_X] \text{ eff} \quad \dots (6.6)$$

Figure 6.22 depicts that 72% of project managers surveyed had a gap of over 60% and that 20% had a gap between 50 and 60%, while 8% had a gap of less than 50%. The minimum gap was 39%, while the maximum was 68%. These results too confirm the existence of discrepancy between the management abilities and qualification of government project managers and their job's requirements.

c) Assessment of Gap in Qualification Using an Effectiveness Ratio of 100%.

Here it is assumed that the effectiveness ratio of each of the three elements is 100%. As mentioned earlier, this is considered practically impossible but is provided here for purposes of comparison and to reflect the size of discrepancy in qualification of surveyed project managers. Thus equation 6.5 becomes:

$$\text{Gap} = 100 - [E_V \cdot P_E + T_V \cdot P_T + X_V \cdot P_X] \quad \dots(6.7)$$

Figure 6.23 depicts that 51% of project managers surveyed have over 60% gap in qualification, and that 21% have a gap of between 50 and 60%, while 28% have a gap of less than 50%. The minimum gap was 24%, while the maximum was 83%. These results confirm the existence of discrepancy in the

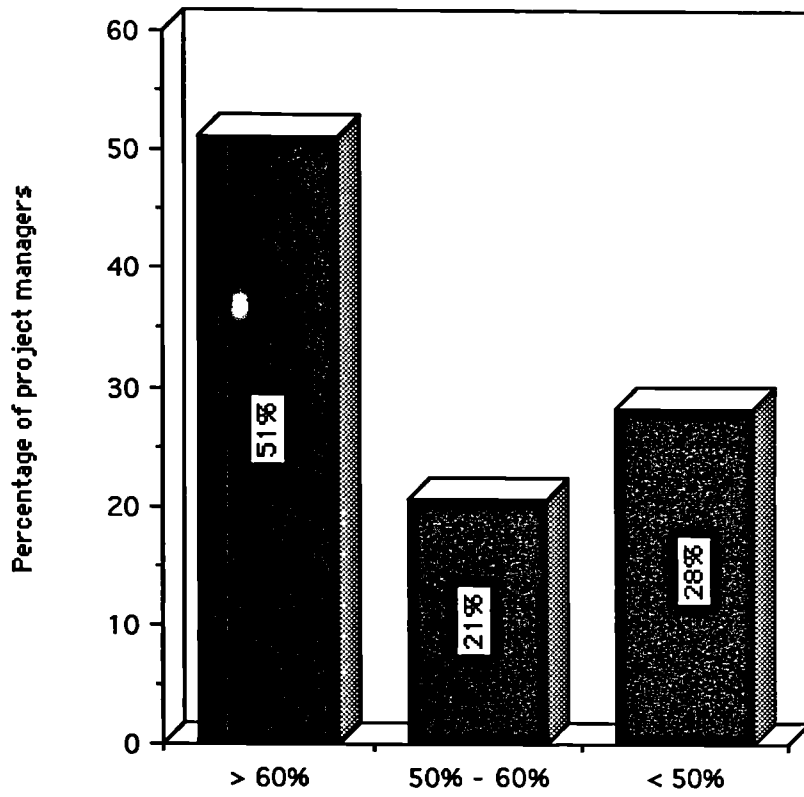


Figure 6.23 : Gap-100% Efficiency- by percentage of project managers

management abilities and qualification of government project managers, knowing that we have here assumed a percentage of 100% for each of the three elements that contribute to the making of management abilities of project managers.

To further confirm the discrepancy in the project management abilities of public sector managers in Saudi Arabia, and to clarify that the results achieved, which confirm this gap, are not dependent on the ratios established for the components of Education, Training and Experience.

Further calculations have been performed based on two assumptions. These assumptions change the weightings of the components and show that :

- **First Assumption**

The education and training contributions were increased, while reducing the weighting of experience's, and assumed that training contributes more than experience and education in the making of project managers abilities. In detail we assumed that education contributes 22% to the making of project management abilities while training contributes 40% and experience 38% assuming an efficiency factor of 100% .

Figure (6-24) shows that 49% of project managers surveyed had a gap of over 60% and that 33% had a gap between 50 and 60%, while 18% had a gap of less than 50% . The minimum gap was 23% , while the maximum was 81% .

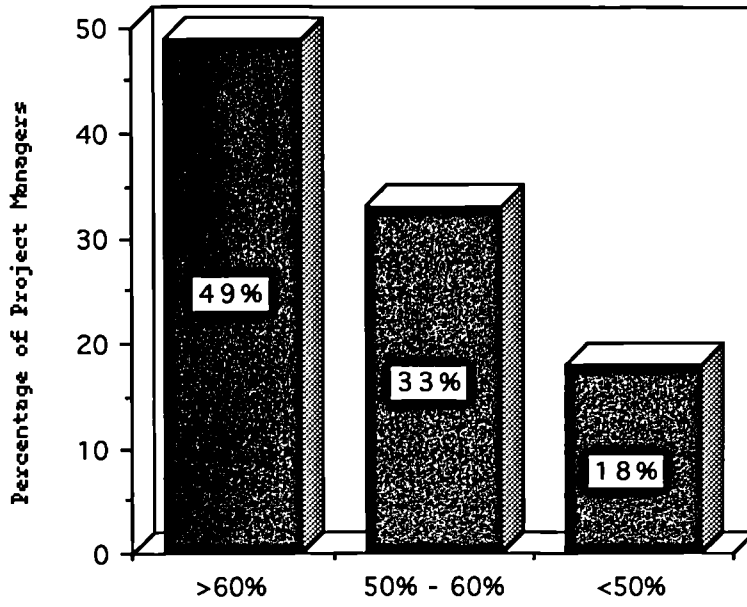


Figure 6.24 : Gap - 100% Efficiency - by percentage of project managers , assuming Education contributes 22%, Training 40% and Experience 38%.

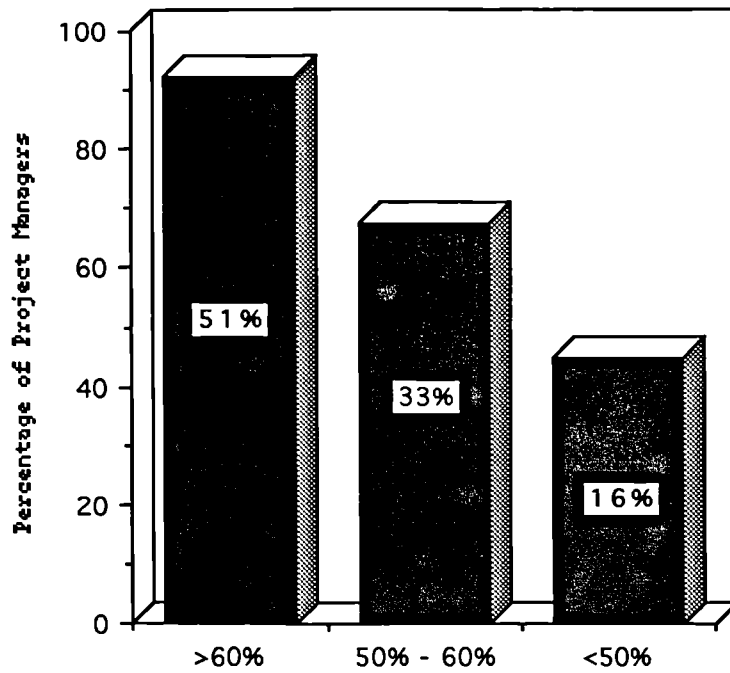


Figure 6.25 : Gap - 100% Efficiency- by percentage of project managers, assuming Education contributes 30% , Training 35% and Experience 35% .

- Second Assumption

We increased the education contribution to a higher level than in the first assumption and assumed equal contributions of training and experience to the making of project managers abilities. In detail we assumed that education contributes 30% to the making of project management abilities, while training contributes 35% and experience 35% assuming an efficiency factor of 100%.

Figure (6-25) shows that 51% of project managers surveyed had a gap of over 60% and that 33% had a gap between 50 and 60% , while 16% had a gap less than 50% . The minimum gap was 30% , while the maximum was 79% .

These results also confirm our previous conclusion that there is a gap in management abilities of public sector project managers in Saudi Arabia.

6.1.5 Conclusion

The survey results and the assessment process reveal that in all standards there is a clear Gap in the qualification of public sector project managers.

6.2 Proposals and Views to Contribute to Development of Qualification and Management Abilities of Project Managers

6.2.1 General

"Are project managers born or made?" This question is posed at this stage of the study. Woodward replies to this question saying:

"The answer is probably that they must be born with the right basic intellectual capability but then must be formed by a process of structured and integrated education and training".(68).

6.2.2 University Education

Perhaps what attracts our attention most when we discuss university education for project managers, based on the survey findings, is the high figure for "lack of benefit" derived from education. What are the reasons for that? To answer this question, we find it essential to discuss the adequacy of courses taught in Saudi universities. However, before we commence, it is important to state that survey results show that 100% of public project managers surveyed were engineers. This leads us to discussion of the adequacy of courses taught at colleges of engineering in the Kingdom to provide the basic preparation of engineers as future project managers. Engineering curricula were analysed for the following three Saudi universities:

1. King Saud University, Riyadh
2. King Fahad University, Dhahran
3. King Abdul-Aziz University, Jeddah

The aforementioned three Universities graduate engineers in all engineering disciplines. The analysis of the engineering curricula at those universities revealed that compulsory courses related to the basic preparation of engineers as project managers were:

- | | |
|------------------------------------|---|
| 1. King Saud University (69) | Three courses related to computer, project management and finance subjects. |
| 2. King Fahad University (70) | Two courses related to computer and project management subjects. |
| 3. King Abdul-Aziz University (71) | Three courses related to computer, project management and finance subjects. |

In view of survey results and the opinions expressed by surveyed project managers in respect of courses they proposed should be taught in universities to provide the required preparation for successful project managers, a high percentage (see Figure 6.26) proposed the following:

- That university education include two business management courses
- That university education include two project management courses
- That university education include three computer science courses
- That university education include one finance and accounting course
- That university education include one legal course.

That is 9 courses. This result is compatible with the study carried out by King Fahad University to assess the need of continued management education of Saudi engineers⁽⁶⁶⁾, the findings of which reveal that the participants in the study recommended 8 courses in this field. However, the study did not provide details of the proposed courses.

In addition to the inadequate number of courses, 68% of project managers surveyed believed that the cause of lack of full benefit from university education was attributable to the fact that subjects taught emphasized theory and neglected practice. It should be mentioned here that this shortcoming was noted in university education in the United Kingdom where Moore states that "*much management education is criticized for being too academic and not sufficiently practical.*"⁽⁷²⁾

On the other hand, 45% believed that the cause of lack of full benefit from university education was the incompatibility of courses taught with actual needs of the project manager. So, in addition to the number of

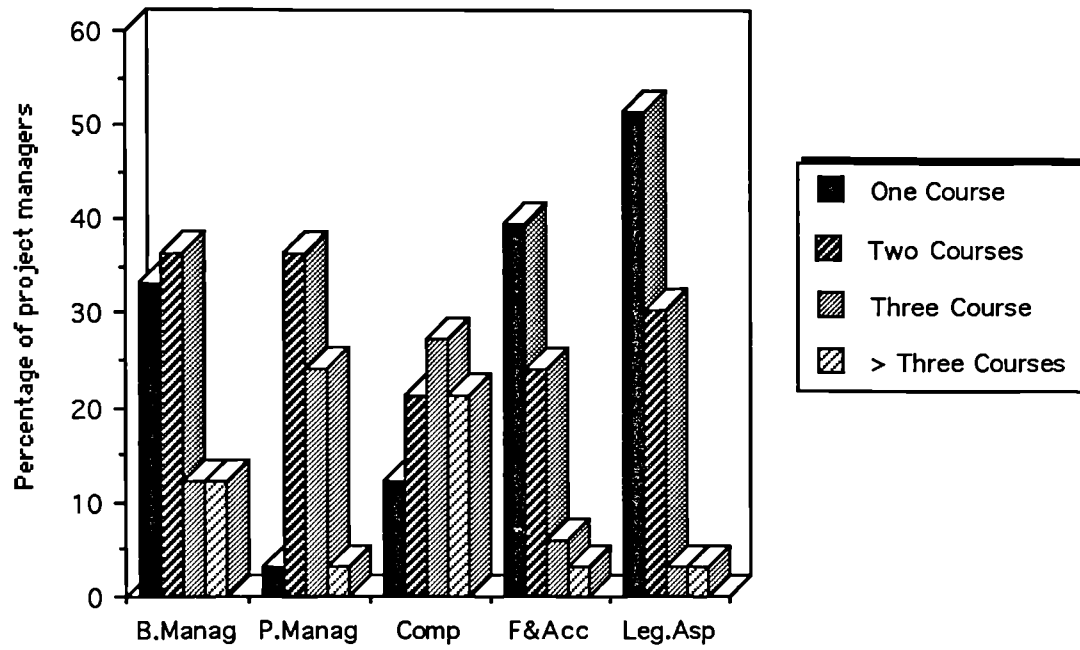


Figure 6-26 : Proposed number of courses by percentage of project manager

these courses being less than required, the courses taught do not satisfy actual needs of the project manager.

Perhaps here we reach the first proposal for the development and enhancement of management abilities and qualification of project managers.

Proposal (1)

It is necessary to restructure engineering education in Saudi universities as follows:

- a. Increase the number of compulsory courses taught to engineers which prepare them to be future project managers. Consider the possibility of applying the findings of this study and the King Fahad University study in respect of course numbers and disciplines. This proposal conforms to the recommendations of the King Fahad University study in respect of the need for continued management education of Saudi engineers. That study recommends that colleges of engineering must reconsider compulsory management courses in their curricula. Furthermore, Woodward (35) states that *"It is very useful to provide undergraduates with some knowledge of the subjects involved in project management."*
- b. The subjects should not emphasize theory and neglect practice as this is apt to render them ineffective.
- c. Selection of appropriate subjects that reflect the actual need of Saudi government project managers.

What makes this proposal of most importance is that it is based on several considerations including:

- * Most engineers assume management assignments at some stage after graduation (66). This fact does not apply to Saudi engineers

only, but also applies to engineers all over the world. For example, a study by the American National Foundation of Science in 1980 found that almost a third of all engineers in the United States stated that their basic assignments were in the field of management⁽⁶⁶⁾. Perhaps this fact is most evident in the case of Saudi engineers in public departments where our survey findings (see Figure 6.17) showed that 80% of engineers surveyed stated that they performed management assignments more than they performed technical assignments during their entire post graduate experience.

- * The speed with which Saudi engineers convert to performance of management assignments. The U.S. engineers study carried out by Le bold and others ⁽⁷⁷⁾ finds that 30% of engineers assume management assignments sixteen years after graduation. The study carried out by King Fahad University⁽⁶⁶⁾ shows that 30% of Saudi engineers assume management assignments only 7 years after graduation, while the findings of our survey show, as depicted in Figure 6.16, that 74% of project managers surveyed gained their first appointment as project managers less than five years after graduation.
- * Difficulties engineers face in converting from engineering to management assignments are attributed to numerous reasons including, the fact that engineering education emphasizes problem solving using subjective measures and known equations, while management on the other hand involves personal initiative and judgements that are not clearly defined. ⁽⁶⁶⁾.

6.2.3 Training

Einsiedel⁽⁷³⁾ says *"Building up a project should include consideration given to training. Training is not just a wise insurance against incomplete performance that could result in losses of time, money, equipment or lives, but it could be the difference between an exemplary project and one that is merely completed on schedule and under budget."* While Woodward⁽⁶⁸⁾ says *"The fundamental need for training is apparent from the fact that many projects in recent years have gone badly wrong. They fail on one or more of three main aspects: time, budget, and quality."*

The importance of training in the making of management abilities and qualifications of project manager is not a subject for discussion, as it is considered a given. The aforementioned viewpoints are listed to shed more light on this essential aspect. Our proposals here will not stress the necessity of training, but will emphasize how training can be made effective in order to achieve aspired results.

Proposal (2)

Public sector departments should emphasize Continued Education as an effective training tool.

Continued education in this field should be a comprehensive process in which government departments participate with universities and vocational institutes through continued coordination of real life needs.

Woodward ⁽³⁵⁾ says *"We cannot learn to swim by reading a book, but have to be taught. Similarly, we cannot become a project manager by reading a book, but can benefit enormously from being taught."* Continued education represents the best way of facing the challenges of the century, involving the preparation of qualified and trained individuals capable of dealing with changes and developments with maximum realism and effectiveness.

In this aspect Bolliger⁽⁷⁴⁾ says: *"Training should be an ongoing process and should be continued as permanent education within project management."*

The importance of continued education in the field of project management in Saudi Arabia lies in several considerations including:

- * It is related to a fast-changing, fast-growing environment.
- * The weakness in the ability of university education to provide basic requirements, as stated in our discussion of university education.

This proposal agrees with the findings of the King Fahad University study on the continued management education needs of Saudi Engineers⁽⁶⁶⁾ where the study recommends that *"universities must provide a continued education system as needed by engineers in technical and management aspects alike. Both the private and public sectors must support continued education activities such that engineers become highly qualified in a rapidly changing environment."*

Finally, continued education in project management must emphasize two broad aspects as Woodward states *"There are two broad aspect to education in project management, namely the techniques, facts, procedure (i.e. knowledge) on one hand, and the development of appropriate intellectual management abilities (i.e. attributes) on the other. The former can be taught more readily, while the second can only be developed through a lengthy educational process, both by teaching and experience."*⁽³⁵⁾

Proposal (3)

Public Sector Departments should develop Comprehensive Training Plans and Programs.

It is necessary to provide effective training that achieves objectives in the framework of a comprehensive clearly defined plan that forms part of the overall management plan. The objectives of training should be compatible with overall departmental objectives. They should be prepared

through an actual study of departmental conditions, taken into account needs, available resources and evaluation of staff. They should assess weaknesses and determine the management structures of the department through which future projects can be assessed, in number and nature. In addition, they should consider the assessment of past management conditions, the determination of negative aspects and impediments to the success of future projects.

Bolliger⁽⁷⁴⁾ says *"It should not be overlooked that, in conjunction with the structure of a project team, there is a need to formulate a training plan for the team and its members."*

Interviews with public department officials, in charge of the government projects surveyed, showed that no departments have clearly defined training plans or programs. This gives a reasonable explanation of the results of the survey which reveal that 100% of managers surveyed believe that they did not benefit fully from available training, and 45% found that their actual benefit was less than 50% (see Figure 6.6).

I believe that the lack of structure or organization of the training process is one of the most negative aspects of public departments. Training if improvised and not well prepared results in loss of money, effort and time, and overall fails to achieve its objective. This is confirmed by managers surveyed, 50% of whom believed that the cause of lack of full benefit from training was lack of good preparation by their employers (see Figure 6.7).

Therefore, a comprehensive training plan should be prepared to include three training schemes as follows:

- short term plan .
- medium term plan .
- long term plan .

These schemes should form a single plan with common goals, purposes and processes and include all details pertaining to training including training subjects, training sources, time periods, qualified training organizations, etc, taking into consideration that we should learn from past mistakes and endeavour to avoid their future recurrence. Cavallone⁽⁶⁷⁾ says *"We should develop training programs based on past experience and have confidence that they will help future generations of project managers."*

It is essential to mention here that, in order to ensure proper preparation and implementation of the plan, and the continued need for training, it is appropriate if each department establishes a special training section, to be charged with preparation, development and follow up of training plans.

Proposal (4)

Public Sectors Departments should select the appropriate training sources.

The selection of the appropriate training source is very important in rendering the training process effective and ensuring the achievement of objectives. The suitability of the training source varies with the nature and circumstances of each organization concerned. A suitable source for the private sector is not necessarily suitable for the public sector, and vice versa. The selection process cannot be improvised and should be subject to thorough study of all the external and internal factors related to that organization. Selection of the training sources must be a main part of the training plan as referred to in Proposal (3) of this Chapter.

The selection of the appropriate training source must also include selection of the most suitable organizations to provide the required training. This concept may be clarified through the survey results which

reveal that 47% of surveyed project managers believe that the cause of lack of full benefit from training opportunities was the lack of capability of the instruction organization, while 57% believe that the cause is attributed to the shortness of training period (see Figure 6.7).

To determine the best training sources used in public departments the questionnaire included a question in this respect. Perhaps the most obvious results are that 92% believe that on-the-job training is the best training source, but none of the managers surveyed has had any on-the-job training in their field of activity (see Figure 6.5). This confirms two aspects:

- * Lack of a training plan in those departments.
- * Importance of a training plan to determine the best and most suitable training sources based upon prevailing conditions at those departments.

Kerzner and Thamhain say in this respect⁽⁷⁵⁾ *"Career growth in project management can be effectively supported and enhanced by on-the-job training"*.

Perhaps the importance of on-the-job-training is related to the practical aspects rather than the theoretical. For on-the-job training to be effective, it should be accompanied by thorough study of actual needs in order to design a training program that serves the department's purposes. This program should also form part of the overall training plan.

Martin⁽¹³⁾ says *"One of the most effective training courses available to an organization is an in-house program."*

For medium courses (2 to 14 weeks) and short courses (1 day to 2 weeks), which ranked second and third respectively, in terms of importance to surveyed project managers (see Figure 6.5). I believe that the determination of suitability should be carried out through:

- * Determination of what is suitable for the department based on its circumstances and nature.
- * Ensuring that the contents of the courses achieve the required benefit and reflect continued education requirements as referred to in Proposal 2 of this Chapter.
- * Ascertain the qualification and ability of the training organization that delivers such training courses.

Woodward⁽³⁵⁾ says about short courses: *"To date, this is the most popular and most widespread mode. Popularity comes from the demands of industry where some education is required but some employers are not willing to release staff for long periods. Many of these courses are well constructed and well organized and serve a useful purpose. Others are not so good, and at best regarded as a waste of time and money."* While he says about medium courses *"Many of the faults of the short course can be remedied by courses of longer duration. Owing to the large amount of time and money involved, it is likely that employers will be more careful in their selection of participants. Only well established educational organizations will be able to mount courses of this length, and therefore courses will generally be of a high standard."*

- * Self education is an important training source. It might seem that the role of the department in this field is limited as training depends on the person himself. But the department can play an important role through encouragement of this aspect in employees and provide them with the incentive to use this source towards development of their management abilities.
- * Post graduate education is an important training source given the discrepancy in university education in the field of project management and the inadequacy of the training process. Perhaps what attracts attention here is, that in spite of the importance of

this training source, none of the managers surveyed holds a Master's Degree in project management. It is important for government departments to allow their engineers, who are envisaged to have future project management assignments, the opportunity of higher education in this field.

We must not neglect here the importance of participation in symposia and lectures as well as preparation of studies and research in this field to complete training and achieve maximum qualification.

Proposal (5)

Public Sector Departments should select the suitable training subjects. Training on subjects that are not compatible with trainee's requirements one of the major causes of loss of time, effort and money. 50% of surveyed project managers believed that the cause of lack of full benefit from training was that training subjects were not compatible with their actual assignments (see Figure 6.7).

In order to determine the important subjects needed for training of government project managers, the questionnaire included a question on this topic. Findings revealed that there is urgent need for training on project management. 92% of surveyed project managers believe this to be true. This highlights the obvious gap in training in this field and the ineffectiveness of past training (see Figure 6.14). These results agree with the findings of King Fahad University study⁽⁶⁶⁾ which revealed that training on project management was the most frequently identified need .

Other subjects of training of project managers as indicated by the

survey included, in the order of importance, the following (see Figure 6.14):

- Computer Science 63%
- Business Management 53%
- Legal Subjects 26%
- Finance and Accounting 23%

The above results, which show the need of the Saudi Engineer to obtain training on management related subjects, is in accord with research carried out in other countries. In a US continued engineering education study, the results state that *"the need for management is foremost in demand in continued education programs"*⁽⁶⁶⁾, while the UNESCO International work group lists management as one of two priorities in continued education for engineers⁽⁷⁶⁾ .

The selection of training subjects must be done through study of future management needs and actual assessment of the management abilities of existing staff. The study should form a main part of the training plan referred to in Proposal 2 of this Chapter.

6.2.4 Experience

Proposal (6)

Public Sector Departments should have a Comprehensive Plan and Program for Gaining Experience.

Interviews with project managers in public sector departments revealed that none of those departments had a plan or program for gaining experience. Such a plan is essential because experience is the most important process that contributes to a project manager's ability and qualification. Experience and training are two complementary processes that go hand-in-hand, based on thoroughly studied steps and proper

planning, without neglecting one aspect on account of the other. Perhaps the most important matter to be recognized here is that experience is two sided, and can be as much a negative element in making an efficient project manager as much as it can be a positive element. What is important is not only the number of years of experience but also the quality of that experience. A person may not have gained knowledge from previous experience or his experience may be based on erroneous concepts rendering it useless.

What make matters more complicated, is that the person who builds on an erroneous basis finds it very difficult to change his ideas that were formed over many long years. Moreover, since gaining experience requires a long time, by the time a person discovers that his experience is poorly based, it would be difficult for him to start again.

In this respect Deller says, in writing about successful companies⁽⁶⁸⁾ : *"Success is due to a policy of avoidance of recruiting anyone with experience"*. He also says *"You don't waste time curing bad habits."* While Woodward ⁽⁶⁸⁾ says *"Some times experience may be irrelevant, incompetent, or at times, even badly wrong."*

The lack of a comprehensive plan and program for gaining experience in government surveyed departments was rated by 100% of surveyed project managers as the cause of their lack of full benefit from experience (see Figure 6.18). The plan should include bases and constraints that help in realizing full benefit of experience and optimal use of available resources and insures proper conditions for benefiting from experience. The importance of such a plan is shown by the results of the survey (see Figure 6.19).

Such a plan and program for gaining experience combines with the

training plan and program requirement for each department, so that both are complementary and aim at one common objective namely enhancing the management abilities and qualification of the project management staff.

6.2.5 Summary of Proposals

1. It is necessary to consider university engineering education through:
 - increase in the number of compulsory management courses in those universities to provide basic preparation of engineers as efficient future project managers.
 - courses should emphasize the practical aspects in addition to theoretical aspects.
 - Selection of courses that are appropriate and reflect the actual need of public project managers.
2. Emphasize continued education as an effective tool for training in the field of project management. This should be carried out in a comprehensive framework, with the participation of public departments with universities and vocational institutes, through continued coordination in respect of needs of its personnel based on actual practices.
3. It is essential to have a comprehensive training plan , clearly defined to form part of the overall department's management plan and consisting of three training schemes, long term - medium term - short term. These schemes are to form one complete plan with common objectives, purposes and procedures. The departments should each establish special section to prepare such a plan and follow up implementation and continued development.

4. Selection of the proper training sources as follows:
 - * Emphasize training on-the-job as an effective training source, to be accompanied by thorough study of actual need and forming part of the overall training plan.
 - * Emphasize short and medium training courses as an effective training source, taking the following into consideration:
 - a) Determination of courses that are most suitable to the departments needs and nature.
 - b) Ensuring that the course contents realize the aspired benefits and reflect continued education requirements.
 - * Public departments should play an effective role in encouraging self education of their employees and provide incentives for using this source as a tool for enhancement of the management abilities of its employees.
 - * Public departments shall allow engineers, who are envisaged to assume project management assignments in the future, opportunity to obtain higher education in this field.
 - * Do not neglect the importance of participation symposia and lectures and in the preparation of studies and research to complete the training process and achieve maximum qualification.
5. It is essential to select proper training subjects in this field taking into consideration the following:
 - * Emphasize providing numerous training opportunities in the project management field.
 - * Other training subjects to include computer science, business management, legal subjects and accounting and finance.

6. It is essential to have a comprehensive plan and program for gaining experience aimed at the following:
- * Proper preparation of employees for work in this field.
 - * Full benefit of available experience.
 - * Provision of proper and effective organization to interconnect project participants and provide an appropriate setting for benefitting from experience.
 - * Compatibility with the training plan and programs to form part of the overall management plan of each department, such that both are complementary and have a common objective, namely the enhancement of management abilities and qualification of department personnel in this respect.

CHAPTER 7

Improving the Systems that Govern the Public Sector's Projects

7.1 Introduction

How can the systems that govern performance of public sector projects in the Kingdom be developed and improved? This is the question we shall pursue in this chapter through a series of proposals and views that may assist in the development of this major aspect that directly contributes to the success of projects.

To achieve the goal of improving the systems that govern the performance of public sector projects, we shall study the basic components of an improved system, as follows:

- * Appropriate procurement system.
- * Study of tender procedures applicable to public sector.
- * Study of contracts that govern the performance of such projects.

7.2 Appropriate Procurement System

7.2.1 General

In order to determine the best procurement system for public sector projects in the Kingdom, it is imperative to study several points relevant to the objective, and our study of this subject will cover the following:

- * Definition of the Building Procurement system Concept.
- * Brief description of the various Procurement Systems.
- * Procurement Systems that are applied in public sector projects in the Kingdom.
- * Brief description of the various selection techniques of the appropriate procurement systems.
- * The importance of selecting the appropriate Procurement system for project success.
- * Determination of the appropriate procurement system.

- * Factors affecting the determination of the appropriate procurement system.
- * The proposed system:
 - * Definition of the proposed system.
 - * How does the proposed system work?
 - * Can the proposed system work?
 - * Why is the proposed system considered most suitable?
 - * Reference viewpoints on the proposed system.
 - * Testing the proposed system through viewpoints of experts.

7.2.2 Definition of the Building Procurement System Concept

Franks (78) describes *“the amalgam of activities undertaken by a client to obtain a building”* as a *“building procurement system”*. While Masterman (79) describes it as *“the organizational structure adopted by the client for the management of the designs and construction of a building project”*. It is worthwhile mentioning here that some authors have used the term (Project Delivery Approach) (80) while others have used the term (Organization Structure)(81) to describe the building procurement system.

7.2.3 Types of Building Procurement System

There are no references that describe building procurement systems in the Saudi public sector, reference was therefore made to some British references that address systems in Great Britain.

References vary in their methods of classification and enumeration of such systems.

Franks (78) classifies them into four main categories as follows:

- * Designer-led competitive tender
- * Designer-led construction work managed for fee
- * Package deal
- * Project Management/client’s representative led.

However, we find that the National Economic Development Office (NEDO)(82) identified four different basic procurement systems as:

- * Traditional
- * Design and Build
- * Management
- * Design and Manage

each of which have a number of variants, but makes no attempt to establish a grouping of systems based upon common characteristic.

Perry's (83) approach categorizes all procurement methods as having one of:

- * Divided management of design and construction.
- * Co-operative management of design and construction.
- * Special emphasis on management.
- * Integrated management of design and construction.

Based on Perry's categorization, Masterman((79) has classified the building procurement systems into three main categories as:

- * **Separated and Co-operative Procurement Systems**

which are divided into two main divisions as follows:

- * Conventional system.
- * Variants of the conventional system which include:
 - * Two stage selective tendering
 - * Negotiation
 - * Serial contracts
 - * Cost-reimbursable contracts.

- * **Integrated Procurement System**

which are also divided into two divisions as follows:

- * Design and Build
- * Variants of the design and build which include:
 - * Package deals
 - * Turnkey
 - * Develop and construct

- * **Management Oriented Procurement Systems**

which include:

- * Management contracting
- * Construction management
- * Design and manage

To give a brief overview of the building procurement system, we shall use Masterman's⁽⁷⁹⁾ classifications because of their ease and comprehensiveness.

7.2.3.1 Conventional (Traditional) Procurement System

This is the system where the client appoints independent consultants who fully design the project and prepare tender documents. The successful tenderer enters into a direct contract with the client and carries out the construction work under the supervision of the client's consultants, Figure (7.1).

Variants of the Conventional System

Masterman⁽⁷⁹⁾ listed different types of variants of the Conventional Systems as :

Two-stage Selective Tendering

The process where a small number of contractors, usually between three and six, are invited to submit tenders based upon approximate bills of quantities or notional quantities or even a schedule or rates, together with specifications and drawings, which are very often little more than sketches. The successful tenderer is formally notified of the client's intention to enter into a contract subject to certain conditions being met, such as an acceptable final tender being agreed which will be based upon total remeasurement of the Project once working drawings are available.

Negotiated Contracts

This variant has two methods :

First Method:

In this method detailed discussions are held with each of a small number of

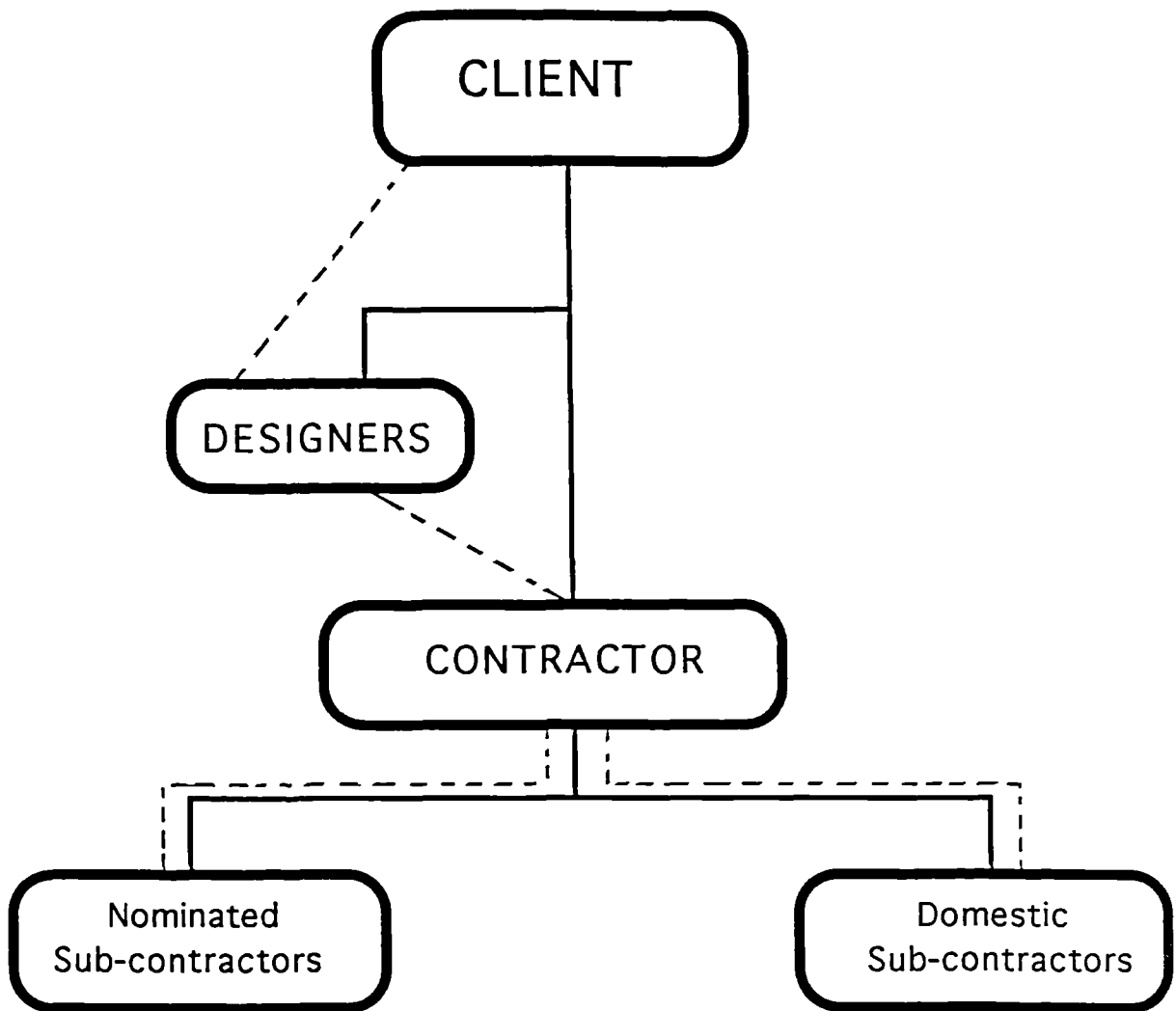


FIG (7-1) - TRADITIONAL PROCUREMENT SYSTEM

(----- indicates management relationships)
 (_____ indicated contractual relationships)

appropriate contractors chosen by the client, during which their experience and management expertise is assessed and the contractor offering the skills and knowledge best suited to the project is selected.

Second Method:

In this method, negotiation is restricted to one contractor.

Continuity Contracts

When using this variant, contractors bidding for a project on the basis of single-stage performance, will be awarded a similar project to follow on from the completion of the first. The price for this subsequent project will be negotiated, using the tender rates included in the bill of quantities for the original project as a basis.

Serial Contracts

In this method, a number of projects, often referred to as a programme, with similar characteristics, particularly in the case of building design, are awarded to a single contractor following the receipt of competitive tenders based upon a master bill of quantities.

Although forming part of the same programme, each project is administered by means of a separate contract with the contract sum for each being calculated by using the rates priced in the master bill and the quantities appropriate to each project.

Cost-Reimbursable Contracts

This variant has two approaches as:

- * **Cost Plus Contracts**

Under this agreement a contractor is appointed to carry out the work defined by the client's consultants, with reimbursement being made by the payment of the actual cost of the works and a fee to cover the contractor's overhead and profit.

- * **Target-Cost Contracts**

In this method a contractual agreement is reached on a target cost for the work and a fee to cover the contractor's overheads and profit. Also a procedure is agreed for sharing any savings or

additions if the actual cost is lower, or higher, than the target costs.

7.2.3.2 Design and Build

In this arrangement a main contractor takes sole responsibility, normally on a Lump Sum Price basis, for the design and construction of a client's project, Figure (7.2).

Variants of Design and Build

The variants of this system as presented by Masterman⁽⁷⁹⁾ include:

Package Deals

A package deal follows the same lines as design-build, with the contractor providing the design and construction under one contract, but there is the implication that the building provided will be of a standardized type⁽⁷⁸⁾.

The Turnkey Method

This system is a method whereby one organization, generally a contractor, is responsible for the total project from design through the point where the key is inserted in the lock, turned and the facility is immediately operational.

Develop and Construct

When using this system the client's consultant is provided with a brief from which he prepares conceptual drawings/sketch designs and a site layout. The contractor develops the conceptual design, produces detailed drawings and chooses and specifies material and submits these proposals with his bid in the same way as with design and build system.

7.2.3.3 Management Contracting

Management Contracting is a process whereby an organization, normally construction based, is appointed to the professional team during the initial stages of a project to provide construction management expertise,

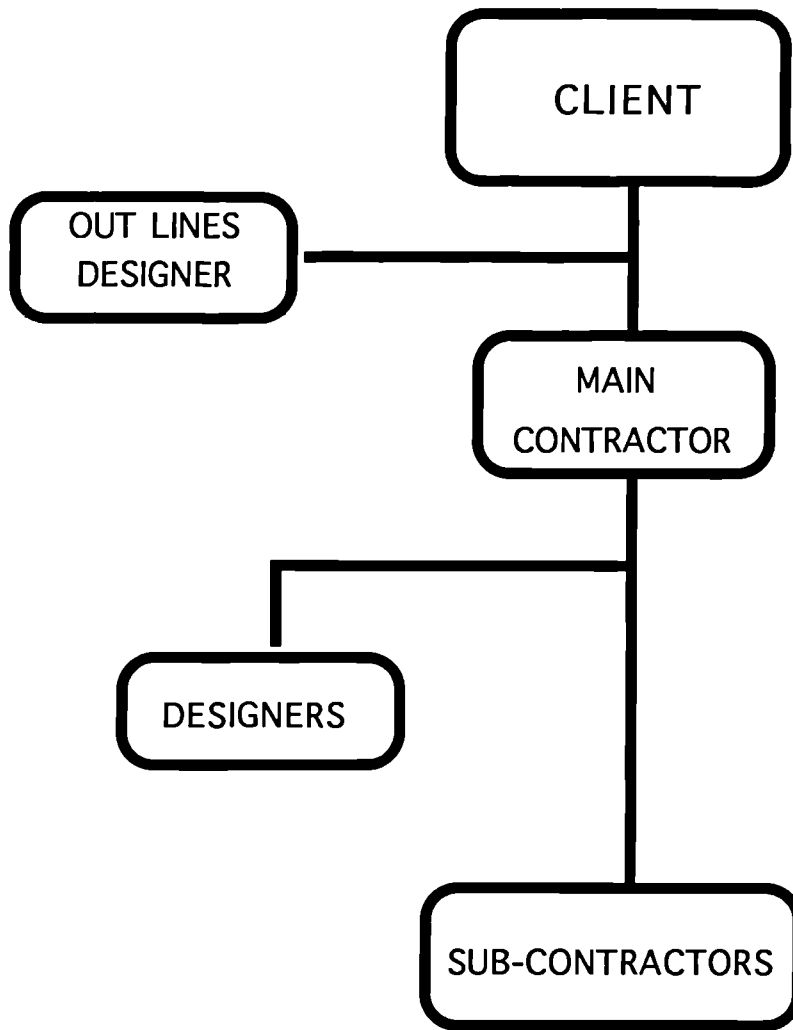


FIG (7-2) - DESIGN & BUILD SYSTEM

(management & contractual relationships are identical)

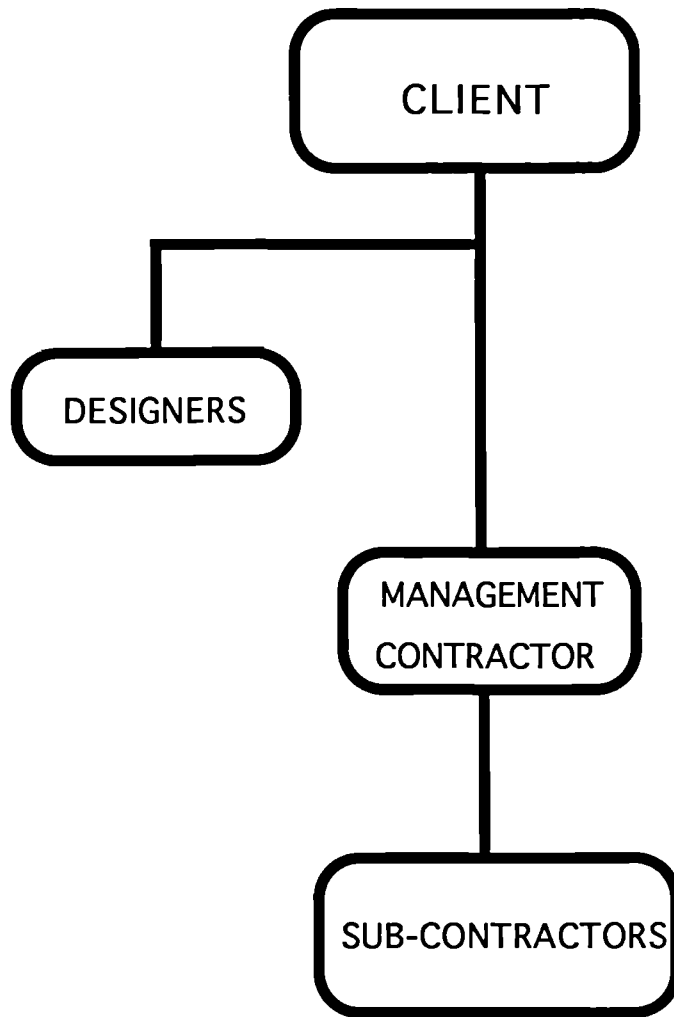


FIG (7-3) - MANAGEMENT CONTRACTING SYSTEM

(management & contractual relationships identical)

Figure (7.3). The management contractor employs and manages works contractors who carry out the actual construction of the project and he is reimbursed by means of a fee for his management services and payment of the actual prime cost of the construction .

7.2.3.4 Construction Management

In this method the construction manager adopts a consultant role with the direct responsibility to the client for the overall management of the construction of the project, Figure (7.4).

The construction manager is reimbursed by means of a professional fee and all construction is carried out by means of works contracts which are the subject of direct contracts between the client and the contractors.

7.2.3.5 Design and Manage

In this procurement system, a single organization is appointed to both design the project and manage the construction operations, using work contracts to carry out the actual work. The single organization responsible for the project can be either a contracting organization, Figure (7.5), or a consultancy practice, Figure (7.6).

7.2.3.6 Project Management

In this process a client appoints a firm to be the sole formal contact with the client, with a main responsibility of managing the whole project from inception to completion, Figure (7.7). Masterman disagreed with Frank's definition of project management as a procurement system in its own right. In this respect he says "*The inclusion of project management among a list of procurement systems is considered to be ill-advised*" (79).

7.2.4 Procurement Systems Applied in Public Sector Projects of Saudi Arabia

The study that we have conducted in Chapter 4 of this research has revealed that two procurement systems were used during the period from

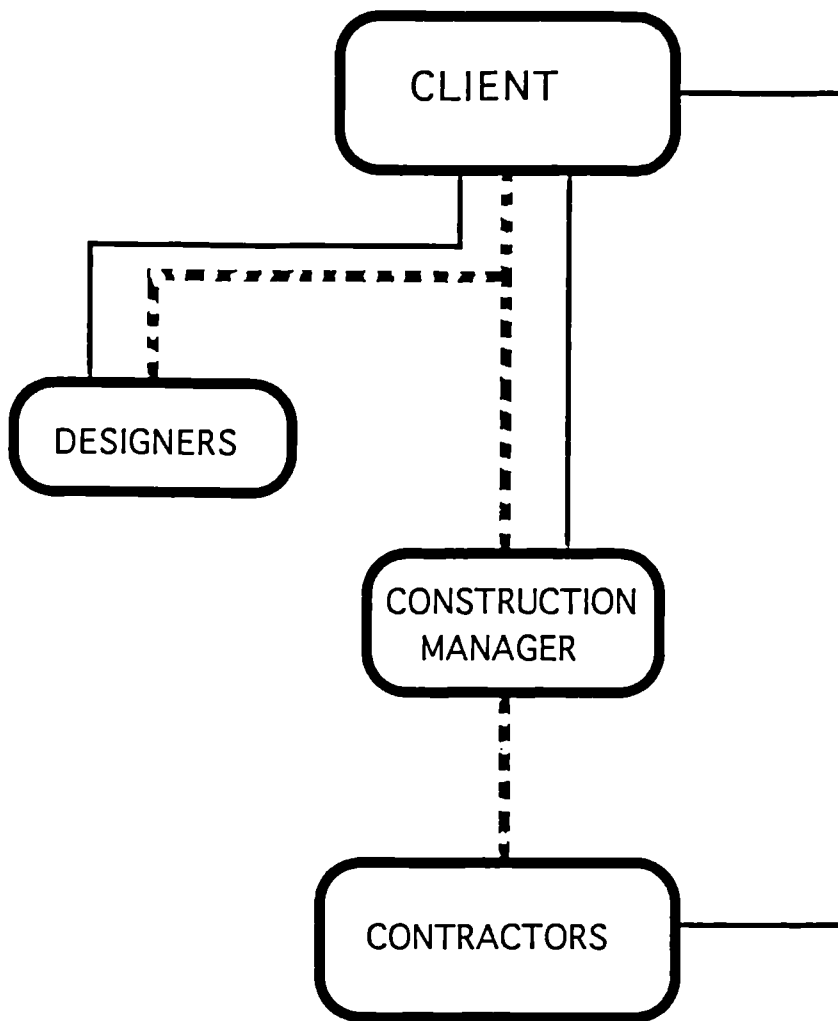


FIG (7-4) - CONSTRUCTION MANAGEMENT SYSTEM

(_____ indicates contractual relationships)

(----- indicates management relationships)

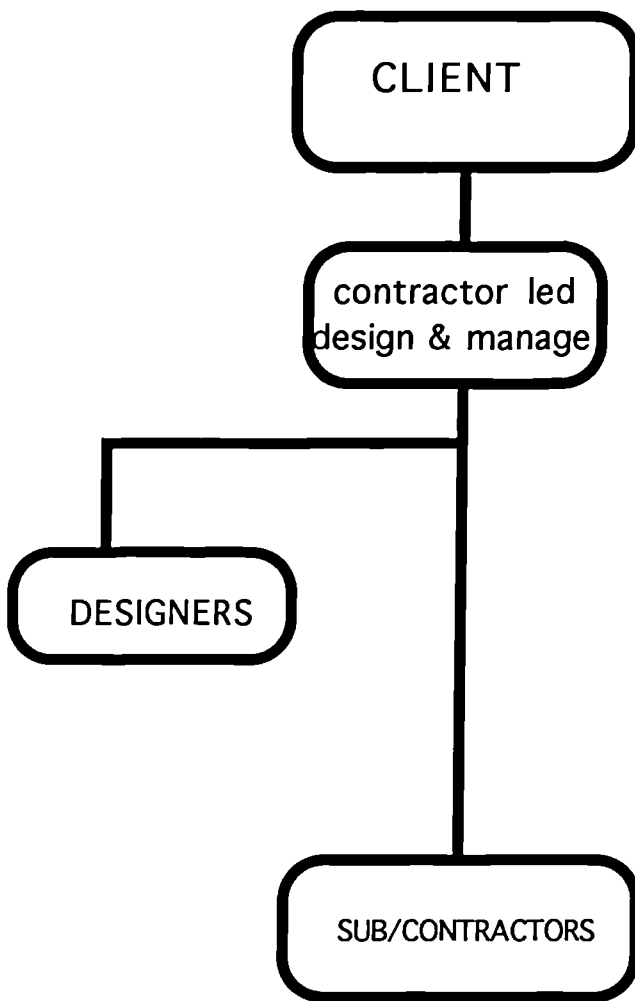


FIG (7-5) CONTRACTOR LED DESIGN & MANAGE SYSTEM

(management & contractual relationships are identical)

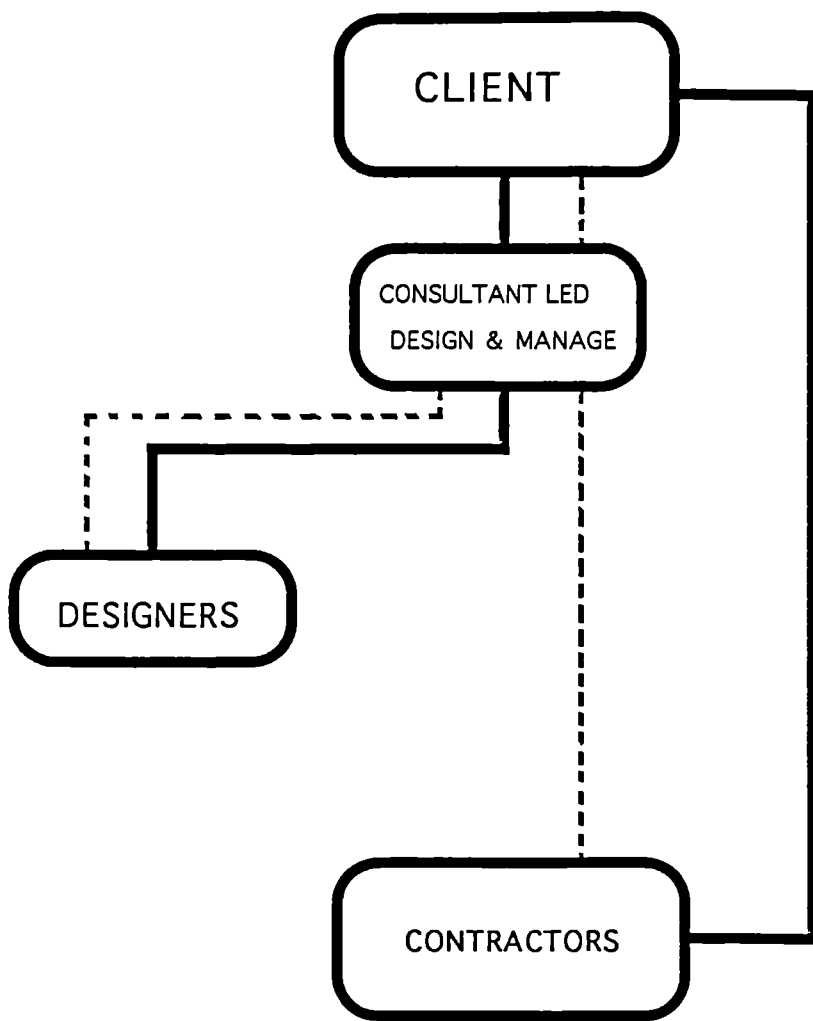


FIG (7-6) CONSULTANT LED DESIGN & MANAGE SYSTEM

(----- indicates management relationships)

(_____ indicates contractual relationships)

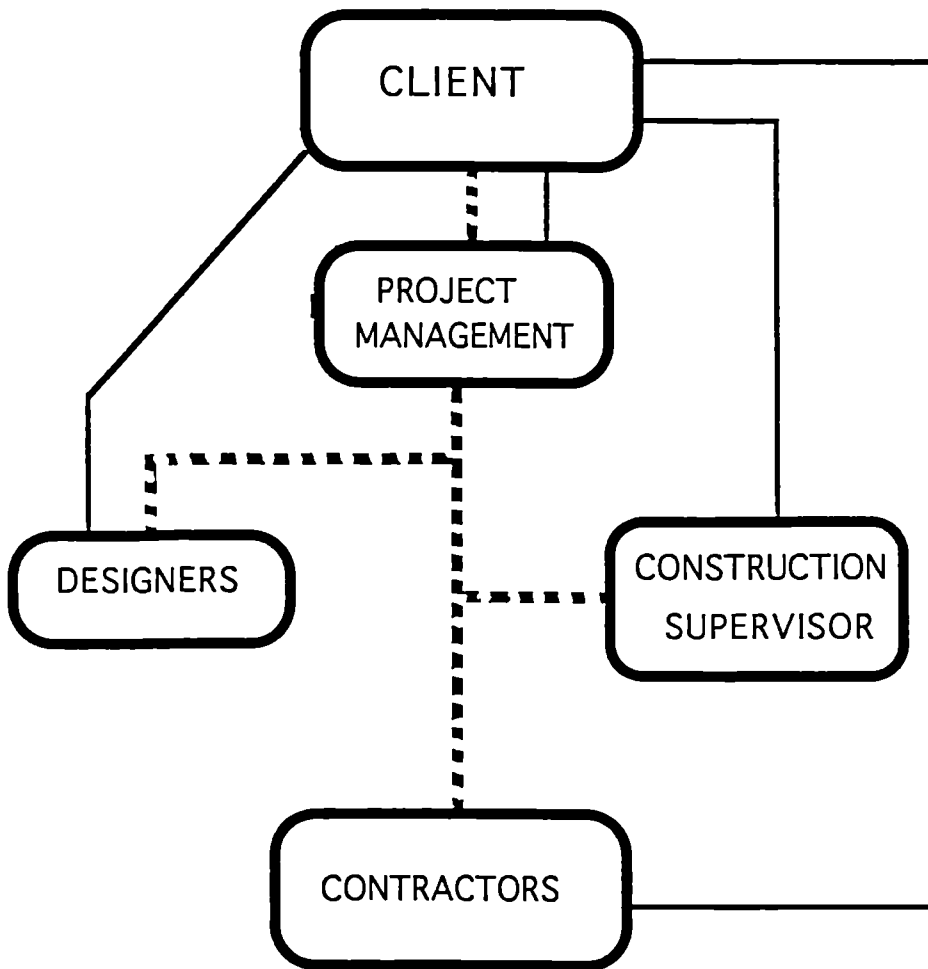


FIG (7-7) PROJECT MANAGEMENT SYSTEM

(- - - - - indicates management relationships)
 (_____ indicated contractual relationships)

1982 to 1992, namely:

- * The traditional system, which was used in 80% of projects completed during that period.
- * Design and Build system, which was used in 20% of projects completed during that period.

These two systems are compatible with the traditional system and the design and build system that were discussed in paragraphs 7.2.3.1 and 7.2.3.2 earlier in this chapter.

7.2.5 Brief Description of the Various Selection Techniques of the Appropriate Procurement Systems

Franks (78), rates each of the systems given in his classification discussed above in terms of their ability to satisfy the seven requirements which he has identified as being common to the majority of clients (item 7.2.8). The ratings are on a scale of 1 to 5, where 1 is the minimum and 5 is the maximum in terms of the individual system's ability to satisfy the listed requirements(79).

The Building Economic Development Council's booklet "Thinking about Buildings"(82) contains a chart which relates the characterises of the following procurement systems :-

- * Traditional
 - Sequential
 - Accelerated
- * Design and Build
 - Direct
 - Competitive
 - Develop and construct.
- * Management
 - Management contracting
 - Construction management
- * Design and manage
 - Contractor project manage.
 - Consultant project manage.

to a list of nine client's priorities or needs for his project (item 7.2.8) which are framed as questions. By simply answering the questions that are posed, the most apparently appropriate procurement system(s) can be identified and given further consideration .

Skitmore and Marsden⁽⁸⁴⁾ reported on their attempt to formulate a universal procurement selection technique and described the two approaches they adopted .

The first was a multi-attribute technique based on the NEDO procurement path decision chart , which was , however, modified to overcome what were seen as two major deficiencies.

Firstly, the criterion answers listed in the original NEDO chart were restricted to a maximum of three alternatives. This was altered to allow the user to rate each of the criteria in terms of the priority that he wished them to have.

Secondly, the NEDO selection method assumes that all of the listed criteria are of equal importance to the client, but as each procurement system may have a differing degree of relevance to each priority relative to the other procurement paths, a measure of their suitability needs to be built into the process. This was achieved by indicating the relative utility of each procurement path against each criterion on a numerical scale enabling a set of utility factors to be established for use in the decision chart⁽⁷⁹⁾.

The Procurement systems included in this approach are:-

- Negotiated traditional
- Competitive traditional
- Competitive develop and construct
- Negotiated design and build.
- Management contracting.
- Turnkey contracting.

The second method reported by Skitmore and Marsden⁽⁸⁴⁾ utilized a technique which examines data collected under a set of criteria which are characteristics on which the various procurement systems are expected to differ . This approach involve use of a fairly advanced statistical technique, requires the use of complex computer software ⁽⁷⁹⁾.

Bennett and Grice⁽⁸⁵⁾ have used both the Building Economic Development Committee, ``Thinking about Building” Guide⁽⁸²⁾ and Skitmore’s and Marsden’s work to tabulate the strengths and weaknesses of the various procurement systems which include:-

- * Traditional
 - Sequential
 - Accelerated
- * Design and Build
 - Direct
 - Competitive
 - Develop and construct
- * Management
 - Management contracting
 - Construction management
- * Design and Manage
 - Contractor
 - Consultant

7.2.6 Importance of Selection and Determination of the Appropriate Procurement System for Project Success

The selection of the appropriate procurement system, researchers concur, is one of the most important causes of project success. We shall review a number of viewpoints on this subject to demonstrate the importance of selection and determination of the appropriate procurement system for project success.

- * One fundamental aspect of the building process that requires early and particular attention if success is to be achieved, is the selection of the most appropriate organization for the design and construction of the project ⁽⁷⁹⁾.
- * The selection of the appropriate procurement method can shape the success of the project ⁽⁸⁶⁾ .
- * The choice of one procurement approach from those available should be a major managerial decision for the building client because

it will have widespread long term and short term effects on the client and his future buildings and fortunes of both(87).

- * Project success is often elusive but the appropriate mix of client control and procurement method can make it less so (86).
- * The choice of which procurement approach is most appropriate to the project which is very important for the client to achieve highest value from the building and should be made as rationally as possible prior to design and perhaps as early as the feasibility study for the project(87).

2.7 Determination of the Appropriate Procurement System

2.7.1 General

Before searching for the best and most appropriate procurement system that can be applied in public sector projects in the Kingdom, we find that it is important to ask the following question:

- * Can we find an ideal system that can be used and applied in public sector projects in the Kingdom of Saudi Arabia ?

Masterman(79) replies to this question saying *“there is no ‘best buy’ among procurement systems”*; while Franks(78) says *“there is no universal system”*.

Naoum(86) concludes from a study he conducted to compare the traditional system with the management contract system that *“neither system is the solution to all problems facing the construction industry”*.

What renders the matter more difficult is that, in the case of government projects, one needs to find the most suitable generalized procurement system that can be applied to all projects taking into consideration the priorities of the government department.

Based on the aforementioned facts, we find that:

- * There is no single ideal system that can be applied and used in all public sector projects in the Kingdom.
- * In public sector projects, it is imperative to find the best procurement system that can be applied to an undetermined number of projects that differ in their characteristics, purposes and requirements taking into consideration the priorities of public department requirements.

We must also add a third fact, namely that public projects in the Kingdom, similar to public projects in any other country, are governed by specific constraints and therefore the process of selection and determination of the best possible procurement system must undoubtedly be affected by such constraints.

Therefore, and in order to ensure that this research proposes practical and realistic solutions that can be of benefit, our pursuit here will concentrate on finding the best possible procurement system for public projects in the kingdom based on actual factors governing such projects.

On that basis, we must study factors that affect the selection of the best and most suitable procurement system. This we will address in the next section.

7.2.8 Factors Affecting the Determination of the Most Suitable Procurement System for Public Sector Projects of Saudi Arabia

Deciding upon the best and most suitable procurement system that can be applied to public sector projects in the Kingdom depends on a number of factors that affect such a decision. The most important factors can be narrowed down to two items as follows:

- * Laws and regulations that govern the scope of work of such projects.
- * Priorities of public departments requirements.

These two factors are closely related and strongly and directly affect the process of selection of the suitable system. The two factors pose certain impediments in the path to finding the best possible procurement system. On this subject, Masterman⁽⁷⁹⁾ says *“the restraints of company policy and financial regulations could result in a conservative approach adopted to the selection of most appropriate procurement method.”*

Here, we reiterate, that in order to make this research practical and inclusive of realistic solutions that can be applied in real life in government projects, we shall endeavour to find the best procurement system commensurate with real life conditions that govern such projects.

Laws and Regulations that Govern the Scope of Work of Public Projects

We have stated in Chapter 3 of this research that public sector projects in the Kingdom are all subject to the Government Procurement Regulations and their Rules of Implementation as well as a number of circulars and appended resolutions that complement those regulations. Perhaps the most important laws and regulations we are concerned with here are :

- * Government Procurement Regulations and their Rules of Implementation.
- * Royal Decree No.136 dated 13.6.1408H, (1988) which ratified the contract format, as prepared by the Ministry of Finance and National Economy, to be used for government projects.
- * Royal Decree No. 9751 dated 26.4.1403H, (1983) which stipulates that all government project tenders must be announced as open tenders.

In reviewing these regulations and laws, we find that they address important requirements for the performance of public projects, as follows:

- * The requirement for complete and valid tender documents prior to announcement of tender. Article 1/B of the Government Procurement Regulations which stipulates that *" full and identical information on required works shall be provided to bidders . Bidders may obtain such information simultaneously and a single date shall be set for bid submission "* . Article 1/A of the Rules of Implementation of Government Procurement Regulations which stipulates that *" the Government Department shall prepare detailed and sufficient specifications before contracting works tenders are announced "* .
- * The requirement for knowledge of the value of the construction contract prior to commencement of construction and the assessment of any possible increase in contract value within specific constraints. Article 5-1 of the Basic Contract Document of the Uniform Contract which stipulates that *" the total contract value shall be (to be stated in figures and in words) in compensation of performance of works in accordance with conditions, specifications, drawings, bill of quantities and other contract documents. "*

Article 11 of the General Conditions of the Uniform Contract stipulates that *"the contractor is supposed to have gained complete information prior to bid submission and that it has verified that prices as proposed in the bill of quantities and price schedules are sufficient to cover all contractual obligations and other essentials pertaining to the proper and sound performance and maintenance of works"*. Article 43- II of the general conditions stipulates that *" the owner may during the implementation of the contract increase the amount of works by a percentage that does not exceed ten percent (10%) of the total value of the contract and he may decrease the amount of works by a percentage that does not exceed twenty percent (20%) of the total value of the contract, in which case the value of the contract may be increased or decreased accordingly."*

Article 7/F of the rules of implementation of government procurement regulations which stipulates that *"categories listed in the price list are inclusive of all expenditures and obligations incurred by the contractor or subcontractors."*

- * The Uniform Contract for construction works states the parties to the construction contract as the owner, the contractor and the supervising consultant. There is a direct contractual relationship between the contractor and the consultant with the owner. Article 1 of the General Conditions of the Uniform Contract identifies the parties to the contract as follows :

- * *owner (First Party):*

- Means the Ministry who has invited bids for performance of works and who employs the contractor or any party that is charged with supervision of works.*

- * *contractor (Second Party):*

- Means the person(s) or entity(ies) whose bid is accepted by the owner including their representatives and assigns with the government departments approval .*

- * *Engineer :*

- Means the person or entity who appointed at any time by the owner to supervise project performance ."*

- * The contractor's functions are limited to the performance and maintenance of construction works -Article 5 of the general conditions of the uniform contract which stipulates that : *" this*

contract shall include the following :

- *Implementation, completion and maintenance of the works .*
- *Provision of labour, materials necessary for the works, construction equipment and provisional works unless otherwise stipulated .*
- *Any other items, whether of a permanent or provisional nature as long as the need thereto is explicitly stipulated in the contract or may be logically deducted therefrom .”*

- * Definition of the construction contract type as a re-measurement contract. Article 5-2 of the Basic Contract Document of the Uniform Contract stipulates that “ *this total value is subject to increase or decrease depending of the change in the amount of actual works implemented by the contractor as per the contract and depending on the additional and complementary works and modifications that the contractor effects at the request of the employer and within the limits stipulated in the conditions of the contract.*”

- * **Priorities of Public Departments Requirements**

The priorities of public departments requirements in respect of public projects are laid down and determined by rules and regulations that govern the scope of work of such projects. Through our overview of the Government Procurement Regulations and their Rules of Implementation or the Uniform Contract for Construction Projects, we can determine these priorities.

It is worthwhile mentioning here that some research projects in this field have attempted to determine the major requirements and common priorities of owners, although there are some minor differences in their determination and method of overview. We find that Franks⁽⁷⁸⁾ has determined seven basic requirements as the common requirements of most owners, namely:

- * Technical complexity (level of structural, mechanical services ... etc).
- * High aesthetic or prestige requirements
- * Economy (minimum cost required)
- * Time is of essence (early completion)
- * Complexity (exceptional size)
- * Price certainty

- * Facility for change (variation control by client during the progress of the work) .

The building Economic Development Council's Booklet (Thinking about Building)⁽⁸²⁾ has stated nine priorities and requirements as follows:

- * Timing (early completion)
- * Controllable variation (need to alter project once it has begun on site)
- * Complexity (technically advanced)
- * Quality level
- * Price certainty (firm construction price before commitment to construction proceed)
- * Completion (choosing construction team by price competition)
- * Responsibility division
- * Responsibility professional
- * Risk avoidance

We also find that Skitmore and Marsden⁽⁸⁴⁾ have integrated the three last requirements in one single requirement to form seven requirements in total as follows:

- * Speed (early completion)
- * Certainty (firm construction price and/or a strict completion date for the project before commitment to construction proceed)
- * Competition (choosing construction team by price competition).
- * Flexibility (need to alter project once it has begun on site)
- * Quality level
- * Complexity
- * Risk avoidance and responsibility (one single organization responsibility)

Bennette and Grice⁽⁸⁵⁾ have stated eight priorities and requirements as follows:

- Time (early completion)

- Cost (firm construction price before any commitment to construction)
- Flexibility (need to alter project once it has begun on site)
- Complexity (Technologically advanced)
- Quality
 - Certainty (Completion on time and/or within budget)
 - Division of responsibility (single point responsibility/direct professional responsibility)
 - Risk (transfer of responsibility).

Through a comparison of the aforementioned laws and regulations and the foregoing requirements and priorities, we can determine those priorities commensurate with importance to government departments, in order of importance, as follows:

* Price Competition

Covered by Royal Decree No.9751 dated 26.4.1403H (1983) - which stipulates *“that all government project tenders must be announced as open tender.”*

* Price Certainty (Firm construction price before commitment to construction proceed).

Covered by Article 5-1 of the Basic Contract Document of the Uniform Contract, Article 11 of the General Conditions of the Uniform Contract, Article 43-II of the rules of implementation and Article 7/F of the rules of implementation (previously stated) .

* Quality Level

The supervising consultant is one of the parties to the project during construction with the main function of quality control - Article 2 of the General Conditions of the Uniform Contract which stipulates that *“ the engineer shall have the authority to oversee and supervise the works, as well as examine and test any materials or methods used for the implementation of the works. ”*

* Time Certainty

Article 3-1 of the Basic Contract Document of the Uniform Contract stipulates that *" the contractor undertakes to carry out works and complete all contract works within a period of (to be stated in days, in figures and in words) including the mobilization period. Such term shall be effective as of the date of site hand over to the contractor against a written report signed by both the engineer and the contractor "*.

Article 35 of the General Conditions of the Uniform Contract stipulates that *" notwithstanding any request contained in the specifications regarding the completion of any part of the works, the works should be accomplished within the period of time stipulated in the contract. "*

* Flexibility

Article 43-I of the General Conditions of the Uniform Contract stipulates that *" ... the engineer may - after obtaining the approval of the employer within the authorities assigned to him - make any changes in the appearance or type or quantity of the works or any part thereof as appropriate and the contractor shall carry out such changes on condition that they do not result in modifying the location of the contract or in exceeding the limits stipulated in Article 43-II of the general conditions "*

It can be stated that the remaining requirements represent the less important requirements, because they do ~~not~~ appear within the uniform contract articles.

7.2.9 The Proposed System

It is Important to start this section by stating that the proposed system is a product not only of research described in this thesis, but of my personal experience acquired through over 14 years of work in the area of public sector project management, as well as first hand knowledge of problems which were encountered in execution of the projects during the period, in addition to familiarity with laws, rules and regulations which govern project execution. My long personal experience in this area provided the

opportunity to assess aspects of project management in the government sector precisely, identify weaknesses of the system , explore means and ways of remedies, as well as formulate sound solutions which are compatible with the status quo of the public sector projects.

Before stating our viewpoints on the proposed system, it is important to restate that the public sector projects in the Kingdom, are governed by specific constraints and therefore the process of selection and determination of the best possible procurement system must be affected by such constraints.

This fact is evident in the existence of a number of laws and regulations that govern such projects which are in essence contradictory to the needs of some building procurement systems.

To clarify this point, we refer to laws and regulations as stated in item 7.2.8 of this chapter where we find that :

- * The requirement for complete and valid tender documents prior to announcement of tenders - conflicts with the design and build system and its variants, it also conflicts with the design and manage system
- * The requirements for knowledge of the value of the construction contract prior to commencement of construction conflicts with the management oriented procurement systems as illustrated in article (7.2.3) of this chapter .
- * The uniform contract for construction works defines the parties to the construction contract as the owner, the contractor and the supervising consultant, this conflicts with the construction management system .
- * The contractors functions are limited to the execution and maintenance of construction works. This conflicts with the management contracting system, the design and manage system, the design and build system and its variants.
- * The definition of the construction contract type as a re-measurement contract conflicts with the design and build system and its variants .

The foregoing paragraphs reveal that the laws and regulations that organize government projects, and reflect the requirements and priorities

of government departments, do in fact reflect the traditional system as the system to be applied in government projects. This renders the application of methods for selection of a suitable system, as discussed in item (7.2.5) of this chapter, of negligible benefit because systems other than traditional cannot be used. However, this does not mean that we must accept this and stop at this point, especially given the impediments and negative implications that are encountered in the performance of such projects, that we addressed in Chapter 4 and Chapter 5 of this research.

Therefore, it is imperative that we study practical systems that are appropriate to the real life conditions of such projects and that may lead ultimately to a better project performance and thus ensure public welfare.

On that basis, what we are proposing is not a new system that is fundamentally different from the current system, which we would find difficult to implement or apply and therefore be rendered useless. This is an attempt to develop an existing reality by addressing the following idea: to integrate the current traditional system with another system namely the project management system in order to improve and enhance the current system.

To shed more light on this proposal, we shall overview a number of points as follows:

- * Definition of the proposed system.
- * How can the proposed system work?
- * Can the proposed system be effective?
- * Why is the proposed system considered most suitable?
- * Reference viewpoints on the proposed system.
- * Testing the system through experts viewpoints on the proposed system.

A) Definition of the Proposed System

The proposed system can be simply defined as an integration of the traditional management system with the project management system, while at the same time preserving the general nature of the traditional system. The government department will continue to contract a consultant to carry out design works and engage a contractor to carry out construction works after documents are completed and

announced in a public tender. Then a consultant will be contracted for supervision of construction. This will be done in parallel with the government department's assignment, in the early phases of the project, of a management team with the main function of overall project management from inception to completion. That party would be contractually and administratively bound to the owner while all other project parties are administratively overseen by it and contractually bound to the owner (see Figure 7-8).

B) How Can the Proposed System Work?

The idea on which the proposal is based emanates from the simple concept of "optimal use of available resources." To understand the concept, let us take an in depth look at the method of performance of government projects in Saudi Arabia.

Government projects in the Kingdom consist in aggregate of a number of different projects that vary in size, type and specifications being carried out by different government departments. Those projects are inter linked by laws and regulations that govern their performance such as the Uniform Contract, the open Tender, etc.

- * Government departments are generally of one of two types:
- * Government department whose functions do not require frequent project construction and therefore carry out only a limited number of projects over lengthy time periods. The projects carried out by this type of government departments constitute a very small percentage of government projects.
- * Government departments whose functions require almost continued construction of projects. The projects carried out by this type of government departments constitute the vast majority of government projects in the Kingdom. These are the government departments that we are concerned with in our research and will be the subject of our discussion of government departments and projects.

Given the nature and large size of projects that are carried out by these departments, each government department has formed its own fully equipped department to follow up and supervise project

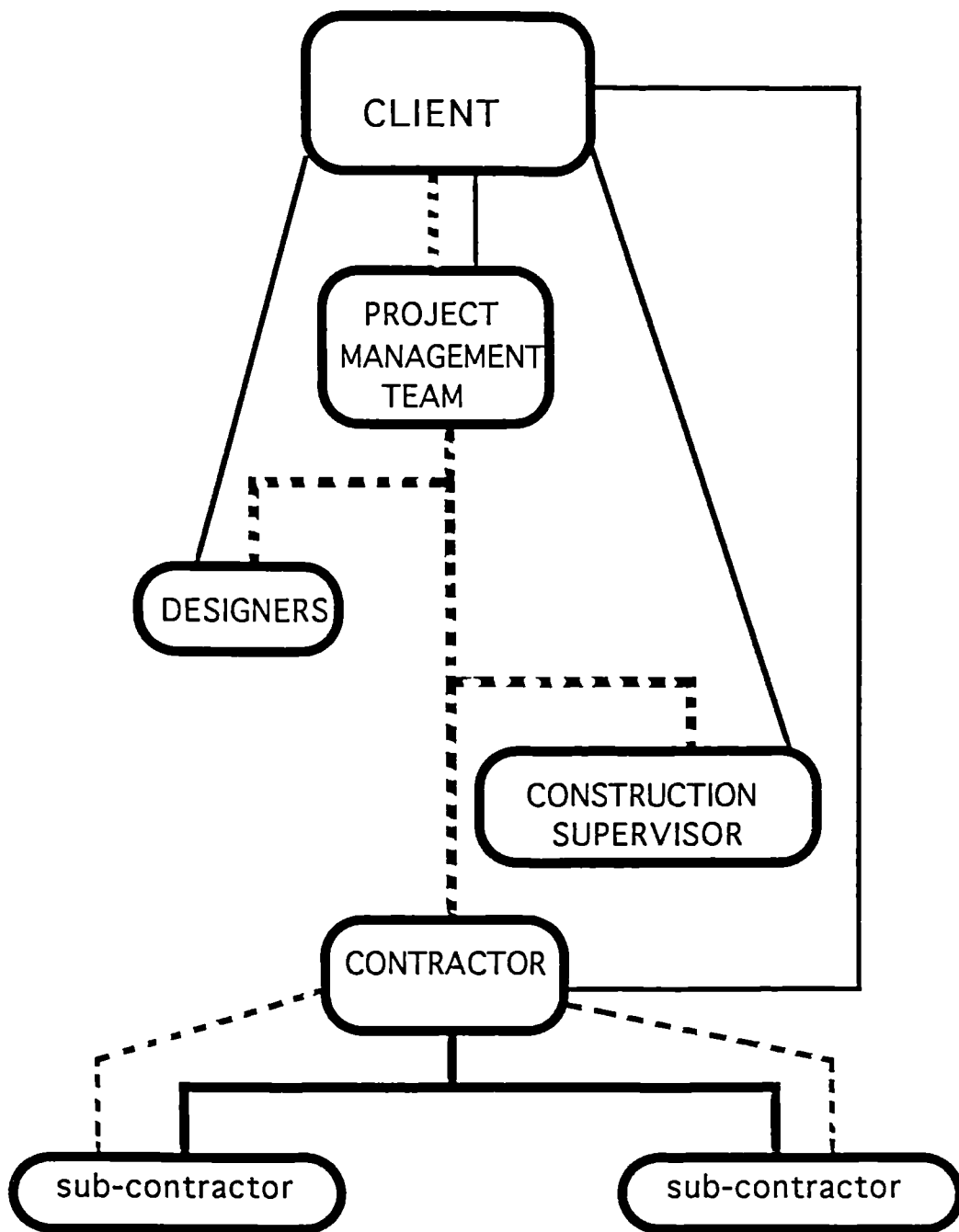


FIG (7-8) - PROPOSED SYSTEM

(——— indicates contractual relationships)

(----- indicates management relationships)

execution. The sizes of such departments, Table 7.1, are evident from the large numbers of staff employed, including Saudis and expatriates, in all required disciplines.

The actual functions performed by these departments in their supervision of projects are limited to coordination between the project owner, the contractor and the consultant. Some departments limit their activity to coordination between the project owner and the contractor only, thus forming a link to receive and deliver correspondence between the two parties. This is because these departments suffer a clear lack of performance in organization and planning that has led to ambiguity in the roles they play in supervising projects. This has led to improper decisions, loss of effort and money and lack of attention to the management aspect.

Perhaps the best evidence here is what was stated by project managers surveyed in Chapter 6, where the results of the survey revealed that a large percentage of project managers believed that the most important problems they faced and that hampered their development were caused by their department's lack of clear cut organizational plans with distinct objectives.

Therefore, the real life of these departments can be summarized as follows: Most government departments employ a large number of staff that cost huge sums of money without yielding aspired benefits

From this, the idea emerges that the staff can carry out the functions of management of the entire project from inception to completion. This can be achieved through:

- These departments establishing through their head office, a separate Project Management Section.
- The objective of this section would be to prepare and perform project management functions for all of their department's projects.

The section should perform its functions through a comprehensive study of anticipated future projects of its department and preparation of long term programs and work plans to achieve section objectives.

TABLE (7-1) : - GOVERNMENT STAFF NUMBER -

DEPARTMENT	TOTAL STAFF NUMBER
A	170
B	130
C	150
D	110
E	160
F	140
G	140

The expertise and specialities required to carry out tasks would be made available through recruitment of qualified experts and specialists in the management field to provide required expertise, advice and training to department staff.

The preparation of the department's Saudi Staff who do not have the required expertise would be approached through preparation of required training plans for internal or external training within clear cut constraints and the use of expatriate experts based on a clear cut work plan in order to prepare Saudi Staff to carry project management functions.

The general principles and rules upon which this section manages various projects shall be laid^{down} taking advantage of the large number and repetitive nature of the projects which allows for reorganization and updating.

For each future project within the management plan, a complete work team covering all disciplines and consisting of adequate numbers of staff from project manager to scheduler shall be assigned a sufficient time period in advance and shall be properly prepared to carry out project management functions.

The system does not need a long term period for implementation. It can be implemented within a relatively short period after laying down the aforementioned general principles and rules and after preparation of work team (whose members shall at the start consist of foreign expertise with Saudis to start gaining experience and skills in accordance with a clear cut training plan). The system shall be implemented gradually starting within one pilot project, followed by evaluation of the pilot project results, and the generalization to other future projects.

The project management team shall be the single liaison point between the project parties on the one hand and the owner on the other. This team shall be delegated full authority for carrying out project management functions and shall report to its supervising section in the head office for purposes of consultation or assignment of additional staff.

The team shall upon formation commence performance of assigned functions as follows:

- a) Prepare and develop plans for future project programs to be implemented covering all various phases.
- b) Commence compiling required information on the project.
- c) Commence preparation and development of the client brief through meetings and discussion with each of the other owner's related departments separately in order to determine needs and requirements accurately and completely at an early stage and therefore allow for a complete determination of the various project components.
- d) Study methods of provision and selection of the proper site.
- e) Discuss with the Ministry of Finance expected project costs and its various phases and programs.
- f) Complete preparation of design tender documents including legal and technical documents that define the scope of required work.
- g) Supervise design tender procedures including qualification and selection of bidders.
- h) Carry out the technical analysis and recommend award for best bid.
- k) Carry out full management of the design phase and ensure that the designer complies by the project time schedule as stipulated in the contract, and ensure that the design submitted satisfies the owner's requirements and that the construction works tender documents are complete.
- l) Supervise the construction tender procedures, including the time schedules of this phase, which includes tender announcement in local newspapers, delivery of tender documents, determination of the period of study of documents, receipt of tender documents and bid opening.
- m) Carry out the technical analysis and recommend award for best bid.
- n) Full management of construction phase starting with site hand over to the contractor, to site take-over from the contractor

and commissioning.

- o) Follow up and monitoring of the project time schedule and ensure the contractor's compliance with it.
- p) Monitor project cost and ensure that it remains within the specified project cost in coordination with the supervising consultant.
- q) Oversight of the works of the supervising consultant to ensure proper performance of project quality control function.

C) Can the Proposed System Work?

The proposed system can work if applied to government projects in the Kingdom because of the ease of assimilation of this system which is attributed to the following reasons:

- * It does not conflict with laws and regulations applicable to government projects.
- * It does not put new financial burdens on government departments.
- * It provides for better exploitation of available resources.

The prerequisite for this system is that government departments follow the findings referred to in Chapter 6 of this research. Which may be summarized as endeavouring to enhance the management capabilities of its own staff through appropriate training plans and plans designed to ensure that they gain required experience. In addition, the requirements and procedures referred to in Paragraph 7.2.9.B of this Chapter must be implemented in a complete and proper manner to provide for achievement of the objectives of this research which pursues the best interest and benefit of these government departments.

D) Why is this System Considered Most Suitable?

The proposed system is considered the most appropriate system that can be applied to government projects in the Kingdom based on the real life conditions of such projects. In addition to the aforementioned reasons, the system is characterized by the fact that it represents an integration of Traditional and Project Management

systems and thus benefits can be derived from each of the two systems separately without conflict with the priorities and requirements of government departments and through the practical ease of application.

This makes the system the appropriate system that can be applied on government projects in the Kingdom. We shall hereafter overview some of the attributes that render this system the most suitable.

D.1 Achieves Prime Competition

This system satisfies the first prerequisite of government departments by providing for possible announcement of the project in a public tender after preparing full contract documents. This allows suitable prices for performance of required works to be reached.

D.2 Achieves Cost Certainty

This system satisfies one of the priorities of government department requirements through the fact that it ensures award and commencement only after the project is announced in a public tender. Furthermore, the award is only made after the expected project cost becomes known and restricted within the limits specified by the government departments. The integration of the project management system with the traditional system will assist in achieving this requirement through the project management team monitoring project cost during construction to ensure that they remain within the set limits.

D.3 Achieves Good Quality Level

The proposed system provides the ability to achieve better quality through the continued presence of the supervising consultant and the project management team, one of the functions of which (as noted earlier) is to ensure that the supervising consulting properly performs quality control functions.

D.4 Enables Good Communication

One of the shortcomings of the traditional system currently followed

is the poor communications between project parties. The addition of another party to perform project management functions from inception to completion will help to minimize such shortcoming and improve communication between the various project parties. This results from the existence of a single work team that manages the various project phases. This helps in bridging the gap between design and execution given to the nature of the traditional system in separating the design phase from the execution phase.

D.5 Provides Good Client Brief

One of the major problems that is encountered in projects in general is the incomplete project brief prepared by the owner. This is due to the inability of most owners to comprehend all requirements at that stage. A qualified department within the owner's organization charged with this task would be the best alternative to the present system. Such a department would be able to comprehend all the various requirements and collect required information easily. All of this helps to make the project brief complete and thus avoid a lot of the problems that might arise later .

D.6 Achieves Time Certainty/Reducing the Overall Time

One of the major faults of the traditional system is the increase time accumulated by the overall project through an increase in time for each separate phase⁽⁷⁹⁾. The integration of the project management system with the current traditional system will help in reducing this problem because the project management systems provide for:

- D.6.1 A specific time schedule that integrates all the various project phases from inception to completion.
- D.6.2 The existence of a department that is charged, among other functions, with the task of monitoring approved time schedules for each phase and ensure compliance therewith.
- D.6.3 It is observed in government projects that the time period of each phase is longer than the originally determined period. Such delay can be avoided through:

D.6.3.1 Design Phase

- * Preparation of the client brief by the owner's organization will ensure that the brief is clear and complete and subsequently will contribute to a shorter design phase period. One of the main reasons of delay during the design phase is the ambiguity and discrepancy of the client brief.
- * A qualified department in the owner's organization to follow up all phases of design and assist in prompt decision making will contribute to the removal of numerous obstacles that may be encountered by the designer and lead to project delay such as incomplete or incorrect design documents.
- * The follow up of the designer's time schedule by the project management team will influence the designer to abide by the time schedule as much as possible.

D.6.3.2 Tender Phase:

The tender phase in government projects usually takes a long period, the causes are numerous, including:

- * The project tender is sometimes announced without fund allocations being made available.
- * Prices bid are larger than estimated amounts and subsequently larger than allocated budget.
- * Lack of a specific time schedule, based on valid assumptions, that determines estimated time periods for the various phases, including:
 - * Tender announcement phase
 - * Period from obtaining bid documents to bid submission.
 - * Bid opening and technical evaluation phase.
 - * Award phase.

All the above reasons can easily be avoided when implementing the project management system because a qualified department to manage the project will have, among its priorities, the following:

- * To ensure availability of fund allocations for the project before tender commencement.

- * Through follow up of design work, it is ensured that the proposed design satisfies estimated project cost requirements.
- * To prepare a clear time schedule with valid basis for the various phases and for the step by step follow up of construction.

D.6.3.3 Construction Phase:

Most of the causes of delay during the construction phase of government projects, which can be connected to the role that the owner plays, lie in the following (Chapter 4 of this research).

- * Numerous alterations and changes in the project.
- * Delay in decision making by the owner.
- * Delay on the part of the contractor in the supply of certain project materials and equipment.
- * Design complexity.
- * Terrain that the contractor has to deal with that impede project construction.
- * The designer and/or contractor do not coordinate as and when required with other government departments.
- * Poor communication between the various project parties.
- * Poor follow up of the time schedule submitted by the contractor and lack of step by step updating commensurate with project variations.

The introduction of the project management system will contribute to avoidance of all such problems through:

- * Fewer changes in the project, more flexibility and faster performance.
- * Enhanced decision making by the owner.
- * Follow up of the contractor's time schedules in respect of project materials and equipment to assure availability and suitability.
- * Assisting the designer to overcome design complexities through follow up of the designer's work during the design phase and through continued coordination with the designer to ensure that design work can be implemented flexibly.
- * Assisting in overcoming problems related to the terrain through first ensuring site availability prior to design, and second through ensuring that the designer carries out a thorough and complete soil analysis, and a study of the conditions and nature of the terrain prior to

preparation of project designs.

- * Ensuring that the designer and/or contractor coordinate as and when required with other government departments concerned with the project
- * Ensuring better communication between project parties.
- * Constant and intensive follow up of the time schedule to ensure updating commensurate with new project developments.

D.7 Achieves Flexibility (need to alter project once it has begun)

The proposed system assists in meeting this requirement because:

- * It contributes to decreasing the possibility of change and alteration during construction since the existence of a qualified department within the owner's organization will ensure preparation of a project time schedule and follow up such schedule during the design phase. This will lead to decreasing the possibility of alteration and change as communications are improved between the various section of the government department concerned with the project and the project designer
- * It contributes to enhancement of flexibility in introducing alterations and changes during construction because direct communications exist between the contractor, the supervising consultant and the project management team on the one hand, and between the owner and project management team on the other hand.

This contributes to faster decision making in respect of alterations.

D.8 Assists in Achieving Better Performance by the Project Parties

The proposed system contributes to achieving better performance by the project parties by enabling them to concentrate on performance of their disciplinary functions without diverting resources to other tasks. Franks⁽⁷⁸⁾ states that *“Project management enables the client, design team and construction to concentrate its energies and skills on the*

functions for which they are primarily trained” while (Walker)⁽⁸¹⁾ stated that *“the major benefit claimed for the project management structure {referred to in the book as executive project management} is that management becomes clearly separated from the operating system. This allows concentration upon the management needs of the project”*.

D.9 Achieves Better Management Control

The existence of a project management department within the owner’s organization will allow the owner better management control, and ensure achievement of the owner’s aspired objectives for the projects. Sidwell has concluded in a research he carried out on 32 building projects⁽⁹³⁾ that *“management control was a key element in achieving project success”*. Ireland⁽⁸⁸⁾ found similar results for managerial action. While Naoum⁽⁸⁶⁾ states *“higher management control can provide a higher level of management, thus reducing the risk of overruns and delivering projects in a shorter time”*. Masterman⁽⁷⁹⁾ says *“It has been established, both in theory and practice, that success is much more likely to be achieved if clients have a consistence, continuing and detailed involvement throughout the life of a project”*.

E) Reference Viewpoints on the Proposed System

It is extremely important here to overview the viewpoints of some writers and researchers on the concept of this system.

Masterman⁽⁷⁹⁾ states: *“Experienced clients with their own in-house project management staff may well take the next logical step and carry out the management of their projects themselves.”*

While Naoum⁽⁸⁶⁾ says when making a comparison between the traditional systems and the management contracting system:

“Another important task that the client should examine before selecting a procurement method is his experience and ability in managing a project.

NEDO report *Faster Building for Industry*⁽⁹⁰⁾ studied 56 industrial project and recommended that *“the client ensured that someone acted as the focal point for his interest, either in-house or from outside.”*

Walker⁽⁸¹⁾ states: *“In certain circumstances the client’s organization has personnel who can undertake the project management role without the need*

to appoint someone from outside the client's organization. This arrangement can contribute significantly to the ease of integration between the client and the design team."

Masterman⁽⁷⁹⁾ also states: *Finally, and perhaps most importantly, client organizations must realize that in the future they will need to become increasingly involved in the management of their projects to ensure their performance criteria and project criteria are met."*

F) Testing the proposed System through Viewpoints of Experts
As the proposed system cannot be tested at present because it requires long term implementation to allow for assessment of its success . To overcome such difficulties, we found that is important to meet with experts who have had long experience in the same field and the same place subject of this research and to obtain their viewpoints on the possibilities of future success of the proposed system if adopted and implemented. On that basis, the following question, directly related to the proposed system, were prepared as follows :

- * Do you believe that the proposed system represents the best system that can be applied to public sector projects based on the realities that governs such projects? Do you believe that the proposed system can work successfully if the conditions stated in this research are satisfied ?

I interviewed Dr. M.Al-Jarallah, holder of a PhD in Project Management with over 17 years of experience in this field . He has worked in the academic teaching domain at the University of Michigan, USA and King Saud University, Riyadh . He has carried out many research works and co-authored a book entitled `` Management of Engineering Projects” . He was also involved in the supervision of a number of projects and served as Project Manager of the King Saud University Campus, Riyadh which is considered one of the largest building projects ever undertaken throughout the world with construction costs of over US\$ 5.7 billion . Dr. Al-Jarallah stated briefly :-

`` I think the concept is excellent, and that it could be successfully implemented and would contribute to the resolution of numerous problems that are encountered in project execution in the Saudi Public Sector today.

What prompts me to believe so is my own personal experience , where we have applied the proposed system during my service as Project Manager of King Saud University Campus Construction Project. This concept has indeed achieved great success in all aspects” .

I have also interviewed Dr. Habib, Z.A. who has over 25 years of experience in the field of supervision of construction projects. He has carried out numerous research and I have referred herein to **some** of his research works. For over 17 years now, he has served as Assistant Deputy Minister for Public Works at the Ministry of Public Works and Housing . He stated briefly :

“ The concept is excellent and practicable. It was implemented in isolation at one of the construction projects and has achieved noticeable success” .

I have also interviewed Mr Philip Cykes of CRSS Co., USA. He holds a Masters Degree in Business Administration as well as a Masters Degree in Mechanical Engineering. He has over 13 years of experience in public sector projects in the Kingdom of Saudi Arabia as an Executive Representative of CRSS who was charged with supervision of King Saud University Campus Construction . He currently serves as General Manager of CRSS/MYE joint Venture which supervises the Peace Shield Project in the Kingdom of Saudi Arabia. He stated briefly :

“I believe that the proposed system is excellent and can be successfully implemented and would contribute to the resolution of numerous problems that are encountered in execution of construction projects . ”

7.3 Tender Procedures Applied in Government Projects

7.3.1 General

This section and section (7.4) give the third strand of proposals, first was improving management ability of public sector’s project managers, second was improving the building procurement system applied to such projects, third improving the tender procedures and contracts that govern the performance of public sector projects.

Government project tenders in the Kingdom are usually categorised into three different types of tenders as follows:

- * Project design tender
- * Supervision of construction tender
- * Project construction tender

These tenders are usually similar in their procedures with one exception, namely that design tenders and supervision of construction tenders are carried out by way of selected tender while the construction tender is announced as an open tender.

The problems encountered in these tenders are often similar. Given to the comprehensive nature of the construction tender, we shall address it first and then move to the problems of the design tender and the supervision of construction tender. The tender phase in Saudi Government projects often includes:

- * Tender announcement (with the exception of design tenders and supervision of construction tenders).
 - * Delivery of tender documents to bidders.
 - * Receipt of bid documents and bid opening.
 - * Technical analysis.
 - * Decision to award.
 - * Award.

7.3.2 Construction Tender

The most important aspect of this phase is one of the major problems that are encountered in public sector projects in the Kingdom, namely the occasional award to unqualified contractors which causes delay in project construction and creates numerous problems during the construction stage and negatively affects the interests of public departments. To assess methods and viewpoints that may assist in solving this problem, we must address the most significant laws and regulations that govern this phase. Laws and regulations stipulate as follows:

- * All government tenders shall be announced in open invitations, Royal Decree No. 9751 dated 26.4.1403H, (1983).
- * The project is not awarded to the least bidder unless classified in the field of work of the project and in a degree commensurate with the value of the contract in question, Royal Decree No.1709 dated 19.7.1405H,(1985).

- * The project shall be awarded to the best bid from the financial and technical aspects after ascertaining through the award committee and with the assistance of experts as deemed appropriate that the bid is in compliance with contract conditions and specifications, (Article 16 of the Rules of Implementation of Government Procurement Regulations).

Based on the above, we can say that there are three factors that affect qualification and selection of construction contractors for public projects, namely:

- * Open invitations/classification system
- * Report of the technical analysis committee
- * Report of the award committee.

Open Invitations/Classification System

The open invitation system as applied in public projects in the Kingdom is based on announcement of the tender in official newspapers and delivery of the tender documents to interested bidders. The open invitation system, similar to any other system, has its advantages and disadvantages. Foremost among its advantages is reduced construction cost which is one of the first priorities of government departments, and allowing equal and fair opportunity for contractors to bid. The most significant of the disadvantages is that a number of unqualified bidders may submit bids for this project. To overcome this disadvantage, the contractor classification system was adopted and an independent and complete department was established to carry out these functions.

The system was introduced as a complementary system to the open invitation system in order to avoid underlying disadvantages. Therefore, the concept of this system can be considered as valid and important provided that it is coupled with an ability to carry out classification functions properly and effectively.

There are disadvantages in this system that negatively affect projects, including:

- * The abilities of some classified contractors are not commensurate with their classification grades such that there are contractors

who are classified in grades higher than their actual capabilities; this points to a discrepancy in the classification standards or in their application, and therefore it is required to reconsider those standards and attempt to pinpoint weaknesses and endeavour to develop and improve them.

- * Some contractors go around the system requirement that the contractor must be classified in a grade commensurate with the project contract value. After receipt of documents and determination that the project value is higher than the classification grade, the contractor enters into a joint venture agreement with another contractor who is suitably classified for the project. The second contractor is paid a sum of money or a percentage of project value without having to carry out any works, leaving all works to be carried out by the unsuitably classified contractor. This results in numerous obstacles to project execution as the contractor is unable to carry out project works efficiently. Therefore, consideration of this issue is needed in order to avoid future recurrence.

Technical Analysis Committee Report

One of the important but at the same time neglected matters in determination of the qualified contractor is the report of the technical analysis committee which is supposed to remedy the problems of the qualification system. However, the role this committee plays does not really reflect the role it is supposed to play. This is because of the reasons mentioned in section (5.4.3.1) of Chapter 5 of this research. Here we shall address the methods which can assist in improving the role this committee can play, including:

- * Preparation and development of clear- cut standards based on which the technical committee's report can be prepared. The standards can be used by the technical analysis committees of the various public departments instead of leaving matters to each committee separately. This will contribute to the report's credibility and effectiveness.
- * Careful selection of committee membership to provide persons with high qualifications and experience.

- * Give the committee report greater emphasis and provide for its use as a source of information for the Bid Award Committee. This is provided for in the system where it is stipulated that award decision shall be based on the best bids from a technical and financial viewpoint. This stipulation must be translated into reality and provide for greater emphasis on the report of this committee.

Award Committee Report

The study referred to in article (5.4.3) of Chapter 5 of this research has shown that 95% of projects covered by the study were awarded to the lowest bidders. This reveals the practice of award committee members employed by the various public departments, of awarding the project to the least bidders irrespective of the bidder's technical qualification. To remedy this discrepancy, the following must be complied with:

- * Prepare and develop clear-cut standards based on which the award committee's report is prepared. These standards can be used by award analysis committees of the various public departments.
- * Carefully select committee members such that the majority are not persons who represent finance section of the public department as *this will cause the committee to concentrate on the financial aspects only and neglect the technical aspect.*

7.3.3 Design Tender/Supervision of Construction Tender

What we have mentioned earlier on the construction tender applies to both the design tender and the supervision of construction tender with the exception that the latter two types of tenders are done as selected tenders. Therefore one of the problems that are encountered in public projects in respect of this phase is that some public departments invite unqualified consulting offices to carry out design and/or supervision works. Perhaps the main reason for that is the lack of clear-cut standards at the various public departments to be used in the qualification of such offices.

As a result, each public department invites consulting offices using one of the following methods:

- * Without pre-qualification because of the inability of the public department to develop the required standards. Therefore there are no clear-cut constraints that are used in invitation. Invitations are sent in such cases by improper decisions, personal contracts, or prior knowledge of such offices irrespective of the actual conditions of the consulting offices. This renders such selection incomplete and unsuccessful and therefore negatively affect the project to be constructed.
- * Some of the public departments pre-qualify these offices and in such case each public department prepares its own independent standards and constraints without any coordination. Some public department do not have the required experience in preparation of such standards and therefore the result is incomplete standards and consequently the consulting offices are confused by the double standards of the various public departments, which result in impeding and delaying developmental programs at such offices . To over come such problem it is required to prepare and develop standards to be adopted by various public departments in the pre-qualification of consulting offices for design and supervision works.

7.4 Contracts that Govern the Performance of Public Sector Projects

The current system of public sector project involves three types of contracts that are used by public departments as follows:

- * Design Contract:
Entered into by and between the public department and the designer.
- * Supervision of Construction Contract:
Entered into by and between the public department and the consultant supervising construction.
- * Construction Works Contract:
Entered into by and between the public department and the construction contractor.

.1 Design Contract/Supervision of Construction Contract

There is no uniform design and/or supervision of construction contracts that can be used by all the various public departments. Contracts are prepared by each public department separately based on individual judgment, and some of those departments may not have the legal, technical and financial expertise necessary to prepare such contracts. Thus contracts appear incomplete and vague and may create confusion and numerous disputes. Moreover there may be conflict with the uniform construction contract. These contracts are addressed in Chapter 3 and 5 of this research. What we should consider here is the determination of proposals that are apt to assist in bypassing problems that may result from vague and ambiguous contracts. These proposals may be stated as follows:

- * Preparation of uniform contracts for design and supervision of construction by establishing a qualified work team having technical, legal and financial expertise as well as representatives of consulting offices operating in the Kingdom. This committee should be completely devoted to complete such contracts. The uniform design and supervision contracts were supposed to be prepared along with the uniform construction contract since the various project phases are inter-related.

Public departments shall at the time of preparation of its design and supervision contracts use qualified legal, technical and financial expertise to enable it to formulate acceptable and usable contracts .

2 Uniform Construction Contract

The uniform construction contract was ratified by Royal Decree No.136 dated 13.6.1408H, (1988). All public projects are currently governed by such contract. Any discrepancy, ambiguity or conflict in such a contract would negatively affect all aspects of completed projects. Some of the weaknesses that were found in the uniform contract, and the impediments that may negatively affect projects through some of the practical applications were discussed in Chapter 5 of this research. These points were listed as examples of discrepancy and ambiguity in some of the contract clauses.

To avoid this problem, we have to review and update the contract clauses clause by clause , and relate them to one another. This review to be performed by a qualified work team having technical, legal and financial expertise.

We must emphasize the participation of technical expertise in such view as they represent the most important aspect of project construction, namely the technical aspect. It appears from the overview of contract weaknesses that technical expertise did not participate in the preparation of the original uniform contract and this has rendered the contract to appear discrepant and ambiguous.

The points addressed in Chapter 5 of this research include:

- * The contractor's responsibility for design.
- * The contractor's responsibility for investigating site conditions.
- * Method of measurement.
- * Variation orders.
- * Warranty and maintenance period.

The more significant weaknesses of the uniform contract (as shown in chapter 5) have clear negative impacts through:

- * Creation of disputes and giving rise to financial claims.
- * The public department suffers great financial losses.
- * Delay beyond the project's time schedule.
- * Conflict with consulting contracts (design/supervision).

In order to avoid such problems in the future, a thorough view of the aforementioned contract must take place with the following considerations:

- * The liability for design must be clearly defined through a realistic and practical study. This will replace the present conflict and ambiguity in the limits of such liability. This can only be done through the preparation of the uniform design and supervision contract and subsequently through the determination of an integrated format of the three types of contracts such that the limits of liability are determined without conflict or ambiguity that may give rise to disputes.
- * The contractor's responsibility for investigating site conditions must be clearly defined. This can be done only through the formulation of a

uniform design contract and the determination of the designer's liability for investigating site conditions. On that basis the contractor's liability can be determined.

- * Given the fact that the uniform contract is a remeasurement contract, it is essential and clearly obvious that the contract should include a clear and comprehensive determination of the method of measurement to be applied. Our study of this item in Chapter 5 of this research reveals the importance of such a method.
- * Variation Orders are blamed for most conflicts and financial claims and therefore the Variation Orders procedures should be subjected to a comprehensive and thorough study without leaving any gaps that may lead to conflicts or claims.
- * The concept of the warranty and maintenance as defined in the uniform contract is an incomplete concept and proves that the warranty and maintenance requirements are misunderstood. It therefore leads to numerous interpretations and personal viewpoints that may cause damage to the subject installation that cost millions of Riyals.

7.5 Summary of Proposals on the Development of Systems that Govern the Public Sector's Projects

1. Develop the currently adopted traditional management system by integrating it with the project management system following the proposals stated in Item(7.2.9.B) of this Chapter.
2. Reconsider the current classification system through an in-depth study that includes assessment of its weaknesses, its development and improvement.
3. Develop and improve procedures and steps of technical analysis of the various tenders through:
 - 3.1 Preparation of clear-cut standards of the technical analysis requirements and procedures for the various tenders (design - supervision - construction).
 - 3.2 Thorough and careful selection of technical analysis committee members to select persons who have the required qualifications and experience.
 - 3.3 Place greater emphasis on this committee's reports.

4. Develop and improve procedures and steps of award of the various tenders through:
 - 4.1 Preparation of clear-cut standards of award requirements and procedures for the various tenders (design - supervision - construction).
 - 4.2 Thorough and careful selection of award committee members to select persons who have the required qualifications and experience in the various disciplines.
5. Prepare and develop standards to be adopted by various government departments in the pre-qualification of consulting offices for design and supervision works.
6. Prompt preparation of the uniform design and supervision contract to be compatible with the uniform construction contract.
7. Reconsider the uniform construction contract through a comprehensive and thorough study of all its items to include:
 - 7.1 Clear determination of the liability for design.
 - 7.2 Clear determination of the liability for investigating site conditions.
 - 7.3 Determination of the method to be used in re-measurement.
 - 7.4 Comprehensive assessment of the procedures to be followed in preparation of variation orders.
 - 7.5 Clear and thorough determination of the concept of warranty and maintenance .

CHAPTER 8

Conclusions and Recommendations

8.1 General

We shall attempt in this Chapter to review:

- * Conclusions reached through out this research.
- * Recommendations, which are divided into two categories as follows:
 - * Recommendations on viewpoints and proposals reached in this research which contribute to the development of the two main elements of public sector projects in the Kingdom, namely:
 - People managing public sector projects.
 - Systems that govern the performance of the public sector projects.
 - * Recommendations for further research.

8.2 Conclusions

Through the study that we have carried out in this research we find a number of significant conclusions that can be divided into two sections:

- * Conclusions related to systems that govern performance of public sector projects.
- * Conclusions related to the management qualifications of the public sector's project managers.

8.2.1 Conclusions Related to Systems that Govern Performance of Public Sector Projects

From the study conducted in Chapter 4 of this research which covered public sector building projects carried out during the period from 1982 to 1992, we can conclude the following:

8.2.1.1 Building Procurement Systems

During that period, the procurement systems by which public sector projects were carried out were as follows:

- * Traditional System: 80% of projects
- * Design and Build System: 20% of projects.

8.2.1.2 Tendering Type

Government tenders during that period were divided into two types as follows:

- * Open Tender: 44% of projects
- * Selected Tender: 56% of projects.

The selected tendering procedures were discontinued in 1989 and all government projects, from that moment on, were subject to open tendering procedures only.

8.2.1.3 Types of Contracts

Three types of contracts were used to reflect the relationship between government departments and contractors. The three types were used during that period were as follows:

- * Lump-Sum Contract: 50% of projects
- * Re-Measurement Contract: 27% of projects
- * Re-Measurement with Ceiling Price Contract: 23% of projects.

8.2.1.4 Delayed Projects

- * A large percentage (75%) of government projects suffered from delay beyond scheduled time period.
- * 77% of projects awarded through selected tender and 65% of projects awarded through open tender suffered from delay beyond schedule.
- * 60% of projects carried out with a lump-sum contract, 74% of

projects carried out with a re-measurement contract and 94% of projects carried out with a re-measurement with a ceiling price suffered from delay beyond schedule.

- * 79% of projects performed in accordance with the traditional system and 43% of projects performed in accordance with the design-build system suffered delay beyond the scheduled period.
- * 68% of delayed projects were carried out at costs less than contract value.

8.2.2 Conclusions Related to the Management Qualifications of Government Project Managers

Based on the study referred to in Chapter 6 of this research, we can conclude the following:

8.2.2.1 University Education

- * While the vast majority of project managers surveyed held a bachelor degree in one of the engineering disciplines none of them had had post graduate education in project management.
- * A large percentage of project managers did not benefit fully from their university education in the field of project management. This was attributed mainly to the low number of courses given in this field throughout university education. A second important reason was that courses emphasised theory and neglected practice.
- * A large percentage of project managers surveyed did not study any course in the field of project management or studied one course only.

8.2.2.2 Training

- * On-the-job training was rated the best source of training in the field of project management. Medium duration was rated the second best source.

- * A large number of project managers did not take advantage of training given. This was attributed to the short duration of training, lack of good preparation in their respective departments and the incompatibility of training subjects with the actual functions they performed.
- * Project managers were not allowed sufficient training opportunities in the various fields related to project management.
- * There was an urgent need in the future for training in project management followed by training in computer applications in project management. These were rated as the highest priorities.

8.2.2.3 Experience

- * A large percentage of government project managers do not gain sufficient experience before their appointment as project managers.
- * The Saudi engineer performs more management functions than technical functions during his term of employment.
- * The Saudi engineer turns to performing management functions within a short period after graduation.
- * A large number of project managers do not fully benefit from the experiences that they are allowed to gain. The main reason for this is the lack of good planning to provide for realising the full benefit of experience during project execution. While a second reason is the lack of efficient and proper organisation to interconnect the parties the project and provide a suitable environment for benefiting from experience.
- * There is a clear deficiency in the management qualifications and abilities of government project managers.

8.3 Recommendations

8.3.1 Recommendations on Methods of Improvement of Capabilities of Public Sector's Projects Managers

8.3.1.1 University Education

Firstly, reconsidering university engineering education in the Kingdom through:

- * Increase the number of compulsory management courses taught to engineers which prepare them to be effective future project managers.
- * Subjects should emphasise the practical aspects rather than theoretical aspects.
- * Selection of subjects that are appropriate and reflect the actual need of government project managers.

Secondly, emphasise continued education as an effective tool for training in the field of project management.

8.3.1.2 Training

- It is essential to have a comprehensive training plan clearly defined to form part of the overall department plan. This should consist of three training schemes, long term - medium term - short term, to form one complete plan with common objectives, purposes and procedures. The above requires the creation of a special section to prepare such a plan and follow up implementation and continued development.
- It is necessary to select the proper training sources as follows:
 - * Emphasise training on the job and short and medium training courses as effective training sources. This is to be accompanied by a thorough study of actual need as an input to the overall training plan.
 - * Government departments should play an effective role in encouraging the self education of its employees and provide incentives for using these sources.
 - * Government department should allow engineers, who are envisaged to assume project management assignments in the future, the opportunity to obtain higher education in this field.
 - * The importance of participation in symposia and lectures and in the preparation of studies and research to complete the training process and achieve maximum qualification should not be neglected.

- It is essential to select proper training subjects in this field taking into consideration the following:
 - * Emphasise providing numerous training opportunities in the project management field.
 - * Other training subjects to include computer science, business management, legal subjects and accounting and finance.

8.3.1.3 Experience

- It is essential to have a comprehensive plan and program for gaining experience, aimed at the following:
 - * Proper preparation of employees for work in this field.
 - * Full benefit of experience gained.
 - * Provision of proper and effective organisation to inter- connect project participants and provide an appropriate environment for benefiting from experience gained.
 - * To be compatible with the training plan and programs of each department, such that both are complementary and have a common objective, namely the enhancement of management abilities and qualifications of department personnel.

8.3.2 Recommendations on Methods of Improvement of Systems that Govern Performance of Government Projects

- a) Development of the traditional management system that is currently adopted by integrating it with the project management system. This can be done through the adoption of recommendations listed in Item (7.2.9.B) of Chapter 7.
- b) Reconsideration of the contractors classification system currently adopted by a thorough review covering determination of weaknesses, development and improvement of performance.
- c) Development and improvement of procedures for technical analysis of tenders through:
 - c.1) Improvement and development of clear-cut standards for the

- technical analysis of the various forms of tender (design , supervision and construction).
- c.2) Careful selection of the technical analysis committee members, to appoint persons with the required qualifications and experience.
 - c.3) Placing more emphasis on the deliberations of this committee.
 - d) Development and improvement of procedures for the award of the various tenders through:
 - d.1) Preparation and development of clear-cut standards for the award requirements of the various tenders (design - supervision- construction).
 - d.2) Careful selection of the award committee members, to appoint persons from various disciplines.
 - e) Preparation and development of standards to be adopted by the various government departments for purposes of pre- qualification of consulting offices for design and supervision tenders.
 - f) Prompt development of a uniform contract for design and supervision to be compatible with the uniform construction contract.
 - g) Reconsideration of the uniform construction contract through a comprehensive and thorough review of its clauses to include:
 - 9.1) Clear determination of liability for design.
 - 9.2) Clear determination of responsibility for investigation of site conditions.
 - 9.3) Determination of the method to be followed in re-measurement.
 - 9.4) Full determination of the procedures to be followed in preparation of variation orders.
 - 9.5) Clear determination of the warranty and maintenance concept.

8.3.3 Recommendations for Further Research

Some of the proposals require further research and study and that may

constitute subjects for future research, namely:

- a) Developmental study of the government procurement regulations and their rules of implementation in respect of applicability to projects.
- b) Analytical and developmental study of the uniform construction contract.
- c) Study aimed at preparation of a uniform contract for consulting works in government projects (design and supervision of construction).
- d) Developmental study of the contractor classification system.
- e) Comprehensive study of university education development to provide for the enhancement of the management abilities and efficiency of engineers.
- f) Developmental study of training in government departments to help improve the management skills of engineers charged with project management.
- g) Study of methods for the development and enhancement of the capabilities of local contractors.
- h) Development of standards for pre-qualification of consulting offices for design and supervision tenders and development of procedures for technical analysis of tenders and for the award of tenders to be adopted by the various public sector departments.
- j) Study of methods for the development of the capabilities of local consultants.

Finally, the need for change, restructuring and development in project management in the public sector of Saudi Arabia is a necessity dictated by the rapid changes of the world around us and the difficult challenges that surround us , it is a need dictated by our reality as a state that is still in its development and growth stages and still has to undergo many different development projects. It is also dictated by the results of the first and second surveys. Therefore the road is long and hard, but reaching the destination is not impossible. All that is needed is perseverance, strength and belief that we need to build a generation capable of facing the challenges of development and growth and lead the ship to safety.

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APPENDIX - A

QUESTIONNAIRE

- Please fill in the required information to include:
- Projects that were completed during the period from 1982 to end 1992.
- Building projects or projects that comprise of at least 50% building works.
- Please fill the attached sheets for the largest 10 projects that were executed in accordance with the above requirements.
- If you would like to state information that is not provided for in this questionnaire, please include on the sheets attached to the back of this questionnaire.

(1) General:
Project Name.....
Total Value (S.R.).....
Project Start Date Corresponding to
Project Completion Date Corresponding to

PLEASE FILL IN THE BLANKS AS APPLICABLE

(2) Building Procurement Systems:

- a) A specialized management firm was contracted to manage all phases of the project.
- b) A general contractor was contracted to design and construct project work.
- c) A specialized engineering office was contracted to design the project and a specialized management company was contracted to manage the construction phase.
- d) An engineering office was contracted to design the project and another engineering office was contracted to supervise construction.
- e) One engineering office was contracted to design and supervise works through:
 a single contract two separate contracts
- f) Others

(3) Owner's Staff:

Owner's staff consisted of:

- Staff on site that reports directly to the Central Head office.
- Staff at the head office only.
- Staff on site only.
- There was no owner's staff.

(4) Owner's Staff Assignment:

4-1 Design :

- Management supervision
- Technical supervision
- Technical & management supervision

4.2 Construction:

- Management supervision
- Technical supervision
- Technical & management supervision

(5) Participating Parties:

Parties which have participated in the project are :

- Owner
- Construction contractor
- Management firm that managed all phases
- Supervision consultant
- Main contractor
- Subcontractors
- Management firm that managed the construction phase
- Designer
- Others

(6) Contracts Documents:

6.1 Design

Design contracts documents consisted of:

- | | |
|--|---|
| <input type="checkbox"/> Instructions to bidders | <input type="checkbox"/> General conditions |
| <input type="checkbox"/> Special conditions | <input type="checkbox"/> Form of agreement |
| <input type="checkbox"/> Scope of work | <input type="checkbox"/> Other documents |

6.2 Supervision of the construction works:

Supervision contracts documents consisted of:

- | | |
|--|---|
| <input type="checkbox"/> Instructions to bidders | <input type="checkbox"/> General conditions |
| <input type="checkbox"/> Special conditions | <input type="checkbox"/> Form of agreement |
| <input type="checkbox"/> Scope of works | <input type="checkbox"/> Other documents |

6.3 Execution of the work

Execution contracts documents consisted of:

- | | |
|---|---|
| <input type="checkbox"/> Instruction to bidders | <input type="checkbox"/> General conditions |
| <input type="checkbox"/> Special conditions | <input type="checkbox"/> Form of agreement |
| <input type="checkbox"/> Drawings | <input type="checkbox"/> Specifications |
| <input type="checkbox"/> Bills of quantities | <input type="checkbox"/> Other documents |

(7) Contracts Preparation:

7.1 Design

Design contract was prepared by:

- The owner The management firm managed all phases (if any)
- Other government departments Main contractor (if any)
- Others

7.2 Supervision:

Supervision contract was prepared by:

- Owner The management firm managed all phases(if any)
- Other government departments Main contractor (if any)
- The designer Others

7.3 Execution:

Execution contract was prepared by:

- The owner Management firm managed all phases (if any)
- Other Government departments Main contractor (if any)
- The Supervision consultant The Designer
- Others

(8) Tender Procedures:

8.1 Design

The tender procedures for design works was performed under supervision of:

- The owner The management firm managed all phases (if any)
 Others

8.2 Supervision

The tender procedures for supervision works was performed under the supervision of:

- The owner The management firm managed all phases (if any)
 The designer Others

8.3 Execution

The tender procedures for execution works was performed under supervision of:

- The owner The management firm managed all phases (if any)
 The designer Others

(9) Tendering Type:

9.1 Design

The design tender was :

Open tender

Direct negotiation

Selected tender

Others

9.2 Supervision

The supervision tender was :

Open tender

Direct negotiation

Selected tender

Others

9.3 Execution

The execution tender was:

Open tender

Direct negotiation

Selected tender

Others

(10) Contracts Type:

10.1 Design:

Lump-sum contract

Others

10.2 Supervision:

Lump-sum contract

Others

10.3 Execution

Lump-sum contract

Remeasurement contract

Remeasurement with
a ceiling-price contract

Cost-Plus Contract

Others

(11) Relations:

11.1 Contractual Relations

11.1.1 The following parties related contractually to the owner:

- Management firm managed all phases, (if any)
- Main contractor (if any)
- The supervision consultant The designer
- Management firm managed the construction phase (if any)
- The contractor Others

11.1.2 (in case of using the project procurement system mentioned in item (B) of Article (2):

The following parties related contractually to the main contractor:

- The designer The supervision consultant (if any)
- Sub-contractors Others

11.2 Management Relations

Please mark the following data from (11.2.1) to (11.2.4) according to the used project procurement system:

11.2.1 The Procurement System (A):

The following parties related managemently to the managed firm managed all phases.

- The designer The supervision consultant
- The construction contractor The sub-contractor
- Others

11.2.2 The Procurement System (B):

The following parties related managemently to the main contractor:

- The designer The supervision consultant
- The sub-contractor Others

11.2.3 The Procurement System (C):

The following parties related managemently to the owners :

- The designer The management firm managed the execution phase
 Others

11.2.4 The Procurement Systems (d) and (E):

11.2.4.1 The following parties related managemently to the owner:

- The designer The supervision consultant
 The construction contractor Others

11.2.4.2 The construction contractor related managemently to the supervision consultant.

11.3 Sub-contractors:

The subcontractors related to the construction contractor:

- Contractually Managemently.

(12) Project Cost:

- Project was completed at contract value.
 Project was completed at a cost higher than contract value.
 Project was completed at a cost lower than contract value.

(13) Project Term:

Was project completed within scheduled contract period ?

- Yes No

If answer is no, please reply to paragraphs 13.1 and 13.2:

13.1 Estimated period of delay is _____ months

13.2 Causes of delay were:

- Contractor's poor technical abilities.
- Contractor's poor management abilities.
- Contractor's poor financial abilities.
- Incomplete and incorrect contract documents.
- Design complexity.
- Changes and modifications
- Inaccuracy of scheduled time estimation.
- Delay in disbursement of contractor's entitlement.
- Client's lengthy administrative procedures and delay in decision making on requirements/Lack of an effective communications system
- Other public departments
- Poor technical/management supervision by owner's staff.
- Poor technical/management abilities of the consultant.
- Poor abilities of sub-contractors.
- Weather conditions
- Failure to select a suitable site.
- Unforeseen conditions.
- Other, please explain:
- Department that filled this questionnaire:.....
- Ministry:.....
- Date: Corresponding to:

APPENDIX - B

QUESTIONNAIRE

1. General Information	
Name
Employer
Age
Date of Completion

2. Education			
2.1 Please state details of all educational qualifications:			
Degree/Diploma	Major	Date of Graduation	Educational Institute
.....
.....
.....
.....
.....
<p>2.2 To assist in the evaluation of your actual benefit from your university education, and assuming that 100% represents full benefit from your university education in your basic and required preparation as a project manager, please state the percentage you believe represents your actual benefit in this respect: _____%.</p>			

2.3 If your reply to question 2.2 shows lack of total benefit from university education in preparing the project manager, please tick as appropriate the cause(s) that you believe have led to such lack of benefit:

- Inadequate number of University Courses related to Project Management (please refer to paragraph 2.4)
- Courses taught emphasize theory while neglecting practical application.
- Incompatibility of Courses taught with the project manager's actual needs.
- Other (please clarify)

.....

2.4 If you believe that such subjects are not sufficient, please state the number of subjects you propose to be added in order to realize the objective of university education in preparing a successful project manager.

Subject	Number of Actual Courses	Number of Proposed Courses
Business Management
Project Management
Computer Science
Finance and Accounting
Legal Subjects

3. Training

3.1 Training Sources:

Below are the major training sources. Please state the importance of each of these sources in the development of your management capabilities using numbers 1 to 10, where 10 indicates most important and 1 indicates least important.

Source	Number
- Courses	
- Short Courses (1 to 14 days)
- Medium Courses (2 weeks to 20 weeks)
- Lectures and Seminars
- Post graduate
- Self Education
- Preparation of Specialized Research
- On the Job Training
- Other (Please explain)
-
-
-

3.2 Actual Training

3.2.1 To assist in the evaluation of your actual benefit of training opportunities that were made available to you in your preparation as a project manager, and assuming that 100% represents full benefit from such opportunities, please indicate the percentage you believe represents your actual benefit in this respect _____%.

3.2.2 If your reply to question 3.2.1 shows lack of total benefit from training opportunities that were allowed to you in your preparation as a project manager, please tick as appropriate the cause(s) that you believe have led to such lack of benefit:

- Lack of good preparation for training from your department.
- Lack of Incompetence of the training organization.
- Training subjects not compatible with the actual assignments of the project management
- Short duration of the training courses
- Other (please explain)

.....

.....

.....

.....

.....

3.2.3 To assist in determination of your previous training, please state the number of training opportunities allowed to you in the below listed subjects:

Subject	Number				
	Short Courses (1-14 days)	Medium Courses (2-20 weeks)	Lecture & Seminars	Specialized Research	On-the-job Training
- Business Management
- Project Management
- Computer Science
- Finance and Accounting
- Engineering Subjects in your field of speciality
- Legal Subjects
- Other (please explain)
-
-
-
-
-
-
-
-

3.3 Need of Future Training

Please state the fields in which you believe you require future training, commensurate with your actual need of training, and using numbers 1 to 10, where 10 indicates greatest need and 1 indicates least need.

Subject	Number
- Business Management
- Project Management
- Finance and Accounting
- Computer Science
- Engineering Subjects in your field of speciality
- Legal Subjects
- Others (please explain)
-
-
-
-
-

4. Experience	
4.1 What is the number of projects you have worked on before becoming a project manager?	
4.2 What is the approximate date of the first project of which you became a project manager?	
4.3 Of the actual functions you have performed and currently perform, please state the percentage of your actual management functions and the percentage of your actual technical functions.	
Functions	Percentage
Management Functions
Technical Functions
Total	100%
4.4 To assist you in the evaluation of your actual benefit from experiences allowed to you in your preparation as a project manager, and assuming that 100% represents full benefit in this respect, please indicate the percentage you believe represents your actual benefit from experiences allowed to you in this respect: _____%.	

APPENDIX - C

CASE STUDY (1)

C.1 Brief Description

- Total Project Area = 2 million Square Meters
- The Project is divided into three areas as follows:
 - The Academic Area
It consists of 17 different buildings including kinder gardens, elementary schools for boys and girls, intermediate schools for boys and girls, education buildings, laboratories...
 - Central Services Area
It consists of 31 different buildings including administration buildings, workshops, central warehouses, sewerage treatment plants, water treatment plant, power plant, roads, landscaping, etc.
 - Housing Area
It consists of 322 housing units including villas of various sizes for families and housing units for students as well as restaurants and playgrounds.

C.2 Total Project cost = US \$ 360 million

C.3 Problems encountered during this case study

C.3.1 Incomplete and incorrect contract documents

Phase : Construction

Note : In this case study both Parties have agreed to form a committee to arbitrate disputes that have arisen between them .

Examples:

C.3.1.1 The quantities related to the stadium to be built as part of this project included a total item for food supply requirements. However, the specification indicated that this item was part of the requirements of the messhall and other buildings. The contractor's bid price for this item was US\$ 1,980,080. Due to this contradiction, the contractor

did not price this item as part of the stadium but submitted it in a separate list attached to the original bill of quantities. A dispute arose between the two parties and the owner requested the contractor to abide by the bid price submitted with the original bill of quantities and withdraw the list attached to its proposal. The contract was signed by and between the two parties on the basis of the originally bid price without adding the amount contained in the list attached to the submitted bid. However, the contractor, at the end of the project period and prior to calculation of final entitlement, claimed the amount contained in the list that was attached to its contract. The committee found that the contractor is not entitled to this amount because the signed contract did not contain any indication or reservation in respect of this amount . The contractor agreed to withdraw its claim.

C.3.1.2 The contractor noticed during construction that there were contradictions between electrical drawings and architectural drawings pertaining to the requirements for control and monitoring equipment in one of the buildings. The resolution of these contradictions dictated additions to the electric drawings at a cost of US\$ 39,013. A dispute arose between the two parties with the contractor requesting approval for the additions as a change order. The request was denied by the owner's representative. The committee has resolved that the contractor is not entitled to such claim based on an item provided for in the contract by and between the two parties which stipulated that "the contractor shall check all drawings prior to bid submission and shall notify the owner of any contradiction and that the contractor shall be held liable for any faults that it could have avoided". The contractor agreed and withdraw his claim.

C.3.1.3 At completion of this project, the value of new items claimed by the contractor, but not contained in the contract due to contradiction between drawings and/or specifications and the bill of quantities and due to incomplete bill of quantity was US\$ 6,929,844.

- The increase in the value of original bill of quantities for the same causes was US\$ 50,914,596.

A dispute arose between the two parties in both the aforementioned cases since:

- The contract did not specify a method for calculation of costs of new items when the two parties disagreed on the method to be used.
- The contract stipulated that "the contractor may not exceed the quantity of any items without the owner's prior written approval." As the contractor did not obtain the owner's prior written approval during construction, and given the difficulty involved in obtaining such approval, a dispute arose between the two parties.

The committee has resolved that the contractor is entitled to this financial claim as the supervising consultant ascertained that the contractor has actually executed the items concerned. The consultant has also taken actual measurements of such items. In order to determine the cost of the new items, the committee asked the supervising consultant to prepare specifications for those items and obtained a price quotation from the local market. The quotation was approved after deduction of 10% of its value given to the time variance between the period of execution of new items and the date of obtaining the price quotations from the local markets. The committee approved an amount of US\$ 6,362,842 as a cost for new items. As for the cost of increase in the original bill of quantities amounting to US\$ 50,914,596 , this increased was approved by the committee after the supervising consultant submitted proof of validity of this claim and after actual measurements were taken using unit prices submitted by the contractor for the original bill of quantities. The owner agreed to the committee's findings in this respect.

C.3.1.4 The contractor noticed during construction that the storm drainage system shown on the drawings was incomplete and construction in accordance with drawings and specifications would not achieve the

intended purposes. The contractor thus proposed some additions and modifications to the system and obtained the approval of the owner's representative.

The contractor applied for approval of this action as a change order with a value of US\$ 308,835. However, a dispute arose between the two parties when the owner's representative stated that the contractor was not entitled to consider this as a change order . The committee which was formed to settle the conflict between the two parties has resolved that the contractor is not entitled to this claim based on the consultant's view which are in turn based on an item provided for in the contract by and between the two parties which stipulates that " the omission in the drawings and specifications, or faulty specifications of work details which are required to clarify the objectives of the drawings and specifications do not relieve the contractor from his obligation to perform omitted and poorly specified project details and such details shall be executed as if they were fully and accurately described in the drawings and specifications". The contractor agreed and withdrew his claim.

C.3.1.5 This project involved supply and installation of security control cameras at the project site. Drawings however did not indicate such cameras to be connected to the emergency power generators at the project. Thus a conflict arose between the two parties, where the owner stated that one of the priorities in operation of security cameras is to ensure operation during power failures. The contractor refused claiming that the drawings did not refer to the subject. The cost of connecting the cameras to emergency power amounted to US\$ 203,100. The committee has resolved this dispute based on the contract stipulation referred to in example (C.3.1.4) , and as a compromise to connect some of these cameras which are located in security sensitive areas. Both parties have agreed to this resolution.

C.3.1.6 Specifications provided for the supply of a central control and monitoring system on this project to serve two purposes, Building Management System and an Energy Saving System.

The specification contained a detailed description of requirements for the Building Management System, but without any mention of the details of the Energy Saving System. A dispute arose between the two parties vis-a-vis the determination of the requirements of the latter system. The owner was of the opinion that the system should play a distinct and active role in the service of the project. The Contractor did not agree, stating that the specifications contained no mention of the system and its requirements. Total value of additional requirements claimed by the owner was US\$ 587,851. The committee has resolved, based on the contract stipulation referred to in example (C.3.1.4), that the owner is entitled to this claim . The contractor has agreed to this resolution.

C.3.1.7 Claims submitted by the contractor arising from his review of drawings amounted to US\$ 609,911. This led to a dispute between client and contractor due to unclear limits of the contractor's responsibility vis-a-vis review of such documentation. The committee found that the contractor is not entitled to this claim based on a contract item which stipulates that "the bidder shall review the drawings, specifications and bill of quantities as well as all other requirements thoroughly and to ensure their validity from a technical point of view. The contractor shall also ensure that they are sufficient to achieve the goals and objectives of the project . In the event the contractor discovers fault or technical discrepancy, the contractor shall notify the owner of its viewpoint within the period specified for bid acceptance. The contractor shall also propose the alternative it deems appropriate and the owner may agree or disagree as the owner deems necessary. Submission of a bid without giving the owner any such proposal is deemed as an acknowledgement by the contractor of the validity of drawings " . The contractor agreed and withdrew his claim.

C.3.1.8 Based on the stipulation referred in example (C.3.1.7) the contractor attached to his proposal an affidavit stating that it had reviewed

contract documents and proposed an additional amount of US\$ 2,417,910 broken down as follows:

- US\$ 513,483 cost of new items which appear in the drawings and/or specifications but not in the bill of quantities.
- US \$ 1,904,427 cost of additional quantities due to contradictions between drawings and/or specification and the bill of quantities.

A dispute arose between the two parties with respect of owner's approval to the above amount. The result of this dispute was the same as the result of the dispute in example (C.3.1.1) .

C.3.1.9 The contractor discovered at the commencement of construction that the nature of the soil in certain areas of the site was different than that on which project designs were based. The contractor had to take some technical measures to resolve the problem. However, due to the high cost involved and the time taken, the contractor carried only part of the required measures. After preliminary hand over of the project, the owner noticed cracks in some buildings. As a result a comprehensive study was made which revealed the action taken by the contractor and a dispute arose between two parties which led to a delay in final hand over of more than three years. The committee has deemed it necessary to study these cracks from a structural aspect by a specialized organization and to report whether such cracks pose a hazard to buildings. Both parties have agreed to this resolution.

C.3.1.10 Contract documents did not contain a stipulation which specified a quantity remeasurement methodology and this has led to a dispute between the contractor and the owner's representative as to the method to be followed. Each party wanted to adopt a different method that serves its best interest. The Contractor submitted a claim for the difference in cost between the method it chose and the method the owner selected. The claim was for an amount of US\$ 10,834,050. Given to the fact that the points of dispute between the two parties include numerous items, the committee which was formed

to settle the dispute between the two parties has submitted its findings for each item separately. For further clarification, and in respect of one of the disputed points between the parties pertaining to the method of measurement adopted relating to the measurement of excavation and backfilling quantities, for which the company claimed an amount of US\$ 1,120,974, the points of dispute in this respect emphasize that the owner has estimated excavation and backfilling quantities based on the actual dimensions and measurements of work to be executed while the contractor claims additional excavation and backfilling quantities based on the dimensions and measurements to be executed as follows:

- 0,60 meter for any work that requires wooden boards to a depth of over one meter below the pre-excavation level.
- 0,25 meter for any work that requires wooden boards to a depth of less than one meter below the pre-excavation level.

Therefore, the committee has resolved to adopt a compromise between the two parties whereby half of the dimensions submitted by the contractor are paid for, and thus the committee approved payment of half the cost claimed by the contractor for this item. Both parties have agreed to this resolution.

C.3.2 Changes and modifications

Phases: Construction

Examples:

C.3.2.1 Following final remeasurement, the total cost of additions resulting from change orders amounted to US\$ 55,696,609, or 15.3% of total original contract cost.

- Total cost of omission due to change orders amounted to US\$ 61,550,050 or 16.91% of total original contract cost. Thus the result of the variation orders was a saving of US\$ 5,852,441.
- Total cost of new items included in the additions mentioned above amounted to US\$ 26,999,108 or 48.48% of the cost of change orders.
- Total cost of change orders subject to dispute by the contractor amounted to US\$ 11,188,132; these claims were

rejected by the owner and a dispute arose as a result of the following causes:

- The owner's representative found the contractor's cost estimates for the new items were exaggerated.
- Differences between the two parties on the method of measurement of some of the change items.
- Differences between the two parties on what could be considered a change order and what could not be.
- The contractor claimed that the owner's representative gave verbal approval to carry out the change order, at additional cost. The owner's representative claimed that the contractor agreed to carry out the variation works at a saving or at no additional cost.

C.3.2.2 It was agreed to change specifications of some landscaping items without additional cost. The contractor sent a letter, to that effect, to the owner. At project completion, the contractor submitted a claim of US\$ 1,848,474 claiming that the actual changes was more costly than what was agreed upon. The committee which was formed to settle the dispute between the two parties has resolved that the contractor is not entitled to claim such cost because the contractor had submitted a written undertaking to perform required alterations within the original cost of this item. Moreover, the consultant has resolved that the cost of works executed in respect of this items is within the original cost of this items. The contractor agreed and withdraw his claim.

C.3.2.3 Some of the furniture specifications were changed. The contractor submitted a claim for US\$ 1,257,527 claiming that the owner's representative gave verbal approval for the increase. The owner's representative rejected the claim, stating that the contractor agreed to the change at no additional cost. The committee which was formed to settle the dispute between the two parties has found that the contractor is not entitled to this amount as it could not

obtain any official correspondence that took place between the two parties in respect of this variation, that in addition to what the supervising consultant has stated pertaining to the agreement of the contractor to carry out the variation without additional cost to the owner. The contractor agreed and withdraw his claim.

APPENDIX - D

CASE STUDY (2)

D.1 Brief Description

This project is a housing project to be erected in ten different cities. The project includes housing units, mosques, kinder gardens, schools, recreation clubs, and shops, with totals as follows:

- 4682 Housing units of various sizes
- 17 Mosques of various sizes
- 20 Kinder gardens
- 18 Schools
- 12 Recreation clubs
- 79 Shops

In addition to public utilities including power plants, sewage treatment plants, water treatment plants, roads, etc.

D.2 Total Project Cost = US\$ 4000 Million.

D.3 Problems encountered during this case study

D.3.1 Inaccurate and incomplete project programme

Phase : Preliminary studies

Examples :

D.3.1.1 Due to the lack of accuracy in the determination of the project's requirements , it became apparent that the floor areas of the housing units did not meet actual needs. This is because the design did not take into consideration the social aspects of users of these housing units such as the need for a female lounge that is separate from the male lounge, as well as the need for a separate entrance for women This dictated amendment of such areas at a cost of over US\$ 15 million .

D.3.2 Problems in co-ordination with other public departments.

Phase : Design

Examples :

D.3.2.1 To commence construction of a project, a building license was sought from the local municipality. The contractor received a rejection from the municipality because the project was designed as 3-storey housing units (villas) while the number of stories in that area was limited to two. This problem led to:

- The need to seek a new plot of land.
- The need to redesign based on the nature of the new site .
- Delay in completion of the project by more than 66% of the specified time.

A claim was raised by the contractor in excess of US\$24 million. The two parties could not reach a mutually agreeable settlement and therefore have agreed to refer the case to the Board of Grievances as provided for in their contract. To date the Board did not reach a final resolution.

D.3.3 Delay in disbursement of contractor's invoices.

Phase : Construction

Examples :

D.3.3.1 The contractor submitted a claim at project completion, stating that it had suffered damage due to delay of payment during the course of the project. The claim for interest charges amounted to SR 2,000,000. This dispute remains unsettled to the date of preparation of this research.

APPENDIX - E

CASE STUDY (3)

E.1 Brief Description of the Project

Housing project distributed over nine sites in various cities. The project includes:

- 723 housing villas of various sizes and apartments of various areas.
- 9 mosques.
- 9 kinder gardens.

In addition to administration buildings, recreation clubs, commercial centres, sports fields, workshops, central warehouses, sewage treatment plants, water treatment plants, auxiliary power plants, roads, landscaping, etc.

E.2 Total cost = US\$ 352 million.

E.3 Problems encountered during this case study

E.3.1 Inadequate Preliminary Planning

Phase : Preliminary studies

Examples :

E.3.1.1 Because of insufficient conceptual study and inadequate planning, it was resolved not to supply electrical power to those projects via the local electricity power plants, but by means of a special power plant, the cost of which was to be included in the project cost. Mid-way through project construction , the issue of how logical and how realistic this decision was addressed and it was resolved that the decision was invalid. It was therefore resolved to eliminate the supply and installation of the special plants and connect power to the projects from the electricity companies operating in those regions. This decision was implemented and the contractor was notified of the omission of such requirements. The contractor then submitted a claim in the amount of US\$ 11,000.000 as compensation for works performed including purchase order, supply and manufacturing of those power plants. The dispute remains unsettled to the date of preparation of this Research.

E.3.2 Failure to select a suitable site.

Phase : Preliminary studies.

Examples :

E.3.2.1 The project owner could not provide all of the required sites during the design phase, and two sites remained to be selected. The designer assumed that all sites would be similar to one of the actual sites. The tender was announced and bids were invited. It was assumed in tender documents that the hand over of the two sites not yet selected would be delayed for up to one and a half years. After a delay of about two years in the hand over of the two sites, the contractor discover differences in soil structure and terrain to those originally assumed . This gave rise to disputes and financial claims by the contractor in an amount of US\$ 2,000,000 . The dispute remains unsettled to the date of preparation of this Research.

E.3.3 Lack of clarity and consistency of contractual and technical documents.

Phase : Design

Example :

E.3.3.1 Following signature of the design contract, changes in the scope of work were introduced by the owner's representatives which resulted in a radically different scope of work. As the contract between the two parties was a design and supervision contract, the problems surfaced during the supervision phase. The staff skills required for supervision of construction was completely different than what was proposed in the original contract signed at the outset of project design. This lead to legal disputes and financial claims of US\$ 8,000,000. The dispute remains unsettled to the date of preparation of this Research.

E.3.4 Changes and modifications .

Phase : Construction.

Examples :

E.3.4.1 Project specifications stipulate that windows should be made of timber. The contractor agreed verbally to provide the owner with savings of SR 2,000,000 if the windows were changed to aluminium. Upon completion, the savings promised changed into a claim of S.R 4,000,000 by the contractor, as loss incurred due to the change. The dispute remains unsettled to the date of preparation of this research.

APPENDIX - F

- Arabic Stipulation of the laws and Regulations included in Chapters Three, Five and Seven

أولاً : نظام تأمين مشتريات الحكومة :-

- المادة ١/ب : توفر للمتنافسين معلومات كاملة وموحدة عن العمل المطلوب ويمكنون من الحصول على هذه المعلومات في وقت واحد ويحدد ميعاد واحد لتقديم العروض .

- المادة ١/ز : لايجوز قبول العروض والتعاقد بموجبها إلا طبقاً للشروط والمواصفات الموضوعة .

- المادة ٢/د : يقدم مع العرض ضمان إبتدائي يتراوح ما بين ١-٢ ٪ من قيمته وفقاً لما تحدده الشروط والمواصفات .

- المادة ٢/هـ : يتم فتح العروض المودعة بمظاريف مختومة بمعرفة لجنة تنعقد في الميعاد المحدد لفتح المظاريف ، وتعلن على من حضر من المتنافسين أو مندوبيهم الأسعار الواردة في العروض .

- المادة ٣/ط : ... يجب أن يكون الإتفاق على أعمال الدراسات والتصميم بمبالغ مقطوعة ، أما أعمال الإشراف على التنفيذ فيجوز أن تكون بمبالغ مقطوعة أو دورية أو بنسبة مئوية من قيمة العمل .

- المادة ٥/هـ : يجوز إلغاء المنافسة أو العروض في حالة زوال الحاجة أو عندما تتبين للجنة أن جميع العروض غير مناسبة ولم يمكن الوصول إلى نتيجة بالمفاوضة وفقاً للشروط السابقة .

- المادة ٧/أ : يجب أن يقدم من يتعاقد مع الحكومة ضماناً نهائياً بواقع ٥٪ من قيمة العقد .

- المادة ٧/ب : لايلزم تقديم الضمان النهائي في حالات التعاقد على الأعمال الإستشارية

- المادة ٨/أ : يجوز للجهة الحكومية أن تدفع للمتعاقد معها دفعة مقدمة من إستحقاقه في حدود (٢٠٪) عند التوقيع على العقد مقابل خطاب ضمان مساو لهذه

القيمة وتحسم هذه الدفعة على إقساط طبقاً للمستخلصات .

- المادة ٩/أ : يخضع المتعاقد مع الحكومة لغرامة تأخير لايجوز أن تزيد في مجموعها على ١٠٪ من قيمة عقود الأشغال العامة أو عقود الأعمال الإستشارية ما لم يكن التأخير ناتجاً عن قوة قاهرة أو حادث طارئ أو بسبب لادخل لإرادة المتعاقد مع الحكومة فيه .

ثانياً : اللائحة التنفيذية لنظام تأمين مشتريات الحكومة :-

- المادة ٨/أ : على الجهة الإدارية قبل طرح مقاولات الأعمال أن تضع مواصفات تفصيلية وافية له .. الخ .

- المادة ٢ : يجوز أن تتضمن المواصفات والشروط نصاً يقضي بتجزئة العروض متى كانت هذه التجزئة تحقق مصلحة الجهة الإدارية .

- المادة ٧/و : تكون الفئات الواردة بقائمة الأسعار شاملة ومغطية لجميع ما يتحمله المقاول من المصاريف والإلتزامات أياً كان نوعها بالنسبة لكل بند من البنود .

- المادة ٨ : يجب على مقدم العرض في مقاولات الأعمال أن يتحرى بنفسه قبل تقديم عرضه طبيعة العمل والظروف المحلية وأن يحصل على كافة البيانات الكافية عن كل الأمور التي يمكن بأية كيفية أن تؤثر على فئات عرضه ومخاطر التزاماته ويجب على الجهة الإدارية تقديم كل ما يطلب منها من بيانات في هذا الشأن تكون متوافرة لديها قبل ميعاد تقديم العرض .

- المادة ١٠ : يبقى العطاء سارياً وغير جائز الرجوع فيه إلى التاريخ المحدد لبت في العروض وللجهة الإدارية أن تطلب من مقدم العرض تمديد مدة سريانه ويعتبر صاحب العرض قابلاً إستمرار الارتباط بعرضه إذا لم يطلب بعد إنتهاء تاريخ الضمان سحب عرضه وإسترداد ضمانه وإذا سحب مقدم العطاء عطاءه قبل البت في العطاءات حق للجهة الإدارية مصادرة التأمين المؤقت المقدم منه بدون إنذار وإتخاذ أية إجراءات .

- المادة ١٦ : على لجنة فحص العروض التأكد من مطابقة العروض للشروط والمواصفات ولها أن تستعين في ذلك بمن تراه من الفنيين وعليها أن توصي بما تراه أفضل العروض من الناحيتين المالية والفنية - بعد أن تستبعد ما لا يتفق من العروض مع الشروط والمواصفات وفقاً لأحكام المادة الخامسة من النظام
- المادة ٢٥ : يجوز للجهة الإدارية أن تزيد أو تنقص التزامات المتعهد أو المقاول في حدود ٢٠٪ من مجموع قيمة العقد .
- المادة ٢٨ : لا يجوز للمقاول أو المتعهد التنازل عن العقد أو جزء منه بدون موافقة الجهة الإدارية كتابة ومع ذلك يبقى المتعهد أو المقاول مسئولاً بطريق التضامن مع المتنازل إليه أو المقاول من الباطن عن تنفيذ العقد .
- المادة ٢٩ : يجب على كل من الجهة الإدارية والمقاول تنفيذ العقد وفقاً لشروطه فإذا لم يتم التعاقد مع الإدارة بذلك جاز لها بعد إنذاره بخطاب مسجل وإنقضاء خمسة عشر يوماً دون تصحيح الأوضاع أن تنفذ العقد على حسابه أو أن تفسخ العقد مع الرجوع عليه في الحاليتين بالتعويضات وإذا تخلفت الجهة الإدارية عن تنفيذ إلتزاماتها جاز للمتعاقد معها الرجوع عليها بالتعويضات بعد إخطارها بكتاب مسجل بتصحيح الأوضاع خلال خمسة عشر يوماً ولا يجوز للمتعاقد أن يمتنع عن تنفيذ العقد إستناداً إلى تخلف الجهة الإدارية عن تنفيذ إلتزاماتها .
- المادة ٣٠ : يضمن المقاول ما يحدث من تدهم كلي أو جزئي لما أنشأه خلال عشر سنوات من تاريخ تسليمه أياه للجهة الإدارية متى كان ذلك ناشئاً عن عيب في التنفيذ .
- المادة ٣١ : يكون المقاول مسئولاً عن مراجعة التصميمات الهندسية والفنية بكامل تفاصيلها وعليه إخطار الجهة الإدارية بالأخطاء الفنية المؤثرة على سلامة المنشآت التي يكتشفها في التصميمات .
- المادة ٣٢ : للجهة الإدارية في حالة سحب العمل من المتعاقد معها أن تنفذ على حسابه بأية طريقة من طرق تأمين حاجتها .

- المادة ٣٣ : للجهة الإدارية أن تمنعه من إسترداد الأدوات والمعدات والمواد الموجودة في موقع العمل وأن تستعمل ذلك في إتمام العمل بعد أن يحرر محضر يثبت فيه حالة الإنشاءات عند السحب وما يوجد بموقع العمل من أدوات ومهمات و مواد على أن يخطر المقاول بميعاد تحرير المحضر ليبيدي مالمديه بشأنه - فإن لم يحضر أعتبر المحضر حجة عليه .

ثالثاً : العقد الموحد (عقد الأشغال العامة) :-

أ - وثيقة العقد الأساسية :-

- المادة ٣/٢ : في حالة وجود تناقض بين أحكام وثائق العقد ، فإن الوثيقة المتقدمة تسود على الوثيقة التي تليها في الترتيب .

- المادة ١/٣ : يتعهد المقاول بتنفيذ وإتمام جميع الأعمال المبينة في العقد وذلك خلال مدة (تكتب مدة العقد بالأيام وبالأرقام والحروف) بما في ذلك فترة التجهيز وتسري هذه المدة إعتباراً من تاريخ تسليم موقع العمل إلى المقاول بموجب محضر كتابي موقع عليه من قبل المهندس والمقاول .

- المادة ٤ : يضمن المقاول الأعمال محل العقد على الوجه الأكمل لمدة تبدأ من تاريخ التسليم الإبتدائي وتنتهي بالتسلم النهائي مع مراعاة التفصيل الوارد في المادة رقم (٤١) من الشروط العامة في هذا العقد .

- المادة ١/٥ : إن القيمة الإجمالية للعقد هي (تذكر رقماً وكتابة) ريال عربي سعودي مقابل تنفيذه وفقاً للشروط والمواصفات والمخططات وقائمة الكميات وغيرها من وثائق العقد .

- المادة ٢/٥ : تخضع هذه القيمة الإجمالية للزيادة والنقص تبعاً لتغير كميات الأعمال الفعلية التي يقوم المقاول بتنفيذها طبقاً للعقد وتبعاً للأعمال الإضافية والتكميلية والتعديلات التي يقوم بإجرائها بناء على طلب صاحب العمل في نطاق الحدود المنصوص عليها في شروط العقد .

ب - الشروط العامة :-

- المادة ١ :

أ : صاحب العمل (الطرف الأول) :

ويعني الوزارة أو الجهة الإدارية التي دعت إلى تقديم العطاءات لتنفيذ الأعمال) والتي تقوم بإستخدام المقاول أو أي جهة يؤول اليها حق الإشراف على الأعمال .

ب : المقاول (الطرف الثاني) :

ويعني الشخص أو الأشخاص الطبيعيين أو المعنويين الذين قبل صاحب العمل عطاءهم ويشمل ذلك ممثليهم ومن يحل محلهم بموافقة الإدارة .

ج : المهندس :

يعني الشخص الطبيعي أو المعنوي الذي يعين في أي وقت من قبل صاحب العمل للإشراف على تنفيذ العقد .

- المادة ٢ : إن صلاحيات المهندس هي ملاحظة الأعمال ومراقبتها وفحص وإختبار أية مادة تستعمل أو طريقة تستخدم لتنفيذ الأعمال ... الخ .

- المادة ٤ : لا يحق للمقاول أن يتعاقد من الباطن لتنفيذ جميع الأعمال محل العقد وما لم ينص العقد على خلاف ذلك فإنه لا يحق للمقاول أيضاً أن يتعاقد من

الباطن لتنفيذ جزء من الأعمال بدون الحصول على موافقة خطية من صاحب العمل على زن هذه الموافقة لاتعفي المقاول من المسؤولية والإلتزامات المترتبة عليه بموجب العقد بل يظل المقاول مسئولاً عن كل تصرف أو خطأ أو إهمال يصدر من جانب أي مقاول من الباطن أو من وكلائه أو موظفيه أو عماله .

- المادة ٥ : يشمل العقد ماييلي :-

أ - تنفيذ الأعمال وإنجازها وصيانتها .

ب - تقديم العمال ومواد العمل ومعدات الإنشاء والأعمال المؤقتة ما لم يرد نص على خلاف ذلك .

ج - أي شئٍ آخر سواء كان ذا طبيعة دائمة أو مؤقتة ما دامت الحاجة الى تقديمه منصوصاً عليها صراحة في العقد أو يمكن إستخلاصها منه عقلاً .

- المادة ١/١٠ : على المقاول أن يقوم على حسابه الخاص بفحص ومعاينة الموقع والأماكن المحيطة به وأن يتأكد بنفسه وقبل تقديم العطاء من شكل الموقع وطبيعة تربته بالقيام بعمل الجسات والثقوب التي تمكنه من ذلك وكذلك يقوم بمراجعة كميات العمل وطبيعته والمواد اللازمة لإنجاز الأعمال ووسائل الوصول إلى الموقع والمرافق التي يحتاج إليها وعليه بصورة عامة أن يحصل لنفسه على سائر المعلومات الضرورية وغيرها من العوامل التي قد تؤثر على عطائه .

- المادة ٢/١٠ : يعتبر المقاول مسئولاً عن مراجعة التصميمات الهندسية والفنية بكامل تفاصيلها وعليه إبلاغ صاحب العمل والمهندس عن أية أخطاء أو ملاحظات يكتشفها في المخططات والرسومات أثناء التنفيذ .

- المادة ١١ : يفترض في المقاول أن يكون قد إستكمل معلوماته قبل تقديم عطاءه وتؤكد من أن الأسعار التي دونها في قائمة الكميات وفئات الأسعار تكفي لتغطية جميع إلتزاماته المترتبة عليه بموجب العقد وغيرها من الأمور والأشياء الضرورية لإنجاز وصيانة الأعمال بشكل متقن وسليم .

- المادة ١٢/٢ د : يلتزم المقاول الأجنبي بأن يعهد إلى مقاول سعودي بما لا يقل عن ٣٠٪ من الأعمال المتعاقد عليها وتقوم الجهة ذات العلاقة بالإتفاق مع وزارة المالية والإقتصاد الوطني بإعفاء المقاول الأجنبي من الإلتزام كلياً أو جزئياً بإعطاء المقاول السعودي النسبة المذكورة إذا ثبت عدم وجود أعمال يمكن تنفيذها بواسطة مقاول سعودي أو إذا توفرت أعمال بنسبة أقل من ٣٠٪ ويشترط لتطبيق هذا الإستثناء أن تقوم الجهة ذات العلاقة عند إعداد المشروع وقبل طرحه للتعاقد بتحديد نسبة الإعفاء الجزئي أو الكلي وذلك بواسطة جهازها الفني بالإشتراك مع الإستشاري الذي صمم المشروع ووضع مواصفاته

- المادة ٣٥ : مع مراعاة أي مطلب يرد في المواصفات فيما يتعلق بإتمام أي جزء خاص من الأعمال يجب أن تتم الأعمال خلال المدة المحددة في العقد .

أولاً : إن تعبير فترة الصيانة الواردة في هذه الشروط يعني الفترة المحددة في العقد والتي تبدأ من تاريخ التسلم الإبتدائي حتى تاريخ التسلم النهائي أما في حالة تجزئة التسلم الإبتدائي فتحسب فترة الصيانة لكل جزء إعتباراً من تاريخ تسليمه الإبتدائي .

ثانياً : على المقاول أن يقوم بتنفيذ أية أعمال تصليح أو تعديل أو إعادة إنشاء أو تقويم ما يظهر من عيوب حسبما يطلب منه صاحب العمل أو المهندس خطياً أثناء فترة الصيانة أو عند التسليم النهائي .

أولاً : للمهندس - بعد الحصول على موافقة صاحب العمل أو في حدود الصلاحيات المخولة له - إجراء أي تغيير في شكل أو نوع أو كمية الأعمال أو أي جزء منها ، مما قد يراه مناسباً وعلى المقاول تنفيذ ذلك على الا يؤدي هذا الى تغيير في محل العقد أو تجاوز الحدود المنصوص عليها في الفقرة التالية :

ثانياً : يجوز لصاحب العمل - أثناء تنفيذ العقد - زيادة مقدار الأعمال بنسبة لا تتجاوز عشرة في المائة ١٠٪ من مجموع قيمة العقد كما يجوز له إنقاص مقدار الأعمال بنسبة لا تتجاوز عشرين بالمائة ٢٠٪ من مجموع قيمة العقد على أن يجري في هذه الحالة تعديل قيمة العقد بالزيادة أو الإنقاص تبعاً لذلك .

أولاً : على المهندس أن يقوم بتحديد القيمة إن وجدت ، التي يرى أن تضاف أو تحسم من المبلغ المذكور في العطاء بسبب أي عمل زائد أو إضافي جرى تنفيذه أو إلغاؤه بناء على أمره . ويجري تقويم مثل هذا العمل وفقاً للمعدلات المذكورة في العقد إذا رأى المهندس انها قابلة للتطبيق . أما إذا كان العقد لا يتضمن أي معدلات تنطبق على العمل الزائد أو الإضافي فعلى صاحب العمل والمقاول أن يتفقا على تحديد الأسعار العادلة لذلك .

ثانياً : على المقاول أن يرسل الى المهندس مرة في كل شهر حساباً يشرح فيه بصورة كاملة ومفصلة المعلومات الخاصة بجميع المطالبات المتعلقة بالنفقات الإضافية التي يعتبر المقاول أن له حقاً فيها ويساثر الأعمال

الزائدة والإضافية التي أمر بها المهندس وفقاً لصلاحياته وقام المقاول بتنفيذها خلال الشهر السابق ، ولا يلتفت لأي مطالبة تتعلق بدفع قيمة مثل هذه الأعمال إذا لم تتضمنها المعلومات الخاصة المنوه عنها ولم يتضمنها الحساب الشهري سالف الذكر .

- المادة ٤٦ : ان الكميات المذكورة في قائمة الكميات هي الكميات التقديرية للأعمال وتجري المحاسبة على أساس الكميات الفعلية التي يتم تنفيذها .

- المادة ٤٨ :

أولاً : يجري قياس الأعمال على أساس القياسات الصافية فقط ما لم يرد نص صريح على خلاف ذلك في العقد .
ثانياً : فيما عدا ما يرد بشأنه نص خاص يجب إستعمال النظام المتري في جميع القياسات والأغراض المتعلقة بهذا العقد .

- المادة ٥٩ : على صاحب العمل أن ينفذ شروط العقد بحسن نية وأن يدفع للمقاول الأقساط المستحقة دون تأخير وإذا أخل صاحب العمل بأي شرط من شروط العقد أو قصر عن الدفع في الميعاد المحدد فيحق للمقاول أن يطالب بالتعويض عن الخسائر المترتبة على هذا التقصير أو ذلك الإخلال . على أنه لا يجوز للمقاول أن يوقف العمل إستناداً إلى تأخر صاحب العمل في الدفع بسبب أي خطأ ينسب الى المقاول ، ويعتبر المقاول متنازلاً عن أي تعويض لا يطالب به خلال ثلاثين يوماً من حدوث الواقعة التي يطالب على أساسها بالتعويض .