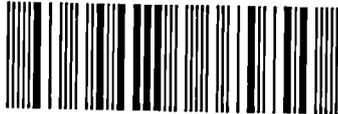


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Analysis of Some Problems in the Management and Cost Control
of Public Sector Construction Projects in Nigeria

Dep

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The Most Benignant Most Merciful

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ABSTRACT

Development is a difficult, painful and long-term enterprise. Not only because of world wide social and economic changes with extensive debts problems, inflation, recession and slow growth, but it is also a matter of finding the technically and economically optimum solution. Over the long-term, the challenge for developing countries is to use their limited resources more efficiently and more equitably through the management of all investment outlays in both the public and private sector.

Construction is a major investment sector in Nigeria, attracting an average of over 60% of all capital investment, with over 70% of that 60% sponsored by the public sector. Construction projects handled by the public sector in developing countries are however fraught with problems, from inception through to completion and beyond. This is well known to members of the public sector agencies. Year after year, in good times and bad, development projects suffer from a host of problems: some of design; others of appraisal; and still others of implementation. Most construction projects are characterised by overruns in cost and time, and are sometimes halted altogether before completion.

It is therefore necessary to understand the problems underlying the system being practised, to establish a realistic pattern, and to be able to interpret and correct any

abnormalities. A lack of understanding of the constraints leads to unrealistic planning, and to later problems that may become insoluble. This research was therefore aimed at identifying these problems, many of which arise from attempts to implement a technology, in this case management technology, in a country other than the country of its origin.

In a comparative study between Nigeria and Scotland a large number of public agencies which sponsor construction projects, and the contracting and consulting organisations that work for these agencies, were surveyed using both face-to-face interviews and the postal questionnaire technique. It was found that the major problems in Nigeria are: bureaucratic obstacles affecting timely payment to contractors; ambiguity in consultant/client contract agreements; lack of sufficient qualified professionals in the agencies; and lack of suitable information on which to base initial estimates.

Recommendations for improving practice in Nigeria include: administrative reform of construction agencies to reduce the trammels of bureaucracy; a better system of funding by central Government; establishment of a construction cost information agency; and payment of competitive salaries to public sector professional staff. These changes, taking into account the cultural environment of Nigeria, should enable decisions to be made with greater certainty of outcome by all parties involved.

TABLE OF CONTENTS

ACKNOWLEDGEMENT	i
ABSTRACT	iii
TABLE OF CONTENTS	v
LIST OF TABLES	xi
LIST OF FIGURES	xiii
CHAPTER 1: THE RESEARCH PROBLEM AND OBJECTIVES	1
1.1 INTRODUCTION	2
1.2 THE RESEARCH PROBLEM	7
1.3 RESEARCH OBJECTIVES	8
1.4 SIGNIFICANCE OF THE STUDY	9
1.5 SCOPE OF THE STUDY	11
1.6 ORGANISATION OF THE STUDY	12
CHAPTER 2: CONCEPTUAL PROBLEMS OF OVER-COMMITMENT	15
2.1 INTRODUCTION	16
2.2 NIGERIAN PUBLIC SECTOR CONSTRUCTION PROBLEMS	16
2.2.1 Economic Problems	17
2.2.2 Political Problems	25
2.3 DISCUSSION	28
CHAPTER 3: LITERATURE REVIEW I: PROJECT PERFORMANCE	30
3.1 INTRODUCTION	31
3.2 PROJECT SUCCESS OR FAILURE	32
3.2.1 Success Measurement	32
3.2.2 Factors Affecting Project Success	38
3.2.3 Discussion of Project Success or Failure	43
3.3 OVERRUNS IN CONSTRUCTION PROJECTS	48
3.3.1 Definition	48
3.3.2 Overrun reasons	50
3.3.2 Discussion of Overruns in Construction Projects	59
CHAPTER 4: LITERATURE REVIEW II: CULTURAL DIMENSIONS AND TECHNOLOGY TRANSFER	69
4.1 INTRODUCTION	70
4.2 TECHNOLOGY TRANSFER	70
4.2.1 Nigerian Patent System and Technology Transfer	76

4.3	CULTURE AND MANAGEMENT PRACTICES	79
4.3.1	Introduction	79
4.3.2	Culture	79
4.3.3	Management Concepts	81
4.3.4	Cultural Dimensions and Project Management	87
	(a) Individualism and Collectivism	88
	(b) Power Distance	90
	(c) Uncertainty Avoidance	91
	(d) Masculinity-femininity	94
4.4	PROBLEMS OF MANAGEMENT (CONSTRUCTION) TECHNOLOGY TRANSFER TO NIGERIA	96
4.4.1	Conflicting Value Systems	96
4.4.2	Inappropriate Transfer Agent	102
4.4.3	Unrealistic Expectations	104
4.5	DISCUSSION	106
CHAPTER 5:	CONSTRUCTION PRACTICE OVERVIEW	112
5.0	INTRODUCTION	113
5.1	PUBLIC SECTOR INVESTMENT APPRAISAL	114
5.1.1	Introduction	114
5.1.2	Traditional Methods of Investment Appraisal	117
	5.1.2.1 Pay-back Period	117
	5.1.2.2 Return on Capital Employed	120
5.1.3	Discounted Cash Flow (DCF) Methods of Appraisal	122
	5.1.3.1 Net Present Value (NPV)	123
	5.1.3.2 The Internal Rate of Return	124
5.1.4	Cost Benefit Analysis	125
5.2	TENDERING METHODS AND PROCEDURES	133
5.2.1	Introduction	133
5.2.2	Open Tendering	136
5.2.3	Selective Tendering	138
	5.2.3.1 Nomination (Single)	140
	5.2.3.2 Nomination (Serial)	140
5.2.4	Negotiation	142
	5.2.4.1 Single Stage Negotiation	142
	5.2.4.2 Two Stage Negotiation	144
5.2.5	Tender Documents	147
	5.2.5.1 Conditions of Contract:	147
	5.2.5.2 Bills of Quantities:	147
	5.2.5.3 Specification/Preambles	148
	5.2.5.4 Drawings	148
	5.2.5.5 Form of Tender	149
5.3	CONTRACTUAL ARRANGEMENTS	150
5.3.1	Introduction	150
5.3.2	Construction Contracts	151
	5.3.2.1 Fixed Price Contracts	154
	(a) Lump Sum Contracts	154

	(i)	Based on Bills of Quantities (Firm)	155
	(ii)	Based on Bills of Approximate Quantities	159
	(iii)	Based on Drawings and Specification	160
	(b)	Measurement Contracts	163
	(i)	Standard Schedule	164
	(ii)	'Ad hoc' Schedule	165
	(iii)	Bills of Quantities from Previous Contracts	166
	5.3.2.2	Cost Reimbursement Contracts	167
	(a)	Prime Cost Plus Percentage Fee	171
	(b)	Prime Cost Plus Fixed Fee	171
	(c)	Target Cost Contracts	172
5.3.3		Composite Nature of Contracts	173
5.3.4		Other Types of Contractual Arrangements	174
	5.3.4.1	Management Contracts	175
	5.3.4.2	Package Contracts	176
	5.3.4.3	Term Contracts	177
5.4		FORMS OF CONTRACT	179
	5.4.1	Introduction	179
	5.4.2	JCT Standard Forms of Contract	182
	5.4.3	Sub-contract Forms	187
	5.4.4	Scottish Documents to Suit the JCT pattern	188
	5.4.5	ACA Forms	189
	5.4.6	ICE Forms of Contract	191
	5.4.7	GC/Works/1 (General Conditions of Government Contracts)	192
	5.4.8	FAS Form	193
	5.4.9	Non-standard Contract Clauses and Forms	194
	5.4.10	List of Standard Contract Forms	194
5.5		DISCUSSION	200
CHAPTER 6: THE ENVIRONMENT OF PUBLIC SECTOR CONSTRUCTION			204
6.1		INTRODUCTION	205
6.2		NIGERIAN SCENE	205
	6.2.1	Geography	205
	6.2.2	Economic Setting	208
	6.2.3	Population	211
	6.2.4	Building and Construction	212
6.3		PRACTICE IN NIGERIA	213
	6.3.1	Plan Development	214
	6.3.2	Plan Implementation and Control	218
		6.3.2.1 Preparing for Project Implementation	218

6.3.2.2	Introduction of New Projects	220
6.3.2.3	Change of Scope of Projects	222
6.3.2.4	Variation in Project Costs	223
6.3.3	Contract Procurement Methods	224
6.3.3.1	Contract Limits	224
6.3.3.2	Method of Letting Contracts	226
6.3.4	Contractual Arrangements	228
6.3.5	Forms of Contract	228
6.3.6	Monitoring of Project Implementation and Progress Reporting	229
6.4	SCOTTISH SCENE	231
6.4.1	Geography	231
6.4.2	Economic Setting	235
6.4.3	Population	237
6.4.4	Building and Construction	238
6.5	PRACTICE IN SCOTLAND	241
6.5.1	Plan Development	243
6.5.1.1	Priority Ranking	245
6.5.2	Cost Control Techniques	251
6.5.2.1	Monitoring of the Capital Programme	253
6.5.2.2	Monitoring of Individual Projects	259
6.6	DISCUSSION	261
CHAPTER 7: METHODOLOGY		263
7.1	INTRODUCTION	264
7.2	RESEARCH METHODOLOGY OVERVIEW	264
7.2.1	Research Approach	266
7.2.1.1	The Experiment	267
7.2.1.2	Field Studies	268
7.2.1.3	The Survey	270
7.2.2	Data Collection Techniques	273
7.2.2.1	Secondary Data	273
7.2.2.2	Primary Data	275
7.2.3	Sample Size Specification	276
7.2.3.1	Non-probability Sampling	278
7.2.3.2	Probability Sampling	278
7.2.4	Primary Data Collection Techniques	279
7.2.4.1	Structured-direct	279
7.2.4.2	Unstructured-direct	280
7.2.4.3	Structured-indirect	280
7.2.4.4	Unstructured-indirect	281
7.2.5	Data Analysis	281
7.2.5.1	Qualitative Data Analysis	281
7.2.5.2	Quantitative Data Analysis	282
7.3	METHOD IMPLEMENTED IN THIS RESEARCH	284
7.3.1	Data Collection Technique	284
7.3.1.1	Sources of Data	284
7.3.1.2	Data Collection Technique	288
7.4	STATISTICAL VALIDATION OF QUESTIONNAIRE	293

CHAPTER 8:	ANALYSIS AND RESULTS	297
8.1	INTRODUCTION	298
8.2	A COMPARATIVE ANALYSIS OF SURVEY RESULTS FROM SCOTLAND AND NIGERIA	298
8.2.1	Discussion	320
8.3	COMPARISON OF BUREAUCRACIES INVOLVED IN SETTLING CONTRACTORS' OUTSTANDING PAYMENTS	322
8.3.1	The Nigerian Practice	323
8.3.1.1	The MWH is both the Supervisory and Client Ministry for a Project.	325
8.3.1.2	The MWH is the Supervisory Ministry only for a Project.	329
8.3.1.3	The Project is a Capital Project, with Sub-head in the Ministry of Finance.	332
8.3.2	The Scottish Practice	333
8.3.3	Discussion	339
8.4	CASE STUDY	343
8.4.1	Introduction	343
8.4.2	Project Background	344
8.4.3	Contractual Arrangements	345
8.4.4	Project Financial Details	348
8.4.4.1	Analysis of Payments Made to Consultants and Contractor at the time of Project Abandonment.	349
8.4.4.2	Breakdown and Analysis of Revised Estimates	351
8.4.5	Discussion	351
8.5	FURTHER STATISTICAL ANALYSIS	356
8.5.1	Introduction	356
8.5.2	Relationship Between Contract Durations after Which Fluctuations May be Paid, and Cost Overrun Problems	357
8.5.3	Relationship Between Numbers of Qualified Professionals and Overrun Problems	362
8.5.4	Relationship between numbers of qualified staff and cost overruns	366
8.5.4	Discussion	370
CHAPTER 9:	CONCLUSIONS AND RECOMMENDATIONS	371
9.1	INTRODUCTION	372
9.2	CONCLUSIONS DRAWN FROM THE ANALYSIS	372
9.2.1	Conclusions on Differing Practices Between Nigeria and Scotland	372
9.2.2	Conclusions on Differing Construction Agency Environments	376

9.2.3	Conclusions Derived from Statistical Analysis	378
9.2.4	Conclusions Based on the Case Study	384
9.3	RECOMMENDATIONS BASED ON FINDINGS	386
9.4	RECOMMENDED AREAS FOR FURTHER RESEARCH	396
APPENDICES	. . . . .	399
APPENDIX I:	MONTHLY FINANCIAL STATEMENT	400
APPENDIX II:	EXPENDITURE PROFILES	403
APPENDIX III:	MONITORING SUMMARY	406
APPENDIX IV:	QUESTIONNAIRES	409
APPENDIX V:	CONTRACT VALUATION FORM	424
APPENDIX VI:	CONTRACT CARD	426
APPENDIX VII:	INTERIM VALUATION AND ADVANCE CERTIFICATE	429
APPENDIX VIII:	FORM OF TENDER	431
REFERENCES	. . . . .	433

LIST OF TABLES

Table No.		Page
2.1	Changes in Government in Nigeria	27
6.1	Trend of Gross Domestic Product (Nigeria) . . .	209
6.2	Principal Exports	210
6.3	Gross Domestic Product in 1986	235
6.4	Employees in Employment in 1986	239
6.5	Fixed Investment in Scotland	239
7.1	Factor Matrices for Construction Delay Reasons	294
7.2	Factor Matrices for Cost Overrun Reasons . . .	295
7.3	Factor Matrices for Delays in Settling Outstanding Payments	295
8.1	Sample Size and Response Rate to the Questionnaire	298
8.2	Respondent Organizations' Ownership	299
8.3	Registration Category of Contractors.	300
8.4	Period of Operation of Respondent Consultants/Contracting Organizations.	301
8.5	Percentage of Workload from Public Sector. . .	303
8.6	Frequency of Monitoring/Reporting on the Financial Position of Individual Projects. . .	305
8.7	Intervals of Interim Payments Allowed By Agencies.	306
8.8	Percentage of Contract Sum Allowed by Agencies for Contingencies.	308
8.9	Tendering and Contract Procurement Methods. (Scores 1-4, with 4 high)	309
8.10	Types of Contractual Arrangement. (Scores 1-4, with 4 high)	311

8.11a	Reasons for Time Overruns (Scotland) (Scores 0 - 4, with 4 high)	313
8.11b	Reasons for Time Overruns (Nigeria) (Scores 0 - 4, with 4 high)	314
8.12a	Reasons for Cost Overrun (Scotland) (Scores 0 - 4, with 4 high)	316
8.12b	Reasons for Cost Overrun (Nigeria) (Scores 0 - 4, with 4 high)	316
8.13	Contract Durations for which Fluctuation Payments are not Made	317
8.14a	Reasons for Delay in Settling Outstanding Payments to Contractors (Scotland) (Scores 0 - 4, with 4 high)	318
8.14b	Reasons for Delay in Settling Outstanding Payments to Contractors (Nigeria) (Scores 0 - 4, with 4 high)	318

LIST OF FIGURES

Figure No.		Page
5.1	Types of Contract and their Subdivisions .	153
6.1	The Planning Machinery Under The Military Administration	216
6.2	Procedure for Change in a Development Plan Within Plan Period.	221
6.3	Contract Limits for Different Federal Government Establishments.	225
6.4	Policy Score Calculation.	248
8.1	Nigerian Payment Procedure for a Project where the MWH is both the Supervisory and Client Ministry	324
8.2	Nigerian Payment Procedure for a Project where the MWH is the Supervisory Ministry only	328
8.3	Nigerian Payment Procedure for a Capital Project with Sub-head in Ministry of Finance, where the MWH is both the Supervisory and Client Ministry	330
8.4	Nigerian Payment Procedure for a Capital Project with Sub-head in the Ministry of Finance where the MWH is the Supervisory Ministry only.	331
8.5	Scottish Payment Procedure for a Project Sponsored and Supervised by a District Council.	335
8.6	Scottish Payment Procedure for a Capital Project initiated by Central Government Department, Financed by Central Government, and Handled by The Property Services Agency of the Department of Environment	337

CHAPTER 1

THE RESEARCH PROBLEM AND OBJECTIVES

1.1 INTRODUCTION

One of the problems facing the less developed countries is lack of proper planning and control of their resources, especially in the case of construction project execution. Like most developing countries Nigeria, with one sixth of the total population of the African continent, is impatient for development. The irony is that one only needs to travel around the country to know that Nigeria has become a "junk-yard" of abandoned projects. Many schemes of high economic and social value, worth billions of naira, lie dormant and neglected. Rotting, rusting and crumbling due to the effects of the Nigerian climate are abandoned hospitals, clinics, markets, dams, airports, office-blocks, housing projects, school buildings, factories, libraries, theatre complexes, hotels and hi-tech facilities (Usen, 1987). The effect of these non-completions on the national economy is known not only to the common man: even the President mentioned in one of his speeches that "Obviously, the non-completion of projects is at great cost to the national economy, with adverse consequences on national income and productivity" (Babangida, 1988).

It is highly relevant, and remarkable, to observe that after this long period of independence (since 1960), the British legal system remains in force almost in its entirety. This is particularly evident in the construction industry, where even State contracts still use the basic Royal Institution of British Architects (RIBA) Form of Contract, and where the Standard Form issued by the Joint Contracts Tribunal (JCT) is still referred to (Hearn, 1980).

There are tremendous differences between UK and Nigeria in the success rate of construction projects. Zomorrodian and Stuckendruck (1987) stated, rightly, that;

"the strategy for implementing (proper) project management in developing countries must be consistent with the culture and the characteristics of the particular society and the configuration of its economic, political and administrative system."

This approach should apply to all facets of project execution, from the conceptual stage to project completion.

The long-held concept of "convergency hypothesis" concerning management in relation to culture has now been disproved. Those obsessed with the hypothesis believed that "management" was something universal; that there were

principles of sound management that existed regardless of national environments; and that if national or local practice deviated from these principles, it was time to change local practice. Thus the universal application of sound management practices would lead to societies becoming more and more alike, and the less developed countries would be managed like the developed countries.

In the 1970s, the belief in the necessary convergence of management practices waned. It was too obviously in conflict with the reality we saw around us (Hofstede, 1983). Supranational organizations like the European Economic Community, which were founded on the convergence belief, had to recognize the stubbornness of national differences. Even within nations regional differences become more rather than less accentuated, as different regional groups the world over defend their identity. This was difficult to reconcile with the management philosophy of convergency.

It is clear nowadays that national and even regional cultures and other environmental factors are important from the point of view of management. The national and regional

differences are certainly not disappearing. Therefore they need to be taken into account in formulating management techniques, particularly construction project management that is the subject of the present study.

A conference on "Project Management in the Nordic Countries" (Nordnet-83), held in Stockholm, Sweden, from 1-3 June 1983, provided evidence that project management concepts are being developed to suit the conditions and culture of a particular country. At this conference, Hofstede (1983) suggested that the existing standard models for project management in the USA are closely related to American culture. He also argued that these standard models are not necessarily suitable in other countries with different cultures.

In clarification of this argument Högberg and Adamsson (1983) drew certain conclusions about the differences in the approach to project management between the USA and the Scandinavian countries shown by Hofstede's (1983) work. They argued that the conclusions, although generalised and perhaps even provocative, nevertheless may contain some truth. Their summary was:

- Scandinavians are less 'individualistic' and have stronger ties to the group to which they belong.
- Scandinavians are used to more decentralised systems with smaller "power distance" (shorter lines of communication). They live in a less authoritarian organizational system, and do not worry about future uncertainties.
- Americans believe in the superman, the hero, the individual. They trust the "John Wayne" type to solve all problems while the Scandinavians have a more so-called 'feministic' attitude, working in teams where the importance of the individual is less evident.

Such findings should encourage companies and agencies to establish more appropriate, and therefore more efficient, project organizations. Techniques suitable for the developed countries should not be applied to the developing countries without modification unless they are proved suitable there also. Therefore, there is a need to investigate a recipient society, and determine the areas where practices developed by other societies may have to be adapted to achieve the desired goal.

This study will investigate both empirically and theoretically why the adoption of the British system has failed to achieve good results in Nigeria.

1.2 THE RESEARCH PROBLEM

The primary goal of economic planning in Nigeria is the achievement of a rapid increase in the nation's productive capacity, with a view to improving the standard of living of the people (Fourth National Development Plan, 1981-1985).

The construction sector has a significant contribution to make in achieving an increase in the productive capacity, and hence in the standard of living, in Nigeria. This is particularly so because construction investment in Nigeria constitutes over 60% of all investment (Fourth National Development Plan, 1985), compared with 20% in most other countries (Evans and Nicklin, 1966). During the execution of many public sector construction works, projects often overrun in cost and time, and are sometimes halted. The effects of such overruns and delays are not confined to the construction industry, but have "knock on" effects that influence the state of the economy generally.

1.3 RESEARCH OBJECTIVES

With the increasing size and value of construction works, the Nigerian public sector continues to experience large cost overruns¹, to the point that many such projects have to be abandoned. Given the special circumstances in a developing country, it might be acceptable if the final cost of a project exceeded the initial estimate by no more than, say, 20%; but in Nigeria nowadays it is not unusual for complex projects to exceed cost estimates by more than 100% (Newswatch, 1987).

Hence, it is not surprising that both the public agencies and the general public are increasingly concerned with improving cost performance. However, to be able to control project overruns causes must first be identified, and then appropriate management techniques applied to those areas in which control is most likely to prove beneficial. Without such knowledge, one does not know how to manage a project so as to avoid cost increases. In this study, a theoretical and empirical investigation was carried out in order to provide, at least in part, the knowledge needed to

¹ Defined as all other expenditures in excess of estimated cost

achieve the following objectives:

- (i) To define the problems encountered in Nigeria, in the management and cost control of public sector construction projects, with particular emphasis on overruns.
- (ii) To identify both theoretically and empirically the principal sources of the problems through a comparative study of public sector project management in Scotland.
- (iii) To identify areas where lessons can be learned from Scottish practice, and draw up recommendations that will promote the efficient implementation of public sector construction projects in Nigeria.

1.4 SIGNIFICANCE OF THE STUDY

It is generally accepted that the keystone of project control is a proper respect for time. Time is irreversible and the consequences of lost time can be irrevocable.

The underlying cause of most project difficulties is the failure to do what is best at the right time (King, 1977). A delay in construction means a time overrun beyond the contract date for completion. For the employer, this means that the facility is not available for use, and benefits are lost that cannot be recovered. For the contractor, delay means higher direct and overhead costs arising out of the extended period of construction; working capital is tied up, and the contractor may be prevented from pursuing other contracts. Delay usually involves loss to both parties to the contract.

Different countries have different problems and need solutions that reflect their unique circumstances. Therefore, identifying the source of a problem's contribution to project failure is important, as availability of such information is the key to more effective project performance. The knowledge will enable better decisions to be made and proper corrective action to be taken when necessary. It will also ensure that factors not relevant to cost do not receive more attention than they merit.

1.5 SCOPE OF THE STUDY

The construction industry embodies diverse business enterprises, each with different specialisation. Similarly, the various stages of carrying out any particular project have their own characteristics. In the present study it was not possible to treat all stages of the construction process in detail. The study therefore focusses less on the decision making process and more on the construction phase, because until funds are expended on a project, the cost of delay is minimal.

Some of the causes of time and cost overruns may occur in the pre-construction phase, ie in the period between the initial conception of the project and the signing of the construction contract between the public body and the contractor. On the other hand, in general the overruns actually occur in the construction phase, ie in the period after the signing of the contract when construction is going on. This is partly because projects that are still on the drawing board are more amenable to control; but also from the overriding fact that the cost of project time is variable. As King (1968) puts it "Roughly speaking project

time is at least 500% more costly at project completion than it is at the start".

The general role played by transfer of technology and factors which impair its success will be investigated only on a conceptual basis, ie as a review of previous research in this area, to identify the findings relevant to this thesis. Particular aspects will, however, be investigated by means of a detailed questionnaire, involving the public sector agencies that sponsor construction projects, their consultants and contractors; and be much concerned with the quantity surveyor's function as the economist to the construction industry.

1.6 Organization OF THE STUDY

After this introductory chapter, the study follows this pattern:

Chapter 2 Conceptual Problems of Over-commitment:

- This chapter outlines the broad political and economic factors that have contributed to the simultaneous commencement of a range of
-

projects which cannot possibly be completed with the resources allocated.

Chapter 3 Literature Review I: Project Performance

- This chapter reviews earlier research on the causes of success or failure in construction projects, and specifically on the reasons for overruns. It draws conclusions which form the basis of the survey questionnaire.

Chapter 4 Literature Review II: Cultural Dimensions and Technology Transfer

- This chapter reviews research work on the interrelationships between technology transfer and cultural impediments to it.

Chapter 5 Construction Practice Overview:

- This chapter presents existing theory related to public sector practice regarding investment appraisal techniques and construction contract tendering methods. The second part of this chapter introduces the different forms of contract agreement available including those not yet used in Nigeria; and the methods of entering them. It gives the historical
-

background to different types of contractual arrangements and construction contracts.

Chapter 6 Nigeria and Scottish Context:

- This chapter presents the major factors which have shaped the history, economic and public sector activities in the Nigerian and Scottish context, with particular emphasis on their relation to construction practices.

Chapter 7 Research Methodology:

- This chapter reviews briefly the research techniques available, and presents the methods adopted in this study.

Chapter 8 Analysis and Results:

- This chapter presents the statistical analysis of the survey data; a case study of a project of special interest; and the results of the analysis.

Chapter 9 Conclusions and Recommendations:

- This chapter draws conclusions from the analysis; and presents recommendations for future practice, based on the analysis and the literature review. It suggests also a number of areas for future research.
-

CHAPTER 2

CONCEPTUAL PROBLEMS OF OVER-COMMITMENT

2.1 INTRODUCTION

This chapter discusses the possible political and economic factors that are believed to have led to over-optimistic planning of many public sector construction projects in Nigeria, often contributing to non-completion.

2.2 NIGERIAN PUBLIC SECTOR CONSTRUCTION PROBLEMS

The Nigerian construction industry experienced a boom in the 1970s. Many projects became available partly due to necessary physical reconstruction after the civil war and more because of the huge oil revenue accruing to the Government, which provoked the commencement of several ambitious development projects. Construction firms sprang up daily and many who were inexperienced in the business of construction flocked in to make quick money. Foreign construction firms moved in too. In a bid to encourage indigenous contractors to acquire the resources needed to execute medium/large projects, the Government introduced a 'Mobilisation fee' clause. This enabled contractors to be paid 10% of the agreed contract sum before even moving a spade. With this incentive (which was to prove disastrous

- see case study chapter 8), more investors flocked in (Olomolaiye and Ogunlana, 1989). The Government, which had maintained a good record of payment to contractors, apparently started to default in honouring payment certificates; construction delays resulted and soon contractors had to abandon projects. There are a large number of examples of such projects throughout the country (see Chapter 8). Hypothetically, the underlying reasons can be broadly classed as economic or political.

2.2.1 Economic Problems

The present general economic chaos in Nigeria, and its effect on the construction industry, can be attributed partly to what is popularly known in economic circles as the "Dutch disease", ie an affliction of the relatively large and middle-size nations which export large quantities of oil, natural gas, or both; and partly to unstable petroleum prices in this major foreign exchange earner. Gillis (1987) explained the Dutch disease as follows:

"For virtually all the postwar period until 1975 the Netherlands enjoyed remarkable prosperity in almost all respects. Inflation rarely exceeded 3% per year, GNP growth rarely dropped below 5%, and unemployment fluctuated around 1 percent of the labor force, very

low by US standards. Much of Dutch prosperity was due to the fact that the traditional export sector was highly competitive with the rest of the world.

In the early 1960s substantial reserves of gas were found in the Netherlands. By 1975 gas exports had risen to about 10% of total exports, and the Netherlands enjoyed a surplus (on current account) of 4% of GNP. The proceeds of taxes on gas were used to fund drastically increased government spending, particularly welfare spending, but even higher taxes from gas proved insufficient to finance them. One result was a surge in inflation rates, from 2% in 1970 to 10% in 1975, tapering gradually to 4% in 1980. From 1973 through 1978 the inflow of foreign exchange from gas exports buoyed up the exchange rate, as the Dutch guilder appreciated by 30% relative to its major trading partners. As a result traditional exporters were faced with a double blow: rising domestic costs coupled with drastically lower guilder earnings from each dollar's worth of exports. Unemployment rose sharply from 1978 as the relatively labour-intensive export sector stagnated, and GNP growth dropped from 5% rates of the 1960s to 1 to 2 percent by the end of the decade."

Clearly, a gas "bonanza" brought mixed blessings to the Netherlands, just as the oil bonanza did for several of the large and less developed countries, like Mexico and Nigeria.

Nigeria's "oil-fired" growth in revenue has contributed to making the country's decision makers too optimistic, and thus engaging in too many development projects that could not possibly be financed effectively

from the proceeds of the oil revenue accruing to the Government.

Before the first oil boom in 1973 and 1974, Nigeria's economy was one of the most prosperous in Africa, with agriculture leading the economic sector (Olayide, 1976). The nation was a major exporter of cocoa and a leading supplier of other labour-intensive, smallholder agricultural products, such as palm oil and ground nuts. In a large country with a rapidly growing population, strong export performance in these commodities, and in cotton and rubber, facilitated major increases in rural incomes. In addition the manufacturing sector grew rapidly, rising from a very small base before independence to 5% of GNP by 1964 and 9% of GNP by 1976. This was just after the beginning of the first oil boom. Throughout the 1960s, even through a costly civil war which ended in 1969, domestic inflation was held to an average rate of less than 3%, and growth in government expenditure was held closely in check. By 1980 Nigeria's per-capita GNP, at US \$1,010, was the fourth highest in sub-Saharan Africa, having grown at 4.1% per year since 1960 (Gillis, 1987).

If growth in per-capita income were the only measure of improved national well-being, Nigeria's record from 1960 to 1980 would appear to be one of advancing prosperity. But surface appearances can be deceiving. By 1980 the labour-intensive agricultural sector was nearly in ruins. Agricultural exports had fallen from 90% of total exports in 1960 to only 8% in 1980, while the share of agriculture in GNP dropped precipitously, from almost two-thirds in 1960 to one fifth by 1980 (Federal Ministry of National Planning, 1981). Nigeria, a net food exporter in the 1960s, spent almost US \$3 billion on food imports in 1980. Inflation surged to an annual rate of 18% for the decade ending 1980. In the period 1972 to 1977 Government spending grew at approximately double the rate of GNP growth. Throughout the whole decade the Government allowed the exchange rate to appreciate gradually against the dollar. The value of the Nigerian naira rose from US \$1.52 to \$1.88 in 1981.

When the world oil market softened after 1981, the exchange rate began to depreciate in nominal terms, falling from 1.88 naira to the dollar in 1983 to 1.31 naira in 1984; but compared with the rest of the world, domestic inflation continued at a rapid pace. While the Consumer Price Index

in the US increased by 2.3 times in the period from 1973 through 1984, it rose by 7.3 times in Nigeria, and as a result, Nigerian exports became increasingly less competitive. The real exchange rate² continued to appreciate even as the nominal rate declined slowly. By 1984, the real exchange rate of the naira against the US \$ was 2.7 times higher than at the beginning of the first oil boom in 1973 (Gillis, 1987).

Thus a sharp rise in the real value of the naira placed tremendous pressure particularly on local producers of building materials, due to the fact that imported goods became relatively cheap, and the locally manufactured materials became less attractive to the industry. Due to a general squeeze in the availability of local resources on the one hand, and on the other to difficulties in obtaining imported materials, which had already been specified, most ongoing projects suffered drastically when the economy turned down. Real GNP per capita in 1983 was over 20% lower than in 1977, and the economic conditions continued to worsen.

² The real exchange rate with respect to say US\$ is the nominal rate times the Nigerian Price Index over the US Price Index

Another economic factor that affects the completion of projects in Nigeria is that of risks in the source of revenue to the country. In countries like Nigeria, which are dependent on a single revenue source, excessive movement in the levels of that source tends to have major impacts on the generality of government expenditure and particularly on development programmes. In Nigeria, as discussed above, the major source of revenue both for the Government as well as for the economy is the petroleum sub-sector. Any vagaries in the market of such a mono-product revenue earner therefore affect not only the level of funding in general but that of construction projects, and by extension project delivery capability.

Nigeria is a member of the Organization of Petroleum Exporting Countries (OPEC) which in itself is a cartel. The seven biggest petroleum purchasing companies (presumably under a gentlemen's agreement) also operate in concert and thus behave as members of a cartel. It is widely believed that the home governments of these 'big seven' also give them support; a support which certainly helps blunt the political leverage which OPEC member countries possess in

addition to their joint oligopolistic powers. Elementary micro-economic theory suggests that when two major cartels find themselves in opposing camps (one large buyer against one large seller) instability is likely. Hence, as OPEC fixes prices and indirectly regulates production, the big seven also stockpile or devise other measures to reduce the amount of petroleum lifted at certain periods with the intention of creating artificial surplus production so as to force down prices. In other words, prices and quantity are indeterminate and the system can only attain local equilibria. As the system moves towards an equilibrium, it may often be disturbed by a change in strategy, hence the variation in Nigerian petroleum export earning and the consequential variability in the level of funding of government projects. It should, however, be noted that the nature of this type of system, its structural instability and the nature of the critical points all tend to make the system very vulnerable whenever an external factor impinges on it. Such a perturbation may result in sudden movements in the supply of funds, resulting in scarcity or plenty, depending on the nature of the perturbation. In the former case, the Government may find it difficult even to prosecute

on-going projects whereas, in the latter case, projects of lower priority (or indeed those which did not initially form part of the plan), and other grandiose ones, may be started. In the last two decades the petroleum market has suffered from several perturbations some of which affected Nigeria significantly:

- | | |
|-----------|--|
| 1976-1977 | Stockpiling in Europe and the effect of increasing supplies of North Sea oil reduced Nigerian export earnings. |
| 1978-1979 | Instability in Iran created a boom in Nigeria's earnings. |
| 1979-1980 | The Iran/Iraq conflict created a further boom. |
| 1981-1982 | Overt action by the 'big seven' to boycott Nigerian crude under the pretext of overpricing resulted in a near-total cessation of inflow of petrol-naira (Oshisani and Dean, 1984). |

Given these types of instability, it is clear that development planners have difficulty in forecasting the expected revenue and there may be high temptation to embark on projects which might not otherwise be started, due to short-term surplus earnings.

2.2.2 Political Problems

Morris and Hough, (1987) rightly noted that: "the influence of politics on projects has received surprisingly little study, despite its evident significance." Politics has an impact on projects through funding, sponsorship, and legislation over fiscal, safety, employment and other matters. This influence can be direct, as in the development of Concorde, or the North Sea oil projects; or indirect (Hall, 1980 & Knight, 1976). Baum and Tolbert (1985) rightly observed that "political considerations invariably dominate decision making in Third World development projects, and in developed world projects in or affecting the public domain, particularly in infrastructure and high technology". Indeed, one could safely say that political sponsorship in Nigeria is one of the single most critical "success" factors for such projects.

A sponsor or 'godfather' is an influential person who chooses to actively support a project and does everything possible to facilitate its development and implementation. An important function of godfathers is to make it known throughout the system that the project is

under their personal guidance and protection. In providing this 'protection,' godfathers engage in a variety of activities of substantial nature to help the project's implementation process. Godfathers make certain that resources remain available to the project throughout the development and implementation. Consequently, they reduce the likelihood of political derailments of the project, and the project team can perform their work without fear about whether or not project funding will continue to its completion.

Government commitment to a project is an essential precondition for project success, although it is evident in some cases that political over-dominance can generally reduce managerial efficiency. As Paul (1982) concluded in his study of six large Third World projects: "government must provide clear objectives, allow flexibility of management approach, monitor progress, and provide stability, commitment and continuity."

October	1960	Attainment of Independence
October	1963	Adoption of a republican constitution
January	1966	Coup d'état and overthrow of civilian government
July	1966	Coup d'état
1967-1970		Civil war
July	1975	Coup d'état
February	1976	Attempted coup d'état
October	1979	Installation of civilian government and adoption of US presidential style of government
December	1983	Coup d'état
August	1985	Coup d'état

Table 2.1: Changes in Government in Nigeria

In Nigeria such conditions have not been met since independence, because of the frequent changes in government. Between 1960 and 1985, the country has witnessed eight heads of government, consisting of two civilians and six army generals (see Table 2.1). Such political instability reduces the effectiveness of even a godfather, especially when a new regime has different people of influence. New

governments have new priorities, and this contributes to non-completion and the abandonment of many projects.

Another political problem which may contribute to overcommitment to projects is connected with planning. Many less developed countries have had a long history of governmental controls over many of their economic activities. The proliferation of controls in such areas as foreign exchange, imports, and actual allocation as against budgeted allocation to agencies, greatly reduces the scope for the planning activities of agency personnel.

2.3 DISCUSSION

In recent years, the symptoms of the "Dutch disease" have faded with the decline of world oil prices, but the after-effects remain. When oil prices eventually recover, exporting countries may be better able to cope with this malady. Meanwhile, the immediate solution for Nigeria, is the promotion of non-oil exports.

Planners should learn their lesson from previous experience and possibly be more pessimistic than current

evidence suggests. The difficulty of forecasting in situations out of one's control is obvious, but better planning and phasing may help.

It is not simply that governments of different hues may impose changes in industrial policy and economic management, and thereby cause substantial problems for major projects (and indeed to business generally [Luffman and Reed, 1984]). Government has to provide the conditions conducive to long term implementation and success of construction projects.

It can therefore be concluded from this chapter that, directly or indirectly, economic and political factors both contribute to project failure in Nigeria. With such uncertainties in revenue and instability of governments (from table 2.1 the average life span of government in Nigeria is seen to be roughly 3 years, a period too short to ensure any long-term strategic perspective by the political leadership), there is no simple answer to the problem of abandoned projects unless subsequent governments give priorities to projects already underway.

CHAPTER 3

LITERATURE REVIEW I:

PROJECT PERFORMANCE

3.1 INTRODUCTION

This chapter reviews earlier research on the causes of success or failure in construction projects, and the reasons for overruns which underlie the Nigerian construction management problems.

This chapter and the next (Chapter 4) are mainly based on relevant published literature identified in the first instance by a systematic review of the following journals, periodicals and other sources for the past 5-10 years; and thereafter from citations appearing in those publications:

- International Journal of Project Management;
- Project Management Journal (formally Project Management Quarterly);
- Long Range Planning;
- Construction Management and Economics;
- American Association of Cost Engineers;
- Harvard Business Review;
- Royal Institution of Chartered Surveyors;
- Proceedings of INTERNET;
- Proceedings of CIB;
- Management Science;
- ABI/INFORM database.

3.2 PROJECT SUCCESS OR FAILURE

3.2.1 Success Measurement

It is important to give first a definition of "a project" before attempting to discuss the various notions of project success. While there are several definitions in the literature, one of the best has been offered by Tuman (1983), who states that:

"A project is an organization of people dedicated to a specific purpose or objective. Projects generally involve large, expensive, unique, or high risk undertakings which have to be completed by a certain date, for a certain amount of money, within some expected level of performance. At a minimum, all projects need to have well defined objectives and sufficient resources to carry out all the required tasks."

Varying opinions on what features constitute a "successful" project have been fairly widely discussed in the project management field. Evidence seems to indicate that this set of characteristics has changed, or developed, over the years. Earlier work by Avots (1969), Gaddis (1959), and others seemed to suggest implicitly that project success involved concern for three factors; time, budget and project

performance. If the project came in on cost, on or near budget, and performed as it was expected to perform (within tolerance limits), it was considered a success.

More recently, an additional element has been added to the factors for assessing the success of a project. This element involves concern for the "satisfaction and welfare of the client" (Bedell, 1983). To illustrate this point a study by DeCotiis and Dyer (1979) demonstrated that five of their twelve determinants of R&D project success are related to the external (client) environment. Jeffrey and Dennis (1988) assert that discussions with project managers as recently as ten years ago indicated that their primary focus as project leader was to get the project completed, make sure it worked, and get it out of the door. Client contact after completion was minimal, and any form of long term follow-up or troubleshooting was often non-existent. They argued further that, in recent years, some important elements have combined to make the "client satisfaction" variable more important to project managers. The points they highlighted are:

- 1 There has been a proliferation of project-based organizations in the marketplace. Project
-

techniques and services have improved as more companies are involved in these operations.

- 2 World-wide competition has resulted in a much more competitive marketplace, in which the customer has a wider range of options in selecting projects and companies with which to deal. As a result, project firms are more interested in maintaining contacts with past customers as a way of holding on to market share. One of the most important ways to consolidate is through ensuring past customer satisfaction, including offering a variety of services long after the project has been handed over to the customer and is up and running.

A study by Baker, Fisher and Murphy (1983) strongly confirms the importance of including client satisfaction within any measure of project success. After sampling over 650 project managers, the researchers concluded that project "success" is something much more complex than simply meeting cost, schedule, and performance specifications. In fact, client satisfaction with the final result had a great deal to do with the perceived success or failure of the project. Further, Baker, Fisher and Murphy (1983) concluded:

"In the long run, what really matters is whether the parties associated with, and affected by, a project are satisfied. Good schedule and cost performance means very little in the face of a poor performing end product."

They, however, stressed that if the survey had been conducted on current, ongoing projects, the emphasis of their respondents would undoubtedly be on meeting schedules and staying within budgets. Their study was concerned with completed projects, and not so much with reasons of abandonment, or large overruns.

Other studies on what contributes to success or failure have followed the "case study" tradition (eg Knight (1976) - Concorde; Likierman (1977) - North Sea Oil; Hall (1980) - London's Third Airport, London Motorway Box, Concorde, Sydney Opera House and others; Kharbanda and Stallworthy (1983) - Grace Bay Canada, Concorde UK, US Nuclear Plants and others; Pugh (1985) - 71 UK Aerospace Projects; Morris and Hough (1987) - Channel Tunnel, Concorde, The Advanced Passenger Train, The Thames Barrier and others).

Success is clearly shown to mean different things to different people, depending on the type of project being undertaken and the party concerned. Hayfield (1985) in his work presented at the 8th World Congress of INTERNET differentiated between success and failure by saying that a project is a success if both the Client and the Company realising the project are satisfied. He suggested that the Client is satisfied if his budget of costs is not exceeded, the date of completion is met, and the quality of work on the project is up to expectations. In addition he adds, the Client will feel happy if during its realisation there is a positive relationship with the local community and authorities. He argued that although the Contractor and the consultants are on site for only a relatively short period, the Client will be present for much longer, and needs a positive and welcoming environment in which to work. Morris and Hough (1987) defined success in a broader perspective with four measures of success viz:

- (1) *Project functionality* Does the project perform financially, technically or otherwise in the way expected by the project sponsors? (This is primarily an "owner measure", although financiers, regulators,
-

citizens, governments, environmentalists and others having a secondary or indirect relationship with the project could have their own "performance requirements").

- (2) *Project management* Was the project implemented within budget, on schedule, and to technical specification?
- (3) *Contractors' commercial performance* Did those who provided a service for the project benefit commercially (in either the short or long term)?
- (4) *Cancellation* In the event of a project needing to be cancelled, was the cancellation made on a reasonable basis, and the project terminated efficiently?

There are almost as many criteria for evaluating project success as there are studies on the subject. For example, Morgan and Soden, (1979) in discussing information system failures, have used as measures: operational failure, economic failure, technical failure, development failure, and priority failure. The only common factor in these studies is the recognition of overruns in time and cost as high ranking measures of failure.

3.2.2 Factors Affecting Project Success

Research efforts over the years have identified a number of factors that are important to project success. Some researchers carried out empirical studies aimed at determining critical success factors (Baker, Murphy & Fisher (1983); and Thamhain & Wilemon (1986) while others carried out conceptual research (Hayfield (1986); Cleland & King (1983); and Archibald (1976)) which succeeded in the development of theoretical frameworks or models listing several of those factors seen as critical to project success. Hayfield, for example, identified two sets of factors that determine the success or failure of a project: technical; and non-technical factors. He detailed these factors as follows:

Technical factors

- Project definition
 - Proven design and modifications
 - Codes and regulations
 - Design and construction doctrines
 - Specifications and regulations
 - Inspection and quality assurance
-

Non-technical factors

- Project performance visibility
- Organization
- Project Management tools
- Information handling
- Risk management
- Team spirit
- Early phase of a project

These factors are based on the definition by the author of a successful project being one that is completed on time, within budget and to performance specification.

A study was carried out at the University of Texas on the success and repeatability of construction projects (Ashley, 1986) and presented at INTERNET's 10th International Expert seminar. It included successful projects only. The results from this study showed that the likelihood of achieving a successful construction project is greatly enhanced by placing more emphasis on the following success factors:

- planning effort (construction)
 - planning effort (design)
-

- project manager goal commitment
- project team motivation
- project manager technical capabilities
- scope and work definition
- control systems

The results also suggested that there are six success criteria most frequently used to measure construction project success:

- budget performance
- schedule performance
- client satisfaction
- functionality
- contractor satisfaction
- project manager/team satisfaction

Judging by the success criteria in this study, it would seem that the parties considered are the Client, Contractor and the project team. In addition, the research also seems to be limited to the design and construction portion of the project life-cycle.

A major literature survey in the UK (Morris and Hough, 1987) on project success and failure including the analysis of eight case studies (The Channel Tunnel; Concorde; The Advanced Passenger Train; The Thames Barrier; Heysham 2 Nuclear Power Station and the AGR programme; The Fulmar North Sea Oil Field; The Computerization of PAYE; and Project Gioto) led to the identification of about 80 factors that are important for project success. The factors were grouped under the following ten headings:

- project definition
- planning, design and technology management
- politics/social factors
- schedule duration
- schedule urgency
- finance
- legal agreements
- contracting
- project implementation
- human factors.

Research work by Slevin and Pinto (1986) in what may be described as one of the most extensive surveys in this subject, involving some 600 project managers world wide, has

led to the development of a model of ten critical success factors for project implementation. These ten factors represent those characteristics found to be critical to project implementation success. The ten critical success factors were described as:

- 1 Project mission - Initial clarity of goals and general directions.
 - 2 Top management support - Willingness of top management to provide the necessary resources and authority/power for project success.
 - 3 Project schedule/plans - A detailed specification of the individual action steps required for project implementation.
 - 4 Client consultation - Communication, consultation, and active listening to all impacted parties.
 - 5 Personnel - Recruitment, selection and the training of the necessary personnel for the project team.
 - 6 Technical tasks - Availability of the required technology and expertise to accomplish the specific technical action steps.
 - 7 Client acceptance - The act of "selling" the final plan to its ultimate intended user.
-

- 8 Monitoring and feedback - Timely provision and comprehensive control information at each phase in the implementation process.
- 9 Communication - The provision of appropriate network and necessary data to all key factors in the project implementation.
- 10 Trouble-shooting - Ability to handle unexpected crisis and deviations from plan.

3.2.3 Discussion of Project Success or Failure

In the most basic sense, it is believed to be clear that everyone understands the concept of a successful project, and yet, within the project management field, inconsistencies abound. A project that came in on time and under budget is not necessarily a success, especially if the mistake was made at the appraisal stage. On the other hand, many examples exist of projects which finished late and far over budget and yet were hailed as successes. This is likely if there was merely underestimation in time and cost. Project managers can also describe cases of "successful" projects which have been poorly received by the intended

clients and used well below capacity. Examples exist also of projects which, when first constructed/installed, were perceived as failures but over time have come to be viewed as major successes.

If Pinto and Slevin (1988) are to be believed, these examples, point to the fact that, in general, the concept of project success has remained ambiguous both in the project management literature and within the psyches of project managers. Because of this ambiguity, some writers claim that many project managers are forced, either through company policy or personal rule of thumb, to subscribe to a simplistic formula in rating project success or failure.

In the public sector, which is the area of this study, the primary goal is the provision of services to the community without necessarily achieving quantifiable returns. Public sector projects, particularly development projects, are often rated as successful if completed on time, within budget and to specification/performance.

It is, however, apparent from the research studies quoted that there still exists no consensus on the criteria for measuring success. Although many studies seem to identify more factors than scheduled completion at budget, the additional factors (eg client satisfaction and performance) remain very difficult to quantify.

A cross-cultural study, the first of its type, sponsored by INTERNET, involving 424 respondents across more than 15 countries mostly from Europe suggested that success is a complex, multiple objective function, that appears to be unique to each organization (Gray *et al*, 1990). The results established that Japanese construction project managers for example, tend to have a stronger focus on cost as the most important objective than do managers in other countries. In the UK and Germany managers, particularly those in construction give slightly more attention to meeting schedule than to other factors.

Based on the foregoing, the most widely recognized factual criteria used to assess construction project success particularly at the construction stage can be listed as:

- Meeting schedule
- Meeting budget
- Meeting clients requirements
- Performance

The schedule and budget aspects will form the core of investigation in this study. This is partly due to their being generally accepted as important to project success, and moreso because they pose a special problem in the Nigerian public sector. They are also quantifiable.

Some authors include only success factors that are within the control of the project team (Slevin and Pinto (1986); Kharbanda and Stallworthy (1983); and Pugh (1985)). Others (Morris and Hough (1987; Paul (1982); and Hall (1980)) include additional factors that are often considered to be beyond the control of the project team, but which nevertheless are felt to have an important impact on the project success. Examples of these factors include: politics; client's changes; etc.

The factors affecting project success may be classified as: micro factors, or those falling within the engineer's/constructor's domain, and are usually evident to,

and avoidable by, the project team; and macro factors, that fall mostly outside the control of the project team, and which are thus less easy to correct by them. The present study is more concerned with macro factors, namely:

- unforeseen circumstances;
 - changes by client;
 - inflation;
 - client's organizational structure;
 - and original underestimation.
-

3.3 OVERRUNS IN CONSTRUCTION PROJECTS

3.3.1 Definition

Calculations of overrun for a project may vary widely, depending on their source. These differences are not necessarily deliberate, or simply inaccurate. They occur because some calculations may be based on preliminary estimates, while others look at initial project budgets, or later definitive estimates.

Apart from the variations in the base against which project actual cost is compared, the real amount of the overrun may also be confused because of the quality of the estimate. Conceptually, if the budget has been overestimated, the final cost will, in fact, include an overrun, even if it comes out on budget! For example, some contractors while tendering for contracts which include some proprietary processes may price such items so high as to avoid any possibility of overrun. From a conceptual viewpoint, however, there would be an inherent overrun in such a project if most other companies had been able to construct a similar facility at substantially lower cost.

In this regard there is need for proper definition of what constitutes an overrun. Likierman (1977) in his report on the North Sea Cost Escalation Study emphasised that search for an adequate definition was important to prevent apparent contradictory statements among the study group members. The most widely and convincing definition of overrun is that adopted by the North Sea Study Group, which defined cost overrun as:

The difference between the original estimate of final cost of a project and the final out-turn or latest estimate of the final cost.

This definition of course excludes any rise in input costs which was anticipated in the original estimate, and cannot therefore be used to describe absolute levels of costs increase over time for identical projects. Most estimates include contingency reserves, which are supposed to reflect the uncertainties involved in the project. Such contingencies can be sizeable by themselves. For example, the US Government objected when the sponsors of the Alaska gas pipeline wanted a \$4000M! contingency in their estimate (Merrow *et al*, 1979).

3.3.2 Overrun reasons

There is a very limited number of studies of construction overrun problems, and most of these investigate only specific project(s). The root cause of most construction project failures in Nigeria is overrun. Projects that are completed late or over budget; do not perform in the way expected; or, after the expenditure of considerable extra sums of money, may be cancelled prior to completion. There are hardly any reports showing underruns in Nigeria! Overrun is the norm.

To be able to investigate this problem, which is the aim of this research, it is important first to look to past research studies possible causes of overruns. Although overruns are common in developing nations, the developed nations also share such experiences on some projects.

In the advanced countries, the results of such studies reveal that, where overruns occur, they are mostly associated with government sponsored projects. For several years, studies by the General Accounting Office (GAO) - the auditing arm of the US Congress - have consistently shown

that federally funded projects are liable to overrun their initial (or "baseline") budgets. A 1975 GAO report, for example, showed that major federally funded projects were overrunning on average 75% while the overrun on projects of \$1 billion or over was 140% (General Accounting Office, 1980). Other studies on technically complex projects show a widespread incidence of overrun both in UK and the US: 55 US process plants (33 having pioneer technology) showed cost overrun in cost of 140-210% (Myers and Devey, 1984); 8 US weapon systems projects showed a cost overrun of 200-400% (Large, 1974); Various North Sea projects revealed 100-144% cost overrun (Department of Energy, 1976); 84 UK laboratory research projects showed 45% cost overrun and 20% schedule overrun (Allen and Norris, 1970). These studies may not principally be construction works, but having studies overruns and the fact that such projects normally have construction works incorporated in them, makes it all that relevant.

Analysis of the nature and reasons for overruns shows that in the study carried out in the US, external factors, such as regulatory impact, scope changes, weather and strikes, were considered of minor importance in cost

overrun, and were not included in the study. These limitations must be kept in mind in interpreting their report, since, on many projects other than pioneer projects, external factors can represent the major reasons for overruns. The studies in the US showed that capital costs for the type of projects investigated were seriously underestimated, and also that their performance fell short of predictions. The underestimates, according to the Rand Report (Large, 1974), were caused by the amount of unproven technology and inadequate project definition at the time the budget was set up. The result suggested that, in view of the findings in their report, estimators may be more pessimistic in the future and their estimates of similar projects may be higher. As a result, one would expect lower cost overruns in the future.

There was a certain similarity between the subjects of investigation in the US and in the UK North Sea study, because both studies dealt with a large number of projects as a group, rather than individually. Unlike the US studies, however, the UK study emphasised the role of external factors, and did not single out any one area as the cause of overruns. It blamed controllable and

uncontrollable factors, including poor management and inexperience with the type of project (new technology). Commonly identified causes of escalation were inflation, design changes, delays and environmental conditions in the North Sea. Operators, the report suggests, stressed the difficulties caused by designing for and installing structures in a new and hostile environment, about which little was known; and the impossibility of making accurate estimates in such circumstances. Purchasing departments remarked on unexpectedly rapid rise in material and equipment prices during the period, due partly to inflation and partly to devaluation of sterling. Fabricators emphasised the importance of incomplete initial designs, frequent design changes and late delivery of materials and equipment combined with short delivery dates demanded by operators, which prevented orderly planning and staffing. Other factors mentioned include a shortage of experienced design and project management staff (due still to new technology); requirements of certifying authorities often imposed at an advanced stage of a project; and government interference.

A study carried out by Thamhain and Wilemon (1986), involving over 400 project managers in the US, revealed that project leaders perceive problems as responsible for schedule slips and budget overruns differently from their superiors. The project leaders were found to blame management problems, technical complexities and unrealistic project plans for poor project performance. Senior management attribute overruns to insufficient front-end planning, underestimated project scope and insufficient contingency planning. On balance, the findings suggest that project leaders are more concerned with external influences, while senior managers focus more on what should and can be done to avoid problems.

Avots (1983) in his conceptual reasearch gathered 57 causes of overruns in projects in the developed countries and grouped them under only four basic factors:

- 1 underestimate;
 - 2 scope and design changes;
 - 3 productivity decreases;
 - 4 basic cost increases.
-

Studies on developing countries often show both cost and schedule overruns. A study of 384 Turkish Public Construction Projects revealed 40-110% cost overrun, and 34-44% schedule overrun (Arditi *et al*, 1985a, 1985b)). A study on 187 Indian public sector projects revealed 19-45% cost overrun and 0-19% schedule overrun (Indian Ministry of Programme Implementation, 1986). A review of King Feisal Specialist Hospital in Saudi Arabia revealed a staggering cost overrun of 25 times original cost (Kharbanda and Stallworthy, 1983). A study of some large projects in South American countries revealed time overruns of over 25%, and over 30% cost overrun (Chalabi and Camp, 1986). Algeria's Trombay I fertilizer plant finished 3 years behind schedule with 50% cost overrun (Kharbanda and Stallworthy, 1983).

Various reasons were cited as causing overruns. The closest in similarity to the study at hand was that of Arditi *et al* (1985a&b) which involved a large sample of respondents in Turkey. The reasons for overruns were noted as: inflation; shortage of materials; delays; payment problems; contractors' financial problems; deficiency in cost estimates; unexpected subsoil conditions; extra work; and organizational deficiencies.

The Indian study revealed the following as the major causes: late approvals; site acquisition and clearing; equipment supply; slow performance; scope and design changes; estimating uncertainties; increased interest charges; and funding availability.

In a study on the management of construction industry in Tanzania (Sasillo, 1988), major problems of overruns were found to include: unforeseen ground conditions; shortage of building materials; delayed payments; shortage of funds; and extra work ordered by client. Other reasons suggested were: poor performance of contractors; lack of proper establishment and mobilization of equipment at early stages of the contract; bureaucracy; and the donor's policy requirement.

The Saudi Arabian overruns were associated with: transplant of sophisticated technology (integrated computerised system); corrupt contractors; many countries involved in the supply of medical hardware; achievement of political goal; and multicultural workforce.

Chalabi and Camp's case study of selected public sector large projects in developing South American countries revealed the following as the leading reasons for overruns: lack of accurate data on which to base estimates; problems or coordination and schedules; delays caused by the owner; shortages of materials and equipment; dependence on intuitive management methods; contractors' management and technical problems; and technical labour shortages.

In the Algerian fertilizer complex study, the reasons found as responsible for overruns were: faulty contract documents - leading to misunderstanding and disputes; management problems; contractor's deficiencies; inflation and corrupt practices.

Other than reports of abandoned projects in news media (Lufadeju (1986); New Nigerian Editorial (1987); Usen (1987); and Agbese (1988)) the only study known to have been carried out on causes of overruns in Nigeria was an investigation made for the Federal Government, by a ministerial committee set up to look into the reasons for the excessively high cost of construction projects. The committee was concerned that the cost of any contract in

Nigeria was much higher than elsewhere in Africa. It was noted that contracts in Nigeria cost twice those in Kenya and 130% higher than in Algeria, another oil-rich developing country. Specific examples mentioned are that, the cost of an irrigation scheme in Liberia in 1977-78 was 250 naira a hectare, in Ivory Coast it was 500 naira a hectare while in Nigeria it was 2,470 naira a hectare³. One northern irrigation scheme cost a staggering 7,540 naira an hectare (Federal Government Press, 1981).

The report of the study group found that the explosive growth of contracts which followed the tripling of oil prices in 1973-74 was not matched with the capacity to execute them. As a result Nigeria has paid dearly for much of the construction work which has been done. After reviewing the entire industry, from the committee's recommendations the following can be inferred as the possible reasons they considered to be responsible for excessive high cost of building: lack of proper planning; lack of monitoring; consultancy related problems; type of

³ From the discussion in Chapter 2 this figure can be misleading due to the over-valued Nigerian naira. Unfortunately this did not seem to be apparent then.

tendering; lack of competent indigenous contractors; shortage of building materials; delays in making payments; and inflation.

In support of the committee's findings on the influence of tendering, an interesting study on overruns was carried out by Robinson (1987), which specifically concludes that different types of procurement and contractual arrangements can only influence contract performance if the project is delayed by more than five weeks. A study by Watson (1979), however, proved that tendering types have influence on final project cost, especially engineering contracts without any proviso.

3.3.2 Discussion of Overruns in Construction Projects

What is clear from the foregoing is that while similar reasons for overruns seemed to be shared among the developing countries, the industrialized countries face different problems, with only little in common with those of developing countries. The problems of industrialized countries could largely be related, either directly or indirectly, to unproven technology and to inflation

associated with the national and global economic crisis. The global economic crisis affects all countries around the world, but affects the developing nations more, especially those relying heavily on economic aid. The problem of implementing unproven technology is rare in developing countries. When this happens, as in the Saudi Arabian example, the overrun was catastrophic - 25 times (2500%). The present work aims to extend investigations of the causes of overruns to the special circumstances of public sector construction projects in Nigeria, an area not yet studied in detail.

Causes of overruns already established in studies carried out in different countries are summarised below:

Turkey

inflation;

*shortage of materials;

delays;

*payment problems;

*contractors' financial problems;

deficiency in cost estimates;

unexpected subsoil conditions;

extra work;

organizational deficiencies.

India

late approvals;
site acquisition and clearing;
equipment supply;
slow performance;
scope and design changes;
estimating uncertainties;
increased interest charges;
*funding availability.

Tanzania

unforeseen ground conditions;
*shortage of building materials;
*delayed payments;
*shortage of funds;
extra work ordered by client;
poor performance of contractors;
lack of proper establishment and mobilization
of equipment at early stages of contract;
*bureaucracy;
*donor's policy requirement.

Saudi Arabia

transplant of sophisticated technology
(integrated computerised system);
*corrupt contractors;
*many countries involved in the supply of the
medical hardware;
achievement of political goal;
*multicultural workforce.

Algeria

faulty contract documents - leading to misunderstandings and disputes;
management problems;
contractor's deficiencies;
inflation;
and *corrupt practices.

South American Countries

*lack of accurate data on which to base estimates;
problems of coordination and schedules;
*delays caused by the owner;
*shortages of materials and equipment;
*dependence on intuitive management methods;
contractors' management and technical problems;
and *technical labour shortages.

Nigeria

lack of proper planning;
*lack of monitoring;
*consultancy related problems;
type of tendering;
*lack of competent indigeneuos contractors;
*shortage of building materials;
*delays in making payments;
inflation.

Those factors marked "*" are noticeably encountered only in the developing countries, although they do arise in the industrialised countries to a lesser extent. It is also important to note that in the more developed countries, an overrun does not usually lead to abandonment of the project. In the developing countries (except the surplus petro-dollar countries), such overruns pose threats to project completion. As Fox (1984) noted in his study on industrialised countries, "the presence of a numerical overrun is only indicative of the possibility of project

failure." It is not in itself a proof of incompetence, imprudence or even necessarily of problems, he adds. For example certain of the GAO overruns are entirely due to increased order quantities - the GAO studies show an overrun, when the final programme cost is greater than initial budget - but an increased order quantity can well be a sign of success. Much of the cost growth in early US defence programmes was due to government requested changes (Large, 1974). Similarly, introduction of new technology was the case in the early North Sea oil projects. It is therefore clear that drawing conclusions from studies on projects in industrialised countries may be misleading with respect to projects in the developing countries.

So far it is clear that the reasons for project cost/schedule overruns vary from project to project, and depend also on the environment. However, if a national survey like the one in this study is to be successfully conducted then major possible reasons have to be identified and used in drafting the questionnaire.

It is interesting, however, to note that only some causes of overruns are shared among many countries, with

some being unique to particular country. This may show deficiencies in the studies of such countries, rather than the real situation. With the exception of India, shortages of construction materials was identified as a problem in all the developing countries reviewed. Another common problem in all the developing countries is that of inflation, except in Saudi Arabia (thanks to surplus petro-dollar!). Other problems were identified in only one country, eg Saudi Arabia's multicultural work-force problem. This is typically a small petro-dollar country's problem, where local manual labour is scarce, not as in most developing countries. There are reasons identified in countries other than Nigeria, that merit investigation, such as corruption charges (Algeria, and Saudi Arabia); bureaucracy (India and Tanzania); and Client's changes (Turkey; India and Tanzania).

Some of the possible overrun causes are as stated above, while others are better rephrased for the

questionnaire, eg corruption charges. The reasons for project overruns based on the professional experience of quantity surveyors in Scotland, in relation to the studies cited above, and investigated in the questionnaire, are:

- i. difficulties in obtaining construction materials
 - ii. shortage of qualified workers
 - iii. deficiencies related to equipment
 - iv. contractor's difficulties in receiving interim payments from public agencies
 - v. contractor's other financial difficulties
 - vi. insufficient public agency's budget
 - vii. deficiencies in contractor's organization
 - viii. deficiencies in public agency's organization
 - ix. inadequacy of site inspection
 - x. large quantities of extra work
 - xi. delays arising from design
 - xii. frequent change orders
 - xiii. unrealistic contract durations imposed by public agencies
 - xiv. deficiencies in planning & scheduling
 - xv. disagreement in contract clauses & specification
 - xvi. natural and/or social events
-

- xvii. contractors' unrealistic estimates
- xviii. inadequate pre-planning
- xix. deficiencies in the initial estimates
- xx. fluctuations in material, labour & plant costs
- xxi. reasons that cause construction delays
- xxii. unforeseeable circumstances
- xxiii. monitoring problems
- xxiv. tendering type problems
- xxv. inadequate budget
- xxvi. multitude of bureaucratic obstacles
- xxv. delays in receiving subventions from the Government
- xxvi. high levels of contractual claims

The influence of politics on projects has been examined in the previous chapter, and since the survey is conducted through civil servants who are expected to be non-political, there is likelihood of bias if a political factor is included in the survey. So also, the problem of unproven technology is not included in the list, for the reason highlighted above: most developing countries do not pioneer technologically novel projects. The broader

problem of technology transfer is however investigated in the next chapter in light of previous research in that field.

The results of the two studies by Robinson (1987) and Watson (1979) suggest a need to compare the different types of tendering and contractual arrangements used in Nigeria and Scotland.

In the questionnaire the reasons were divided into those causing cost overrun and those causing time overrun, to simplify response and analysis. Some parameters, such as monitoring, tendering and forms of contractual arrangements were investigated independently in the questionnaire (Appendix IV).

CHAPTER 4

LITERATURE REVIEW II:

CULTURAL DIMENSIONS AND TECHNOLOGY TRANSFER

4.1 INTRODUCTION

Considerable research has been carried out to examine the relationship of the cultural environment of the individual to his behaviour. The purpose of this chapter is to introduce the subject of technology transfer and the problems that are confronted in implementing it in developing countries; and to review earlier studies of culture, as they relate to project management technology.

4.2 TECHNOLOGY TRANSFER

Definitions of technology can be classified into two major types: the technician and the humanist. The technician definition of technology explains it solely in terms of its technical aspects, while the humanist definition relates it to societal needs (Yankey, 1987).

Among the technician definitions is that offered by Gibson (1976) when he defined technology as "scientific, engineering, and managerial knowledge which makes possible the conception, design, and development, of production and services". Yankey (1987), rightly I believe, argued that this definition seems to be narrow, and might not include

agricultural, military, medical and other technologies. It can therefore be argued that the definition is a good definition only for industrial technology.

Similarly, Hayden (1976) defined technology as "the quantum of knowledge by which such inputs as patent rights, scientific principles and R & D (Research and Development) are translated into production of marketable industrial materials, components and end products". This quantum of knowledge he adds, "comprises two parts: the engineering documentation and the manufacturing techniques. The latter are the human implementation of the written instructions contained in the former". This definition, though it clearly explains an industrial or a manufacturing technology, is equally narrow and suffers from the same defects as Gibson's definition.

The humanist definition which is adopted for the purpose of this study is typified by the one provided by Simon (1973). He defines technology as the "knowledge of how to do things, how to accomplish human goals". This definition brings to the fore the importance of knowledge in the process of accomplishing human objectives. There is

more in technology than machines and palpable substances, viz, knowledge stored in a variety of forms. As Simon (1973) further points out "to view technology in terms of machines and tangible substances is to mistake the shell for the snail, or the web for the spider". This definition clearly indicates that technology is not things but knowledge. The aspect of technology which the present research is concerned with, viz. management technology, is fully embodied in this definition. Management technology in this context refers to the knowledge or science of managing or controlling.

Another definition of technology is given by economists, who often use the terms "disembodied technology" and "embodied technology". Disembodied technology refers to knowledge that can be used productively by society. Embodied technology is the "hardware" arising from the application of disembodied technology for the creation and use of goods, especially capital goods. Capital goods produced in one nation may, in principle at least, be used by another nation even if the citizens of the user nation do not possess the knowledge of how and why the capital goods function. Thus, the user nation may benefit economically

from embodied technology without having to know the underlying disembodied technology. In practice, however, this distinction might be artificial. Can a nation usefully employ capital goods embodying technology without acquiring at least some disembodied knowledge? If not, it might be unable to operate, repair, or modify the capital goods as need arises. Nonetheless, it might be possible for a nation to operate and repair capital goods without acquiring all the knowledge required to design and produce them.

If technology is fully defined as the knowledge needed to perform a particular activity, the transfer of technology must then mean the utilization of an existing technique in circumstances where it has not previously been used (Gruber and Marquis, 1969); or it may mean that scientific or technological information generated and/or used in one context is re-evaluated and/or implemented in a different context. Cases of technology transfer may be between countries, or between applications. An example of technology transfer between countries is that which happened between Germany and Brazil, where Germany transferred Volkswagen manufacturing and marketing capabilities to Brazil. Transfer between applications is illustrated by the

conversion of the osmosis process used to filter salt into reverse osmosis for desalination (Graham 1982). International transfer of technology however, which this study is concerned with, is defined as the receipt and utilization in one nation of technology developed in some other nation. Transfer of technology from one nation to another implies either that persons working within the receiving nation acquire knowledge from those of the donor nation, or that knowledgeable persons from the donor nation migrate to and work within the receiving nation, even if temporarily. Transfer of technology from one nation to another can be either organized, ie initiated by the recipient; or incidental, ie initiated by donor; and can be achieved in the following ways:

- 1 a recipient nation may send students or apprentices to other nations to acquire useful knowledge and skill;
 - 2 a recipient nation might learn from the technical literature published by foreign nations;
 - 3 corporations based in the donor nation might create operating subsidiaries in recipient nations through direct investment and, by various means, transfer
-

useful knowledge to them;

- 4 a recipient nation might acquire technology through licensing contracts or outright purchase, in effect paying the proprietors of the technology in the donor nation to teach them.

The channel used for the transfer depends on the type of technology. Transfer of industrial technology to the developing nations for example takes place through two channels: direct foreign investment, and inter-firm licensing. Transfer of management technology will best be carried out through channels (1) and (2) above (Inglis, 1987c).

Technology, as has already been indicated, is both embodied and disembodied. The latter includes patents¹ which may be considered as a major incentive for domestic technological advancement. It is worthwhile to consider the role the Nigerian Government has played in encouraging the adoption of new inventions locally.

¹ Defined as a legally binding monopoly awarded by governments to inventors to exclude others from manufacturing, selling, or using the patented invention, without the patentee's consent, for a defined period of time.

4.2.1 Nigerian Patent System and Technology Transfer

The main patent legislation which governed the administration of patents in Nigeria before 1970 was the Registration of UK Patents Ordinance of 1925 as amended by the Patent Rights (Limitation) Decree, 1968. The 1925 Ordinance incorporated the then Nigerian patent system into that of the UK and made the procurement of patents in Nigeria dependent on prior UK grants.

In 1970 however, there was a major departure in the patent law and system of Nigeria, which was brought about by the promulgation of the Patents and Designs Decree, 1970 (Decree No. 60) (Yankey, 1987). The decree set up an independent patent system for Nigeria disassociated from the colonial arrangement that preceded it. The decree, unlike the preceding Ordinance, made possible the direct procurement of patents in Nigeria without any prior recourse to the UK Patent Office.

In assessing the success of the Nigerian patent system in the transfer of technology to Nigeria the factors that should be taken into consideration include the efficacy

of the system in the disclosure, spread or diffusion of new technical knowledge.

In considering the dissemination of technical knowledge as technology transfer, it can be argued that the Nigerian patent system has not been very successful. This may not necessarily be blamed only on the patent system itself, but mainly on the administration of the system. Since its establishment, the Nigerian Patent Office has been performing the function of only registering inventions, and ignoring the crucial role of serving as a technology data base including patents from other countries. For example, it does not publish any patent journal giving the details of new inventions to the general public (Yankey, 1987). It therefore seems that until the office receives the necessary resources and attention from the Government, and develops and maintains a technology information data base, it will not be able to play any meaningful role in facilitating the transfer of technology to, and its dissemination, in Nigeria.

It is therefore clear that, due to lack of a proper channel through which the Nigerian inventor can sell his

invention or initiative, most patents that are licensed in Nigeria are imported (ie international transfer of technology).

It is important to mention, however, that some domestic Nigerian inventions are of major importance especially in industrial and agricultural areas. Some of these inventions have been patented also in other countries, including the UK. Examples of these inventions include the "portable planter", developed by Moses Ige, which is used for sowing grain and is well suited to use by small-scale farmers and researchers in agricultural institutions; and the "device for planting stem cuttings" developed by Gabriel Makanjuola, which is used for planting, in particular, cassava (Yankey, 1987).

4.3 CULTURE AND MANAGEMENT PRACTICES

4.3.1 Introduction

It seems clear from the studies referred to in Chapter 3 that there are factors affecting the management of a construction project that depend on the cultural environment. This section reviews studies of the relationship of culture to management technology, and the difficulties of transferring it between cultures.

4.3.2 Culture

There are almost as many definitions of culture in the literature as there are writers on the subject. Each definition places emphasis on aspects of the environment which affect the behaviour of individuals or groups. Factors such as education, religion, language, politics, legal system, and technology are cited.

In his study of American and Mexican executives, Fayerweather (1959) defines culture as "the attitudes, beliefs, and values of a society." While this definition is enumerative rather than comprehensive, it is useful since it

at least identifies certain cultural elements. Hence, when the author speaks about cultural differences responsible for the variation in Mexican and American management practices eg. authoritative vs democratic management, it is clear that he is talking in terms of these three elements.

In a more extended definition, Owens and Martin (1986) defined culture as "the sum of those external factors which are transmitted from one generation to the next in a given society; it is a complex set of typical behaviours or standard social characteristics peculiar to a specific group, occupation or profession, sex, or social class". These external factors may change somewhat in content, priority and dominance, he adds, but they still affect the daily behaviour of those involved.

In slight contrast to the above definitions, Whitehill (1964) offers a more general description of culture as "the whole complex of distinctive features characteristic of a particular stage of advancement in a given society." This definition is not only broad, but it also draws attention to the dynamism inherent in every culture by referring to a point in time. This is important

because most scholars, whether or not they define the term, talk about culture as if it were static and unchanging, when in fact it exhibits both continuity and change he argued.

4.3.3 Management Concepts

Henri Fayol, a French management theorist, postulated that the functions of management are universal in nature. These universal functions apply in any culture (Milan, 1979). The concept is that no differences exist in managerial behaviour across cultures. The argument in this view holds that the manager's behaviour should be the same, despite cultural variations, when the functions are the same. Likert (1963) and Mouton & Blake (1970) support this concept. This is the "convergency hypothesis" mentioned in chapter 1.

While disagreeing with the concepts, Child (1982) postulates that organizations will become gradually similar across cultures; he suggested it would be more appropriate to establish universal theories for and practices in the management of multicultural organizations. Koontz (1969) on the other hand argued that management principles are

universal in particular areas, such as 'management science'. Koontz suggested that those areas where the management could be global are: network planning, utilization of rate-of-return on investment and variable budgeting. However, Koontz failed to separate management science, which is certainly fundamental (and quantitative), from management practice and behaviour, which may require some adjustment and modification between cultures.

The universalists build their assumption on the fact that the differences between managerial approaches are attributed to individuals' perception and to organizational differences, rather than to variations in cultural background.

This belief, considered to be of the 1970s, has waned. Slowly it has become clear that differences in environmental or cultural values do matter in management.

A study by Wright (1971) based on matched pairs of companies in Chile provides support for the environmentalist as against the universalist view. The conclusion of the study was that the locally owned firms were doing better

than their American counterparts. A study of the internal operations of the firms revealed that the US firms were operated essentially according to guidelines set down by the parent company's headquarters, whereas the management philosophy of the Chilean firms was "based on highly individualized patterns of policies and practices, usually characteristics of the personal value systems of the President and local boards of directors of those firms". These basic differences appeared to affect the basic ability "to adapt to the conditions of the Chilean environment in at least two different ways:" (1) the US firms had a more complex and costly management structure, and (2) the US firms responded more slowly to rapid changes in the environment.

Different view was expressed by Negandhi (1983), who argued that industrial and technological diversity has the predominant effect on managerial differences. He emphasized that variations in management practice and style across countries exist, but there is a move in his study to explain the diversity in terms of technological and economic discrepancies rather than a cultural variable. This view

implies that international differences in management will be eliminated as nations of the world converge and become equally industrialised, and as managers everywhere are forced to use the same methods and tools in the performance of their managerial duties.

In support of this idea Kerr *et al* (1964), although they did not deny the impact of culture, insisted that cultural variables provide less significant explanations of managerial differences than the stage and pace of industrial development. Insofar as industrialization tends to create a universal culture of the work place, managers, irrespective of their countries, will tend to behave according to the demands of industrialization. As a result, so runs the argument, managers operating in similar economic environments will tend to behave alike, while those working in dissimilar economic environments will tend to behave differently. Hofstede (1980), however, found in his research, which was carried out in 40 countries around the globe, that successful leadership style varies from one country to another regardless of the economic situation.

Other cross-cultural researchers have also advanced the thesis that socio-cultural factors are the real obstacles in introducing advanced management practices and know-how into industrial enterprises in the less developed countries (Farmer and Richman, 1965). Granick (1964) in a similar study described how managers' attitudes and behaviour are related to their different backgrounds concerning social class, ethnic origin, education and age. One might add that several of the studies reviewed also incorporate a sociological approach to the extent that they bring up the 'background' of managers (mainly, social class, ethnic origin, education and age) to explain attitudes and behaviours.

In his rigorous, empirical study, McClelland (1961) examined the relationship between economic development and the achievement motive in five countries. He found a significant correlation between need-achievement and entrepreneurial endeavour in these countries. He concluded that differences in need-achievement² levels are responsible

² Need-achievement was defined as the desire together with the capacity to pursue set objectives and goals until they are accomplished.

for variations in economic effectiveness abroad. He also investigated the need for affiliation with others and the need for power over those, but he concluded that they did not explain economic development as well as the achievement-need. In line with this result, Hagen's *On the Theory of Social Change* (1967) was also concerned with the process of economic growth in different societies and with factors responsible for generating such growth. He investigated sociological, anthropological, and psychological factors, and found psychological factors to be the most significant ones in the transformation of a traditional society into one where economic change occurs. He concluded: "The interrelationships between personality and social structure are such as to make it clear that social change will not occur without change in personalities." He singled out 'innovators' as agents of this change. The implication of his theory for comparative management is clear: managerial differences among nations are best explained in terms of personality variables such as 'inferiority complex.' According to Hagen, the 'anxious innovators' are stimulated by a psychological factor which results from the 'withdrawal of status respect.' Rejection by the larger society that

this social group of innovators feels, he argued, produces in them the 'inferiority complex' which, in turn, releases their creative energies which are directed toward bringing about necessary social change.

4.3.4 Cultural Dimensions and Project Management

Schaupp (1978) stated that it is a premise of cultural scholars that "international, attitudinal and behavioural differences are the result of divergent values within different cultural spheres". Research was carried out by Högberg and Adamson and presented at INTERNET 83, and also by Hofstede (1983) between 1967 and 1978 and presented at INTERNET 82 (Riis *et al*, 1982) in Copenhagen. It involved 116,000 respondents to questionnaires from fifty three countries, including Nigeria and the UK, and showed that those questions dealing with values were answered with remarkable and very stable differences between countries. Hofstede's work identified four dimensions of national culture that could affect project management. These are:

individualism and collectivism,
large versus small 'power distance',
strong versus weak uncertainty avoidance,
masculinity versus femininity.

The cultural dimensions in project management will therefore be reviewed under these headings.

(a) Individualism and Collectivism

The fundamental issue here is the relationship between an individual and his colleagues. At one end of the scale are societies in which the ties between individuals are very loose. It is expected that every individual will look after only his own self-interest, and maybe also the interest of his immediate family. At the other end of the scale are societies in which the ties between all the individuals are very tight. People are born into collectivities or 'in-groups' which may be their extended family, their tribe or their village. Everybody is supposed to look after the interest of his in-group, and to have no opinions and beliefs other than those of the in-group.

Both the individualist and the collectivist society are integrated wholes, but the individualist society is loosely integrated, while the collectivist society is tightly integrated.

Hofstede's results suggest that the degree of individualism in a country is strongly related to that country's wealth. That is, wealthy countries are individualistic and poor countries are collectivistic. Very individualistic countries include the USA, UK and the Netherlands; very collectivistic countries are those such as Colombia and Pakistan. Nigeria was classed as a collectivistic society. In the middle are Japan, India, Austria and Spain. The relationship between wealth and individualism is, of course, statistical: there are exceptions to the rule.

Project management basically aims to set up flexible, temporary systems to achieve a task. It is very much task-oriented, and people are expected to be motivated by their part of the task for the time they are associated with it; and then to move on to another task, which probably means associating with other people. In project management, very clearly, the task is central, relationships are peripheral and fluctuating. Project management is an idea born of an individualistic culture (Hofstede, 1983). If project management is therefore used in a more collectivistic culture, much more attention must be paid to

the relationships among the people on a project. Existing and stable crews should be involved rather than individuals, and the project teams should be formed of people belonging to the same group, tribe or family.

(b) Power Distance

Power distance reflects how society deals with inequality. People are unequal in physical and intellectual capabilities, and some societies accept that such inequalities lead to inequalities of power and wealth. The latter may become hereditary, and no longer related to physical and intellectual capacities.

Other societies try to play down inequalities in power and wealth as much as possible, despite the diversity of capabilities. No society, however democratic, has ever reached complete equality, because strong pressures exist within it to continue the imbalance.

In organizations, the level of power distance is related to the degree of centralization of authority and the degree of autocratic leadership. Features such as centralization and autocratic leadership are rooted in the

minds of the members of a society, not only of those in power but also of those at the bottom end of the power hierarchy. Societies in which power is distributed unequally remain so because this situation satisfies the psychological need for dependence of the people without power. Societies and even corporations will be led as autocratically as their members will permit. The autocracy is just as much in the members as in the leaders: their value systems usually represent one integrated whole.

(c) Uncertainty Avoidance

Uncertainty avoidance is an attempt by society to deal with the fact that time runs only one way; that is, we are all caught in the reality of past, present and future and we have to live with uncertainty because the future is unknown and will always be so.

Some societies teach their people to accept this uncertainty and not to become upset by it. People in such societies will accept each day more easily as it comes. They will take life rather easily, and possibly not work hard. They will be relatively tolerant of behaviours and

opinions different from their own because they do not feel threatened by them. Such societies are weak-uncertainty-avoidance societies; their people have a natural tendency to feel relatively secure, even though others may see them as living in a "fool's paradise."

Hofstede (1983) illustrated that the dimensions of power distance and uncertainty avoidance are very important for understanding how organizations work in different parts of the world. His illustration was by the following experiment. The same description of a project management organization problem was given to a group of French, a group of German, and a group of British management students. The problem described a conflict between two departments. The students were asked to determine what was wrong and what should be done to resolve the problem. The French (classified as having large power distance and strong uncertainty avoidance) largely referred the problem to the next higher authority level. The Germans (classified as having small power distance and strong uncertainty avoidance) suggested the setting of rules to avoid such problems in the future. The British (classified having as

small power distance and weak uncertainty avoidance) wanted to improve communication between the two department heads, for example, by some kind of human relations training. The conclusion was that the model of an organization for the French was essentially a pyramid of people: a hierarchical structure held together by the unity of command (larger power distance) as well as by rules (strong uncertainty avoidance). The model for the Germans was a well-oiled machine: the exercise of personal command was largely unnecessary because the rules settled everything (strong uncertainty avoidance, but smaller power distance). The model for the British was a village market: no decisive hierarchy, flexible rules, and a resolution of problems by negotiation (small power distance and weak uncertainty avoidance).

Project management is usually most successful when it follows a village market model of organizations. Hierarchy is not the ultimate criterion in decisions; most participants are in two hierarchies at the same time, a functional hierarchy and a project hierarchy; the people involved must have a tolerance of ambiguity and a sense of

resolving conflicts by negotiation, with the ultimate interest of the project as the overriding criterion. Hofstede (1983) argued that this does not come naturally in societies to which a pyramid, machine or family (large power distance and weak uncertainty avoidance) model of organization is dominant.

(d) Masculinity-femininity

In masculinity versus femininity, the fundamental issue is the division of roles between the sexes in society. All societies have to deal with the basic fact that about one half of mankind is female and the other male. In some societies it is believed that the only activities that are strictly determined by the sex of a person are those related to procreation: men cannot have babies. However, in other societies they have assigned some roles to men only, or to women only. This is believed to be a social, rather than biological, sex role division.

All social role divisions are more or less arbitrary, and what is seen as a typical task for men or for women varies considerably from one society to another.

Hofstede (1983) gave the example that most dentists in Belgium are female but in Holland they are male. The important aspect of this is the extent to which societies allow both men and women to take many different roles.

Although the degree of masculinity or femininity in a country is of importance to the citizens, there is as yet no evidence that differences in this dimension are relevant to the success of project management.

4.4 PROBLEMS OF MANAGEMENT (CONSTRUCTION) TECHNOLOGY TRANSFER TO NIGERIA

The transfer of 'management technology' ie the technology of getting results through better organization and control, is aimed at improving the capacity of managers in a developing country to respond to the demands of economic development. The adaptability of management practices developed for one country to that of another has many impediments.

Some of the more obvious problems of management technology transfer, which broadly apply to many developing countries and particularly to Nigeria, can be grouped under the following headings: conflicting value systems; inappropriate transfer agents; and unrealistic expectations.

4.4.1 Conflicting Value Systems

Because each culture has developed independently in a situation uniquely different from that of any other culture, there are inevitable basic differences. As Lincoln (1981) noted "enough management failures have occurred to demonstrate vividly that wholesale application of

'rational', 'normal' Western principles and techniques simply can not be expected to bring automatic success in less developed countries."

The key to the problem is in the fundamental differences in cultures. Cultural values can have an important influence on the success of any enterprise. "Unless they are fully understood both in their existence and in their ability to influence thought and action, they become culture blinders which prevent real understanding and appreciation of foreign cultures" said Wallin (1976). Arensberg and Niehoff (1964) also observed that "relevant cultural values, if not recognized in their impact on our manner of thinking and acting, can, despite our attempts at 'understanding' the foreign culture, act decisively as culture blinders".

The differences between Nigerian culture and that of Western society, particularly the UK, from where most of the management principles are borrowed, will be easily understood if some of the Western style management principles are examined. Adler (1986) and Ronen (1986) both

observed that even relatively value-free³ Western management techniques are not entirely value-free. Many are biased towards such value-loaded concepts as 'rewarded achievement', 'wage motivation', 'individual accountability', and 'productive efficiency.' They both believed that to an unknown degree, these values may be responsible for the past success of Western management methods. The problem is that these values are not universally shared.

Nepotism, a practice prevalent in many less developed countries, is one of the major cultural differences from the West. The employment and promotion of family or tribal relatives is a practice often repudiated by management experts, who recommend practices that are oriented more towards performance and merit. However, if these experts were to examine the circumstances underlying such nepotistic practices, their total condemnation might be mitigated. What one often discovers is that in countries where such practices are prevalent, members of the privileged groups may be the better educated and socially

³ ie techniques that pay little attention to cultural values.

polished individuals in the country. Frequently such group members are well trained because of the support they receive from their elders, and are therefore better placed for employment.

However, because of the foregoing, social prestige systems in such societies often lean toward 'ascriptive' rather than 'achievement' related values. Where the former are predominant, employees may sometimes be rewarded according to 'who they are' rather than to 'what they accomplish.' In these cases family position, education level, and personal contacts are more important than 'results.' Much of a public office holder's energy may be expended in establishing a network of friends and supporters - often via the judicious distribution of organizational rewards. In certain instances, the officer may also be called upon to favour those with ascriptive characteristics similar to his own. These may be members of the officer's family, tribe, or religious affiliation. Employment and promotion based on ascriptive characteristics may not only be considered acceptable, but also may be viewed as morally commendable in such societies as Lincoln (1981), rightly in my view, noted in his investigation.

The Western belief in 'wage motivation', and also the 'protestant ethic', that to work is virtuous in its own right, may run counter to local economic realities. The most obvious difficulty is the scarcity of available funds due to low productivity, or to government attempts to hold the lid on 'wage-push' inflation. In some cases, however, incremental wage and bonus schemes can still be effective, especially with lower level employees. The more intractable cases occur when wages represent only part of the individual's income. An executive level position, for example, is seen by members of the elite class, whose main income flow is derived from other businesses, as an opportunity for making contacts to boost business.

Another problem is that of honesty. Certainly no country has a monopoly of honest people. However, the prevailing standards of honesty appear to be different in certain societies from those in some industrialised nations. There may be various reasons for this, such as poverty, low salaries of government officials, lack of efficient means of tracking fraudulent people and others. But whatever the reason, the untrustworthiness of many employees weakens any argument that they would be prepared to improve their

performance for a meagre bonus payment unless their peculiar circumstances were seriously considered.

In Nigeria, the evident over-centralization of decision making involves a chain of people (see Figure 8.4, in Chapter 8), and in essence helps to diffuse rather than pinpoint responsibility. The concept of "individual accountability" can be seen to run counter to this mode of decision making. By the time a decision is reached, "not one man, but all those who took part in the process have become responsible for the decision. Responsibility has been diffused and all are committed to success" noted Stifel *et al.* (1977) in their work on developing countries' management training. In this environment, strict accountability in the Western Management by Objectives (MBO) fashion is not considered desirable by business and public executives as no one person can be blamed for failure.

The final example of conflicting values concerns the Western ideal of 'efficiency'. This is generally construed to mean maximum output per unit of labour. It has been argued that this value is a direct descendant of the 'Protestant work ethic' (Weber, 1958). To some extent, the

local preference for leisure may be influenced by poor wages or undesirable working conditions, but preference to attend family or group engagements may count for much more than work. Hofstede (1985) observed that "preserving face, that is, preserving the respect from one's reference groups, is the collectivistic alternative to preserving self-respect in the individualistic cultures". In individualist work organizations, the task comes before the relationship; in collectivistic work organizations, the relationship has precedence over the task.

4.4.2 Inappropriate Transfer Agent

Most process-and-person embodied techniques can be theoretically "acquired" simply by purchasing one or more management handbooks, as the majority of such techniques are not governed by patents or royalty agreements. Ample literature is available regarding practical problems or implementation. In reality, however, their true accessibility is limited by the fact that they are difficult to implement without formal training and on-the-job experience (Lincoln, 1981).

Inglis, (1987c) noted that "if there is to be any meaningful 'Transfer of Technology' to Third World countries, then the young people from these countries will require not only to read for degrees but also to undergo periods of work experience. The sandwich type of course, which encompasses both academic study and work experience, is perhaps the most economical and effective method of achieving the desirable 'Transfer of Technology'". Inglis was referring to the transfer of quantity surveying practice to the Third World. This implies that in some instances a single transfer medium is not appropriate or even not suitable. Management technology is practice oriented and therefore needs to be transferred by both academic and practical means.

The transfer agents involved in the first wave were primarily colonial administrators. The transfer process they employed was less one of management development than of bureaucratic transplantation. In spite of the negative aspects of colonial rule, the results of this first wave were rather remarkable. The major drawback was that the resulting systems were primarily designed to "administer" policies and programs created by the colonial authorities,

rather than to design and develop "management capacity" to respond to local needs. As a result, "the colonial legacy generally was one of lagging management innovation", observed Lincoln (1981).

4.4.3 Unrealistic Expectations

The successful transfer of management technology, especially in economic development planning, where technical assistance teams are involved in the transfer process, can be hindered by the existence of unrealistic expectations. The first of these is excessive time optimism. This tends to place an undue burden on the task team and their counterparts, and to reduce the potential for lasting change. Secondly, the transfer agents may be misled by the unrealistic tendency of the host institution executives to pose as enlightened and benevolent in their field, as the team would wish. Merely because an agency is eager to receive the benefit, eg technical assistance, does not necessarily mean they are eager to introduce changes (Lincoln, 1981).

The third problem is that technical assistance teams tend to believe what they are told by host institution representatives. In many cases, however, what they are told does not reflect reality. This is not to imply that host institution representatives are misrepresenting the facts. Rather, technical assistance teams are often unfamiliar with the degree of formalism found in the institutions of less developed countries (Riggs, 1964). This problem may be characterized as one in which formal goals, policies, and procedures are not put into practice.

The problem for technology transfer arises when institutional formalism is overlooked. In such cases the technical assistance team may spend a good deal of time revising current procedures, which are never followed; and preparing detailed programs that, as with their predecessors, will be reviewed by executive committees, issued over the signature of the top executive, and seldom if ever implemented.

4.5 DISCUSSION

Indigenous technology development in Nigeria has so far been a slow process. Clearly, the current situation suggests that neither technology transfer by itself, nor indigenous technology development, offers complete hope for long term development in Nigeria.

A rise in the capacity of the developed countries to develop indigenous technology and effectively assimilate and utilize imported technology is a potential source of expansion in world trade, and an important precondition for their long-run income growth (Thomas, 1988). Such technical capacity expansion requires, in addition to international support, a reorientation of government funding for research towards encouraging practical applications in industries.

Commenting on the USA economy, Professor Peter Drucker (1980) of Claremont Graduate School in California, an authority in Business Management, has asserted that it is the productivity of knowledge which provides the key to industrial productivity, competitive strength and economic achievement. "Knowledge has .. become .. the industry that

supplies the economy [with] the essential and central resources of production".

Japan's successful model of economic growth and development in recent times is attributed to her systematic post-war purchase of technologies from the Western advanced countries (Ohene-Manu, 1987). Ohene-Manu further asserts that Japan's choice of technology was greatly facilitated because she had a pool of dedicated and competent scientists and engineers to ensure that the incoming technologies were adapted to Japanese societal and environmental specifications. Lockwood (1981) cited the Japanese experience where he argued that less developed countries cannot "simply import the industrial revolution from abroad, uncrate it like a piece of machinery and set it in motion".

The issue of main significance is that, whereas (disembodied) technology is transferable directly from the developed to the less developed countries, it must be adapted to suit the users societal objectives and values, otherwise technology transfer becomes specious.

Technology has transformed what were once crude, primitive and predominantly agrarian economies into rich

industrially advanced and powerful nations. For such a change the application of technology for economic development activities is essential.

Economic development in Nigeria can improve with the rapid acquisition and use of those foreign technologies that are compatible with, or adaptable to, the social and cultural setting of the country. Equally important, local technological development efforts should be encouraged by government, through the improvement of facilities for research and development.

Having discussed the various cross-cultural studies which interpreted management differences between cultures, it is very difficult to rank the variables or even identify those which have the greatest influence on managerial behaviour. It is, however, possible to synthesise the different arguments into four "schools of thought":

- 1 the universal school
 - 2 the economic school
 - 3 the sociological/psychological school
 - 4 the cultural school
-

Scholars such as Fayol (see Section 4.3.3) believe that managerial behaviour is similar worldwide, and that proven management principles can be applied anywhere to achieve similar results. Economists think that the level of industrialization determines differences and similarities in managerial behaviour across cultures. They argue that since all modern societies, by necessity, must obey the logic and imperatives of industrialization, differences in managerial behaviours and practices among nations can best be explained by their level of economic development. Other scholars presume that sociological/psychological aspects account for managerial differences. These two aspects are associated because of the close interaction between them. These scholars believe that management practice differences can be explained by either 'class or elite' and personality traits. Finally, other scholars strongly believe that cultural differences are the major determinant of managerial differences around the world. Cultural scholars believe that managerial differences will remain a permanent feature as long as differences in culture are found.

All schools except the universal school of thought can be grouped as environmental, and they all contribute to the explanation of the differences between Nigeria and the UK. The environmental factors that influence the adoption of Western project management practices in Nigeria can be summed up as: level of literacy or lack of qualified personnel; overcentralisation; economic; inequality; and collectivism.

A low level of literacy, or lack of enough trained persons, reduces the ability to implement or adapt any imported technology effectively. Overcentralization is a crucial backbone in hindering proper accountability, and constitutes a major environmental difference from the West. A low level of economic well-being of a society not only deters development programmes, but also encourages "brain drain" of the few qualified personnel of a society to greener pastures. The sociological problem of inequality affects progress in the developing world negatively, especially in legal matters. If a legal system falls short of according justice to citizens' irrespective of their social class it creates much scope for abuse of power. A

consequence of collectivism is nepotism, which was already shown to conflict with western values, hence hindering the adoption of some Western style management practices. The role played by these factors will be further analysed in Chapter 8. The cultural differences that have just been discussed and which hinder the transfer of management technology between countries, provide a basis for many of the reasons for project overruns included in the questionnaire.

CHAPTER 5

CONSTRUCTION PRACTICE OVERVIEW

5.0 INTRODUCTION

A considerable number of authors have written on the management and control techniques for construction projects in general, and the various contractual arrangements and forms of contract. The literature review chapters have summarised the difficulties in implementing in developing nations management techniques that have been developed for the industrial countries. This chapter presents the existing theory in those fields, in relation to public sector practice in Nigeria and Scotland. The extent of usage of the different techniques in Nigeria and Scotland will be discussed in the light of responses to the "ordinal components" of the questionnaire in Chapter 8, to show which techniques are not practiced in the developing countries, or are inappropriately practiced.

5.1 PUBLIC SECTOR INVESTMENT APPRAISAL

5.1.1 Introduction

Projects in the public sector of the economy comprise those undertaken by the nationalised industries and by central and local government. The principles of economic evaluation are basically the same as in the private sector. Appraisal is about looking for value for money from the resources available. Following proper appraisal, a project may sometimes be procured at lower cost than otherwise. Appraisal may be applied to investment projects, to the review of existing assets, to the setting of standards, to the choice between alternative current expenditures, and to general policy analyses.

Project appraisal is therefore a systematic approach to expenditure decisions. It entails deciding clearly upon the objectives of an expenditure proposal, considering the various ways of meeting them, and working out and presenting the costs and benefits of each option. It encourages managers or agents to question and justify what they are doing. It sets the scene for thinking rationally about the use of resources. It is particularly important when there

is severe restraint on public expenditure. Appraisal is therefore particularly necessary in most developing countries.

Investment appraisal, as opposed to project appraisal, is so called because its techniques have been developed to quantify the relative merits of options. Its principles apply to any specific proposal for spending money, and to the use of any other resources for which a money equivalent can define.

Appraisal in the public sector is concerned with the best use of the nation's resources. Often (for example, in the choice of technique for securing a given output) virtually all the costs and benefits of a project may fall on the appraising department or organisation. However, in other cases they fall partly, or perhaps entirely, outside it. In the case of a public road investment, for instance, most of the benefits may accrue directly to the private sector. Similarly, private costs and benefits may be affected by decisions about the quality or location of a service provided by the public sector.

It is useful to show how the costs and benefits are allocated among different organisations, sectors of the economy, or individuals, by the appraisers, but attention is often given in public sector decision making to the public expenditure implications only, as distinct from the costs and benefits accruing to the economy as a whole. There are sometimes good reasons why public and private costs and benefits should be given different weightings, but it is generally correct to consider them as having equal importance. The nation exists not only as taxpayers, but also as organisations and individuals who benefit or suffer in various ways from government decisions.

All investment appraisals in the public sector are concerned with costs or benefits to the national economy, but they differ from private sector appraisals in the way benefits are measured, and in the attention given to benefits which cannot be measured directly in money terms. The common types of appraisals are described below.

5.1.2 Traditional Methods of Investment Appraisal

Lumby (1987) defined an investment decision as one which involves an organisation in making a cash outlay with the aim of receiving cash inflows in return. The so-called traditional methods are the Pay-back Period, and Return on Capital Employed. Although these methods are used mostly in the private sector, they are worth mentioning because of their popularity in the field of investment appraisal. Improved methods which take into account the "time value of money" will be discussed in section 5.1.3.

5.1.2.1 Pay-back Period

The Pay-back Period is one of the most tried and trusted of all appraisal measures. Its name neatly describes its operation, referring to how quickly the incremental benefits that accrue to a company from an investment payback the initial capital invested. The benefits are normally defined in terms of cash flows after tax.

Companies frequently require that the initial outlay on any project should be recoverable within some specified

period. The payback period of a project is estimated by calculating the number of years it is expected to take before cumulative forecasted inward cash flows equal the initial investment (Brealey and Myers, 1986).

The pay-back method can be used as a guide to investment decision-making in two ways. With a straight accept-or-reject decision, it can provide a rule whereby projects are only accepted if they payback the initial investment within a certain chosen time. In addition, the pay-back method can provide a rule when a comparison is required of the relative desirability of several mutually exclusive investments. In such cases projects can be ranked in terms of 'speed of pay-back', with the fastest paying-back project being the most favoured, and the slowest paying-back project the least favoured. Thus the project which is calculated to pay back quickest would be chosen for investment.

This appraisal procedure has the advantage of simplicity of calculation, provided the input data is available, and can be easily understood by management. The pay-back period can become a dominant short-run

consideration for companies with only limited supplies of cash available. Additionally, concentration on speed of return is often viewed as being in accord with management's wish to avoid or minimize risk. The investment decision is made on estimates of future cash flow, and the further ahead the estimates are forecast, the less reliable they become. Selecting the fastest repaying project usually means selecting the least risky one. From a theoretical point of view, the advantages of the pay-back method are not fully justified (see below), but the procedure may be reasonably valid for some practical purposes.

On the other hand, there are obvious disadvantages. The first arises from the ambiguity of the term 'initial investment'. The initial investment in a project may be small, compared with further investments at later dates.

Another problem with the method is found in setting the maximum acceptable period criterion. This is because there may be no objective way to determine it.

A further problem arises from the fact that the decision depends solely on the cash flows that occur within

the pay-back period, and cash flows that occur outside it are ignored.

The pay-back method gives equal weight to all cash flows. For a lengthy project, decisions taken on this basis may be misleading, as the concept of "time value of money" has not been introduced into the appraisal.

5.1.2.2 Return on Capital Employed

The second traditional approach to investment appraisal is the Return on Capital Employed (ROCE). In its basic form, it is calculated as the ratio of the annual accounting profit generated by a project to the required capital outlay, expressed as a percentage.

The measure is normally expressed as the ratio of the forecast average annual profit generated over the life of the project to the average annual capital employed, and stated as a percentage.

The ROCE calculation can be used as an investment decision guide in two ways. Firstly, it can help in a straightforward 'accept or reject' decision by providing a rule that projects may only be accepted if their ROCE

exceeds some minimum or target rate of return. Secondly, in a decision situation where projects have to be placed in an order of investment preference (eg when several investment alternatives are mutually exclusive), the higher a project's ROCE, the more it is to be preferred.

The method is preferred to pay-back because, given reliable data, not only is it relatively quick and easy to calculate, but it also produces a percentage rate of return - a concept with which financial management is familiar. In addition it overcomes the greatest criticism of the pay-back method, by considering the profit flows over the whole of a project's life.

Nevertheless, to set against these advantages, there are a number of disadvantages. The first is, again, the ambiguous nature of the ROCE concept. There is no general agreement on how capital employed should be calculated; on whether initial or average capital employed should be used; or on how profit should be defined. As a result, the method lays itself open to abuse as a technique of investment appraisal by allowing the decision maker to select a definition of ROCE that best suits his prejudgment of a

project's desirability. The second is that although the method takes into account the profit flows over the whole of a project's life, it ignores the complication of differing lengths of life. When comparing alternative projects, a difference in length of life, for example, of the building, may be of crucial importance for a number of reasons, concerned with uncertainty, liquidity, or technological change.

Finally, the most important criticism is that the ROCE ignores the time value of money.

5.1.3 Discounted Cash Flow (DCF) Methods of Appraisal

There is no doubt that the DCF method of investment appraisal involves considerably more arithmetic than either the return on capital employed or the pay-back period methods. It does not, however, have the main faults of these two methods, and the additional arithmetic is therefore usually justified (Woodward, 1975). In any case, computations by machines are readily available.

Two basic measures arise from DCF methods of investment appraisal: the Net Present Value (NPV) and the

Internal Rate of Return (IRR). The principle upon which DCF evaluations are based is that money has a value related to time, arising from the possibility of payment of interest.

Allowance for the time value of money is achieved through 'discounting' the cash flows. The process of discounting is that of compound interest "worked backwards". The present value at the end of t years from now of all forecast receipts and expenditures is calculated by multiplying them by $1/(1+d)^t$ (Little and Mirrlees, 1988), where $100d$ is the percentage rate of discount, and adding. Thus, by this process of discounting, expenditures and receipts which occur at different times within the duration of the project (and are to this extent incomparable) are all revalued, as if paid at the starting date of the project.

5.1.3.1 Net Present Value (NPV)

The NPV investment appraisal method works on the simple but fundamental principle that an investment project is worth undertaking only if the present value of all future cash receipts from the project is at least equal to the present value of all the investment outlays (Glautier et al,

1981). This method therefore requires a forecast of future net cash flows, year by year, which may then be discounted at an appropriate rate. Usually, this discount rate is the minimum that the investors would expect to obtain otherwise than by investing in the project. The NPV is thus the present value after all expenditures, as well as receipts, have been discounted back to the present. The project must usually have a substantial positive Net Present Value if it is to proceed.

5.1.3.2 The Internal Rate of Return (IRR)

This method requires a forecast of all future receipts, to be discounted back to the present, as in the Net Present Value method. Instead of discounting these receipts by some minimum rate of return, a value is chosen so that the PV of the receipts exactly equals the PV of all investments, discounted back at the same rate, that is to say, the NPV is zero. If the discount rate established in this way is greater than the cost of capital, that is, the market rate of return expected by investors, the project is accepted.

Both the measures of appraisal based on the DCF concept are generally regarded as more "realistic" than the traditional measures. The choice of acceptable NPV or IRR depends mainly on financial circumstances of the firm, and involves matters of detailed accountancy.

5.1.4 Cost Benefit Analysis (CBA)

HM Treasury's publication "Investment Appraisal in the Public Sector, (1984)" described cost benefit analysis as the most sophisticated kind of appraisal technique; which quantifies in money terms as many of the costs and benefits as possible, including those that are non-marketed, or where market value does not reflect their economic or social value.

Valuation of non-marketable outputs is undertaken only in the few areas where there are widely accepted methods for doing it, notably road construction. Translation to market value is more common in, for example, the analysis of aid to other countries, and energy policy (HMT, 1983). On the other hand, cost benefit analysis is rarely used by trading bodies. In general, it is applied in commercial areas only where the decision concerns a

project so large that it becomes a matter for government, as well as for the trading body itself.

Cost benefit analysis is suited only to those cases where there is sufficient and sound information on which to base it, and where the scale of the proposed expenditure justifies expenditure on the cost benefit analysis itself (HMT, 1983). The evaluation of alternative plans for public sector investment is one step in the planning process. It is assumed that the planning process should be rational (Hill, 1988). Rational planning is defined as a process for determining appropriate future action by utilizing scarce resources in such a way as to maximize the expected attainment of a set of given ends (Davidoff and Reiner (1962) and Meyerson and Banfield (1955)). Cost benefit analysis was developed as a technique to serve this very purpose. It was originally conceived during the 1930's and 1940's for the evaluation of alternative courses of action in the design of water resource projects and served the single goal of economic efficiency. McKean (1958) defined the goal as the maximization of the net project contribution to the national income.

The cost benefit model was conceptually derived from the theory of the firm and the endeavour of the firm to maximize its profits. Faced with the need to choose from a number of projects, the profit-maximizing entrepreneur compares the profitability of alternative projects by determining the profits (considered over an extended period of time) of each project, calculated on the basis of the monetary revenues and costs predicted to accrue, and relates these to the capital invested. He then chooses the most profitable projects. In the case of limited resources, the entrepreneur allocates his resources by developing projects to the point where marginal revenues equal marginal costs. According to welfare economic theory (Baumol, 1961), "such private profit maximization by individual firms in an economy of pure competition¹ leads to optimal community welfare".

In an analogous manner, cost-benefit analysis can be conceived as a process whereby a public agency in pursuit of economic efficiency allocates its resources in such a way that the most "profitable" projects are executed and

¹ This is not feasible in a real life situation

developed to the point where marginal benefits equal marginal costs. Thus the last pound invested in a project brings a marginal economic return at least as high as that possible were the funds spent in some other way. However, so direct an extension of the private allocation model to allocation in the public sector raises a number of problems. The private and public models are analogous only if (i) no barriers exist to flow of funds and resources, (ii) benefits and costs can be determined at competitive market prices, (iii) there are no external economies or diseconomies, and (iv) no other external effects (either cost or benefit, eg pollution) exist.

These conditions are rarely evident in the public sector (and seldom in the private sector). The existence of a public sector in a free enterprise economy is justified, in part, by the absence of some of these factors. Public resources are limited, and barriers to the flow of funds and resources do exist in the public sector. The value of benefits and costs cannot all be expressed in market prices. Some cannot be quantified even in non-monetary terms. External effects and indivisibility are particularly evident in investment in the public sector.

Hence cost benefit analysis of alternative investments in the public sector should take note of social costs and benefits as well as private costs and benefits. It should be able to guide public action when market prices alone do not accurately reflect the consequences for society of a public investment; or when, by virtue of the indivisible nature of collective goods, no market exists from which to observe objective evidence of the community's valuation of the social marginal product. The analysis should also be designed to register the value of other products or inputs that arise from externalities and interdependencies.

When costs and benefits cannot be expressed in market prices, the cost-benefit model imputes prices as if they were subject to market transactions. In order to take into consideration social costs and benefits, the analysts are required to "compensate for the rigidities and defects of the market which prevent market prices from being reliable" (US Federal Interagencies Committee on Water Resources). When imputing market prices, the analyst should distinguish between those items that are ordinarily evaluated in the market because they are often produced

privately; those that are never evaluated in the market, but are subject to monetary valuation; and those that are outside the scope of the market and cannot be priced in monetary terms. The last class of goods and services are "intangibles".

Although lip service is generally paid to consideration of the intangibles, usually they do not actually enter the analysis. The net result of this is that the effects of the investments that can be measured in monetary terms (whether imputed or derived from the market) are treated implicitly as being the most important effects. In fact, the intangible costs and benefits may be more significant.

Furthermore, the conversion of some consequences into monetary terms and the restriction of the evaluation process to an economic analysis, may lead to an erroneous decision resulting from the confusion of the original purpose of a course of action with its secondary consequences (Galbraith, 1965). For instance, if the major purpose of an urban public park is first, to provide recreation services of a particular quality for the local

population, and second, to structure the development of the city, how likely is a recommendation based solely or primarily on changes in adjacent land values, tourist expenditures, and so forth, to lead to a realisation of the first objective? In this respect Galbraith (1965) has said

"Economists and politicians still measure accomplishment by indices relevant to the popular concern of the past.... If the gross national product grows adequately and unemployment declines, this, pro tanto, means success. If our cities, at the same time, become unlivable in part as a product of this growth and the smoke, sewage, trash and traffic that it spawns, that is unfortunate but not highly relevant."

The Cost Benefit Analysis method was designed not only to choose the course of action that maximized "economic efficiency", but it was also assumed that economic welfare would thus be maximized. Evidently, this assumption is rarely justified.

Thus, whereas Cost Benefit Analysis identifies the most efficient course of action, it is questionable whether this course of action also maximizes economic welfare. The achievement of maximum economic efficiency is most likely to be seen to be accompanied by the achievement of maximum

economic welfare in those public activities that most closely approximate private economic activity, and have well-defined products subject to market transaction.

Cost Benefit Analysis is, therefore more suitable for ranking or comparing courses of action designed to attain roughly the same ends rather than for testing the absolute desirability of a project.

This is partly so because all estimates of benefits and costs are subject to errors of forecasting. An even greater limitation is the difficulty of obtaining a quantitative measure of desirability. Thus, economic Cost Benefit Analysis cannot really provide guidance in the allocation of investments among the various public sector activities, such as transportation, education, or housing. Given two diverse projects, eg a school and a road, each costing the same amount, and a budget sufficient to build only one of them, Cost Benefit Analysis can, in fact, give no guidance in the choice.

5.2 TENDERING METHODS AND PROCEDURES

5.2.1 Introduction

The purpose of any tendering method is to obtain for the Client a suitable tender from a contractor who will be appropriate for the particular project. The Client should make a deliberate decision as to the best tender procedure for the project, and the best tender so obtained should form the basis for letting the Contract. The Client should act on the advice of his professional advisers and take into account all relevant circumstances. The effect of different methods of tendering was shown to have influence on project performance (Chapter 3). In considering which approach to inviting tenders would be most appropriate, the Client should consider the following factors (Hancock, 1984):

- 1 The size and complexity of the project.
 - 2 The building type, eg offices, or housing etc.
 - 3 The likely method of construction, eg traditional or industrialised.
 - 4 The time available before a start on site is required.
 - 5 The time required to complete the project.
-

- 6 The likely involvement of the contractor in the design process.
- 7 The availability of contracting and professional resources.

The above factors which have to be considered when choosing a method for selecting a tendering procedure demonstrate why differing tendering methods have evolved to meet different situations.

One of the most important considerations before deciding on a tendering procedure is whether or not the contractor has a contribution to make to the design process and, if he has, when this contribution should be made. The time and method of selection of the contractor is considerably influenced by this. If it is desired to involve the contractor in the project design, it is essential that he is appointed early. Should the design be already completed it will rarely be possible to adapt the design to incorporate a contractor's system of construction or proposals, as such changes may not be compatible with the existing design.

Another important consideration is the question of risk. The Client, from the earliest stages of a building project, becomes open to risk, regarding planning approval, relaxation of building regulations, letting or selling of the building, and coping with unforeseen circumstances, such as strikes or a change in interest rates. The Contractor may be required to carry some of this risk, and will therefore adjust his price accordingly.

Essentially there are three principal methods of inviting tenders:

- (a) Open tendering
- (b) Selective tendering
- (b) Negotiation.

Although these are normally considered to be three completely different methods, there may be some element of open tendering in the selective tendering procedure. For this reason some writers classify both methods as one, and name it "competitive tendering". Further, in both open and selective tendering methods an element of negotiation may be required.

5.2.2 Open Tendering

The Open Tendering method involves two stages. The first stage puts some limit on the number of competing contractors, but the number is not decided in advance. No judgement or comparison is made at this stage: the number of contractors is limited solely by the publicity given to the invitation to tender, and the level of interest shown by the contractors. Public advertisement is initiated by the Client, his Architect or Quantity Surveyor, in local newspapers, the technical press, etc. A notice posted on the Client's premises may invite contractors to apply for tender documents, and to tender in competition for carrying out the work, of which the main characteristics are given. To discourage frivolous applications, normally a cash deposit is required from an interested contractor, the deposit being returnable on submission of a bona fide tender.

The second stage involves selection of one contractor, normally on the criterion of price. In the UK, central government departments and most local authorities no longer use this method of obtaining tenders, as a result of it being opposed by the Banwell Report (HMSO, 1964).

Advantages of Open Tendering

- (a) There can be no charge of favouritism as might be brought where a selected list is drawn up (this is of concern particularly to local authorities).
- (b) An opportunity is provided for a capable firm, which might not be included in a selected list, to submit a tender. This is particularly true in Nigeria where indigenous contractors are being encouraged to compete with their foreign counterparts.
- (c) Open tendering should secure the maximum benefits of competition.

Disadvantages of Open Tendering

- (a) There is a danger that the lowest tender may be submitted by a firm inexperienced in preparing tenders (particularly if Bills of Quantities are used) and whose tender is the lowest only as a consequence of having made the most or the largest errors.
 - (b) There is no guarantee that the lowest tenderer is technically and managerially capable, or financially stable.
-

- (c) The total cost of tendering is increased as all the tenderers will have to recoup their costs eventually through subsequent tenders that are successful. The result can only be an increase in the general level of construction costs.

5.2.3 Selective Tendering

The first stage of the Selective Tendering procedure is to compile a list of eligible contractors who are considered suitable to carry out the proposed project. The names may be selected from an approved list or 'panel' maintained by the Client (as most public authorities in the UK do); they may be specially chosen, on the basis of known reputation, or as a result of an advertisement by the Client or his representative.

In the last case, contractors may be invited, through suitably worded advertisements in the press, to apply to be considered for inclusion in the tender list. This gives the Client the opportunity both to exclude any firms thought to be unsuitable, and to limit the number of tenderers. At the same time, it gives any "outsider" firm an opportunity to apply to be considered.

The Code of Procedure for Single Stage Selective Tendering published by the RIBA recommends that, depending on the size of the contract, the number of tenderers should be limited to between five and eight. If the firms on the list are all ones that are reputable, well-established and suitable for the proposed work, and the Client fixes the construction duration, then selection is resolved into a question of price alone, and the contract can be safely awarded to the firm submitting the most favourable tender.

Advantages of Selective Tendering

- (a) It ensures that only capable and approved firms submit tenders.
- (b) It reduces contractors' aggregate costs of tendering.
- (c) If the two stage method as explained later is used, it allows work to start before detailed design is complete.

Disadvantages of Selective Tendering

- (a) The cost level of the tenders received may be higher than with open tendering, due to less competition, and the higher calibre of the tenderers.
-

5.2.3.1 Nomination (Single)

Another version of Selective Tendering is nomination, which can be either the single or serial type. Nomination is a special case of Selective Tendering, where the short list contains only one name. It is used when the Client has a preference for a particular firm, often because the firm has done satisfactory work for the Client in the past.

Obviously, if only one firm tenders for a job competition is eliminated, and that almost inevitably leads to a higher price. However, the Client may think it is worth paying more in return for a quicker job, or one of better quality than he might otherwise obtain. Before a Client nominates, rather than going out to competitive tender, benefits should be fairly certain.

5.2.3.2 Nomination (Serial)

When a large project is to be carried out in successive phases, a combination of Selective Tendering and Nomination may be employed. This is sometimes called Serial Tendering. The Contractor is chosen for the first phase by

means of the selective competitive tendering. The accepted tender forms the basis of payment for the resulting contract in the normal way. The contract may be used also as a basis for the second and later phases, with provision for this in the contract by the inclusion of a formula for updating the rates. Alternatively, the contract for the first phase may specify negotiation of new rates, based upon the initial tender rates, as a means of determining the payment for each successive phase in the series.

The purpose of Serial Tendering is to maximize the benefits from continuity, and yet maintain flexibility in the contract. The Contractor for the first phase of the project will have his site organisation set up, his offices, mess and storage huts, etc., already in use and his plant on site. Thus when the second phase commences, these facilities will be already available, allowing a smooth transition with much less additional expense, should the same contractor continue. However, a different contractor may successfully bid for the next phase.

The original Contractor's workforce will, of course, be familiar with details of the construction so far, and

thus should be able to work more speedily and efficiently on the second and subsequent phases.

5.2.4 Negotiation

As with the competitive tendering system, negotiation can be carried out as either in a single stage operation, or in two stages.

5.2.4.1 Single Stage Negotiation

When it is desired to carry out negotiations with a contractor in a single operation there are two ways of proceeding. These are:

- (a) Using the rates obtained from a previous project as a basis.
- (b) Preparing a detailed estimate or tender for the new project from basic data.

An advantage of using the rates of a previous project, let on competitive tendering, as the basis for a negotiated contract, is that it may be possible to prove to auditors that the negotiated price was related to a price obtained in competition. It is important that the project

chosen for use as a pricing basis is similar in size, complexity and type of building to the project that is the subject of negotiation.

There are situations where a Client normally uses the same contracting organisation again, and may use a previously negotiated tender as basis for a new tender. This can be a dangerous practice; and if it is done, independent checks should be made by obtaining competitive quotations for individual parts of the project.

When previous contract documents are used, it is important that specific documents are identified as the only basis for the negotiation. This is sometimes called a Nominated Bill of Quantities. It is essential to analyse fully the Nominated Bill of Quantities, and to establish exactly where the Contractor has priced such items as plant, overheads and profit.

The most logical method of negotiating a tender is for the independent Quantity Surveyor and the Contractor to negotiate the tender. To facilitate the procedure, and to provide a basis for the negotiation, one party usually prices the tender document first. The other party then

checks through the rates and prices of principal items ticking off those that are acceptable. The two parties meet to negotiate the un-ticked items. When agreement on the whole is reached, a contract can then be entered into between the Client and the Contractor.

When considering negotiation it is important to realise that in many building contracts, nominated sub-contractors and suppliers and provisional sums account for a significant proportion of the project cost, sometimes up to 40%. The Contractor's and sub-contractors' labour, together with materials, may account for another 35% to 40% of the cost, with the remainder covering site management, head office overheads and profit (Hancock, 1984)

5.2.4.2 Two Stage Negotiation

With a view to gaining the benefits of competition as well as the advantages of negotiation, a process of limited competition for the selection of a contractor, followed by negotiation with him on the details of his tender, is used.

In the first (competitive) stage, tenderers are informed of the second stage intention and are asked to tender on the basis of:

- (a) an ad hoc schedule of rates consisting of the main or significant items only;
- (b) rates for the main preliminary items;
- (c) a construction programme showing estimated dates and durations and labour and plant resources which will be used, and construction methods;
- (d) details of all-in labour rates and main material prices and discounts which will go into the build-up of the detailed tender.

During this stage, discussion with each of the tenderers may be conducted, to elucidate their proposals and to enable the contractors to make suggestions with regard to design and/or construction methods.

At the end of the competitive stage, negotiation with the selected contractor follows on the basis of a detailed tender document, as in single stage negotiation. Again, when agreement is reached on the whole, the parties will enter into a contract for the construction work.

When time is pressing and it is desired to commence work on site before final agreement is reached, a contract may be signed before negotiations are complete. In that case, when the Client's Quantity Surveyor considers that a sufficient measure of agreement has been reached on the rates for the principal parts of the work, he recommends the Client to proceed with arrangements for signing the Contract. Where the project is complex, "one-off", and in a new situation, with a large amount of design work to be undertaken after selection of the Contractor, then a second alternative is likely to be used. A second-stage document is prepared as described for two stage competitive tendering, and this is priced jointly by the Client's Quantity Surveyor and Contractor.

Two stage negotiation is the method which best suits selection for management contracting, in which the main Contractor does little or none of the construction work, but organizes sub-contractors to carry out the work.

5.2.5 Tender Documents

The number and nature of the tender documents varies with the type of contract to be employed. They may include some or all of the following (Ramus, 1982).

5.2.5.1 Conditions of Contract:

This document presents to the tenderer the obligations and rights of the parties to the subsequent contract and the detailed conditions under which the contract will operate. If a standard form is used, such as the Joint Contract Tribunal (JCT) Form, it is normally not sent out with the invitation to tender, it being assumed that the tenderers are familiar with it, or can readily obtain a copy for reference. The headings of those clauses that will apply to the contract are, however, listed in the first section of the Bills of Quantities and/or Specification.

5.2.5.2 Bills of Quantities:

Code of Procedure for Single Stage Selective Tendering (1977) recommends that two copies of the Bills are issued to the Contractor. One copy is priced and returned

to the Architect or Consultant Quantity Surveyor with the tender; the other is retained by the Contractor. If the tenderers are not required to submit priced Bills with their tenders, only one copy need be sent to them initially. A second copy is then sent at the time of requesting submission of the priced Bills.

5.2.5.3 Specification/Preambles

In the case of lump sum contracts without Bills of Quantities, a detailed Specification is sent to tenderers. It is supplied in addition to Bills of Quantities, where they are used.

5.2.5.4 Drawings

Normally general arrangement drawings are provided for the tenderer, showing site locations; the position of the building(s) on the site; means of access to it; and floor plans and elevations. Tenderers are not necessarily given working drawings as they are not considered to be essential for pricing purposes, particularly when full descriptions of the work have been incorporated in the Bills or Specification. Tenderers are informed, however, that

they can inspect at the Architect's office drawings which have not been supplied to them.

5.2.5.5 Form of Tender

This is a pre-printed formal statement (Appendix VIII), often in the form of a letter, in which a tenderer fills in his name and address, and the sum of money for which he offers to carry out the work as shown on the drawings and described in the Bills of Quantities or Specification.

5.3 CONTRACTUAL ARRANGEMENTS

5.3.1 Introduction

In the past, construction was performed on a force-account basis, ie the owner hired additional manpower, or used his in-house forces for construction when they were not otherwise occupied. In recent years construction by independent contractor, under the spur of competitive bidding, has steadily increased (Thompson, 1981). The use of force-account construction has therefore dwindled. Only a few organisations now utilize it successfully, and these are normally large enough to have their construction business organized as a separate company or division. The growth in the number of construction companies and the resultant competitiveness have encouraged this trend.

Some Clients however have a policy of undertaking their construction work on a sub-contract basis, letting out individual components of the work to local sub-contractors who are specialists in their particular fields: concrete work, pipework, insulation etc. This could produce good results for those organisations that are large enough to

maintain a group of highly qualified project managers to coordinate and guide the sub-contractors on site.

A third, and most common, method of effecting construction is on a several works basis, with the main Contractor either hiring all personnel himself, or handling only certain operations such as earthwork, concrete work etc with his own work people, and sub-contracting out specialist work such as plumbing, electrical, etc. In some cases, the sub-contracting may be only optional, while in others, the proficiency of experienced sub-contractors makes their employment economical.

5.3.2 Construction Contracts

Under the general law of contract, when a party makes an offer to provide goods or services for some consideration and the party to whom the offer is made accepts it, then, provided it does not imply any illegal act, a contract exists which is enforceable at law. This leads to a "simple contract". This is no less the case in the construction world than in any other sphere of business or industry. The offer is made by a Contractor who tenders

to carry out specified construction works in return for payment, and upon the acceptance of that offer by the Client promoting the project, a binding contract comes into being.

Under English law another type of contract is the "contract under seal (or by deed)". The principal difference from a simple contract is that contracts under seal depend for their validity on the form of the contract and not on the existence of a consideration (the promise, object, etc., given by one party to persuade another to enter into a contract). A matter of some importance to the Client is the extension of the period of limitation² from six to twelve years for contracts under seal (Wallace, 1976).

There are several types of simple contract, hereafter referred to as "a contract", in common use for construction projects, differing principally in the way in which the sum to be paid to the Contractor is determined. The different types of contract offer differing degrees of flexibility, incentive, and allocation of risk between the parties.

² The period of time, legally defined, within which an action for claim must be commenced

Contracts for construction work can be grouped into two main types, fixed price and cost reimbursable, but many contracts contain characteristics of each. These two types of contract and their subdivisions are illustrated in Figure 5.1.

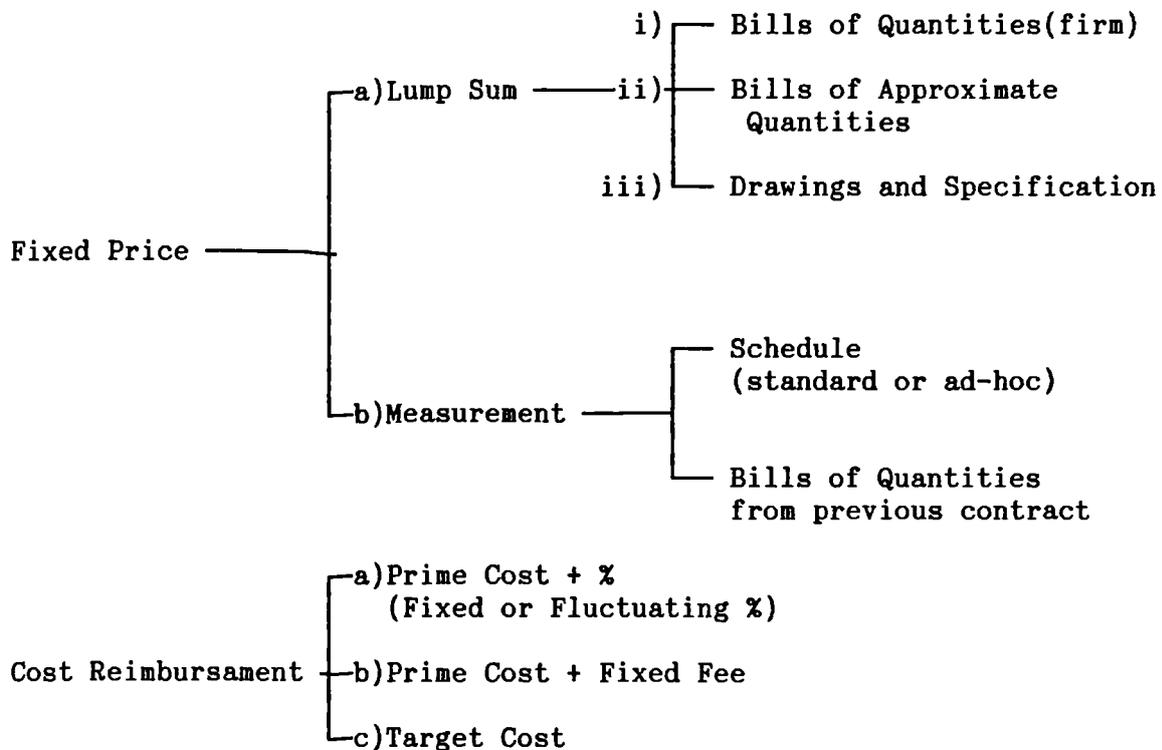


Figure 5.1 Types of Contract and their Subdivisions

5.3.2.1 Fixed Price Contracts

A fixed price contract may be a lump sum type, based on drawings and specification, with a total fixed price for the whole of the work; or it may be a measurement type, based on fixed prices for units of specific work without any quantities to show the final extent of the work. In measurement type contracts the total price is determined by measuring the work as built, and pricing during progress at the contract unit prices.

Most fixed price contracts fall somewhere in the range between the lump sum and measurement types. The provision of firm quantities assists the Contractor in determining at least part of the total price, and the provision of approximate quantities guides the Contractor towards the probable scope of the work and assists the Client in determining his budget for the expected total cost.

(a) Lump Sum Contracts

Sometimes called fixed price contracts because a price is fixed beforehand for a defined amount of work.

i) Based on Bills of Quantities (Firm)

The essential characteristics of this contract type are that both the quantities and the unit rates in the Bills of Quantities (BOQs) form part of the contract and that virtual completion of the design by the Architect and subsequent approval by the Client precedes the signing of the contract.

This type of contract is particularly suitable for construction work since the task can be defined substantially by drawings and specifications. It can also be satisfactory for both the Contractor and the Client. The Contractor sets his tender price after thorough study of the work to be performed. He has a chance to make an additional profit if he is able to perform the work with unusual efficiency. The Client obtains for a fixed and known sum a building or installation which, subject to a reasonable amount of inspection on his part, conforms to the drawings and specifications agreed upon. By obtaining competitive tenders he is assured that the work will be performed at a reasonable price.

Lump sum contracts have been extended from well-defined construction work only to less well-defined situations in which, for example, the Contractor provides complete design, procurement and construction (Hackney, 1986) - "design and build". The design and build type of contract is useful and appropriate in many cases, but it has certain drawbacks for the Client and the Contractor. One of the principal drawbacks is the lack of complete definition in advance of the work to be done, as would be provided by a complete set of drawings and specifications. The contractors who are bidding for the project must however each provide a preliminary design in sufficient detail to enable preparation of a reliable cost estimate. This preliminary design is set out in a detailed tender proposal which the Client must examine to ensure that it fully meets all the requirements of the project. Usually the Client must rely very heavily on the reputation of the Contractor, and on examples of similar work which the Contractor has undertaken and successfully completed. The Client must take steps to ensure that he is comparing tenders from contractors of similar size and reputation. This is because contractors of different sizes have different overheads,

which may contribute to disparity in their rates in favour of the smaller company who otherwise may not however be capable of handling the project with a high level of expertise.

From the Contractor's standpoint, the principal difficulty with design and build contracts lies in the disproportionate expense required to tender for such projects. Each tender requires a considerable amount of preliminary design. The cost of this design work and preparation of the cost estimate and proposal documents may be 0.5% to 2% of the value of the project as a whole, depending on its nature, size, and other conditions (Hackney, 1986). This means that when several tenderers are involved, tender preparation in total may amount to over 5% of the project cost. In the long run this 5% must be paid by the industry, taking one project with another. The principal compensation to the Client for this increased project cost is the additional ingenuity required of individual tenderers in preparing their proposals. Under the pressure of this type of competition, project technology is encouraged to advance rapidly, as each tenderer attempts to find some new means by which he can produce a facility of

the required capacity, maintenance cost, and production efficiency with a low capital investment. This also makes it necessary for building procurers to appraise maintenance costs and production efficiency carefully to be sure that a low first cost has been obtained without liability for unnecessarily high costs thereafter.

Lump sum design and build contract documents must specify as clearly as possible exactly what is being offered and accepted, otherwise this type of contract can result in very serious misunderstanding, recriminations and lawsuits.

Advantages of Lump Sum Contracts Based on firm BOQs

- (a) Both parties have a clear picture of the extent of their respective commitments in relation to the size and complexity of the project.
 - (b) The unit rates in the BOQs provide a sound basis for the valuation of any variations to the design.
 - (c) A detailed breakdown of the tender sum is readily available.
-

Disadvantages of Lump Sum Contracts based on firm BOQs

- (a) The length of time taken in the design of the project before going to tender, and in the preparation of the BOQs (where applicable).
- (b) The problems of dealing with those variations which are so fundamental or extensive as to change the character of the remainder of the work or the conditions under which it has to be carried out.

(ii) Based on Bills of Approximate Quantities

Here, the essential characteristics are that the unit rates in the BOQs form part of the contract, but not the quantities, so that remeasurement is necessary. Signing of the contract and commencement of construction on site may proceed before the design is complete.

The BOQs of Approximate Quantities may be prepared for the Client, and be as detailed in item descriptions as firm BOQs, but the quantities given may bear little relation to the actual amount of work to be done. Alternatively, the BOQs may use the quantities prepared for an earlier project of a sufficiently similar nature.

Advantages of Lump Sum Contracts based on Bills of Approximate Quantities

- (a) Construction on site may begin earlier.
- (b) The extra expense of preparing firm quantities is avoided.

Disadvantages of Lump Sum Contracts based on Bills of Approximate Quantities

- (a) At the tender stage the Bills of Approximate Quantities cannot be relied upon as giving a realistic total cost and in consequence, the parties to the contract are less certain of the extent of their commitment.
- (b) The construction works have to be fully remeasured, which may prove more costly than to have initially prepared firm BOQs.
- (c) The design team may feel under less pressure to make early design decisions.

(iii) Based on Drawings and Specification

The characteristics of this contract type are that tenderers are supplied with a complete set of working drawings and a full Specification only. The virtual

completion of the design must therefore precede the signing of the contract.

No BOQs are supplied to tenderers, who are therefore obliged to prepare their own quantities from the drawings. Drawings and Specification contracts are used mostly for small works and for sub-contract works, although it is not unknown for large contracts to be tendered for on this basis.

A particular problem arising under this variant of the lump sum type of contract is that of valuing variations. In order to reduce the problems, tenderers are usually required to prepare a schedule of the principal unit rates used in the compilation of the tenders (HMSO, 1964). Those rates are then used in pricing items in the measurement for variation accounts. There will inevitably be many items in the variation account which are not catered for in the schedule of rates. Rates for such items will have to be agreed later.

Advantages of Lump Sum Contracts based on Drawings and Specification

- (a) The time required for the preparation of tender documents is reduced, as the time-consuming process of preparing BOQs is eliminated.
- (b) Because detailed Drawings and Specification precede this type of contract, parties can have a clear picture of their total respective commitments at the time of signing the contract.

Disadvantages of Lump Sum Contracts based on Drawings and Specification

- (a) No breakdown of the tender sum is immediately available (although tenderers may be asked to provide this, either as a part of their submission or subsequently).
 - (b) The valuation of variations presents problems.
 - (c) There is little if any control over the percentage additions for overheads and profit related to the prime cost of labour, materials and plant elements in daywork. Tenderers are normally asked to state percentages to be used in the event of dayworks arising (the practice in the UK differs from theory)
-

in that an amount is inserted into the Bills by the Quantity Surveyor, so the Contractor's rate will affect his competitiveness). Where such rates have no effect on the tender sum, there is little incentive to the tenderer to moderate them.

(b) Measurement Contracts

A Measurement Contract refers to a type of lump sum contract wherein rates are fixed in advance for units of work to be measured later. In other words it consists of a list of items with full descriptions, but no total quantity; units of measurement; and unit rates. The latter may be either predetermined or inserted by the Contractor's estimator.

The total cost of the project is only ascertained by measuring the work as it proceeds on the site, and pricing the measured items at the appropriate rates.

Where they can be used, Measurement Contracts have a particular advantage in that work can start on site well before completion of the design.

(i) Standard Schedule

A Standard Schedule lists under appropriate trade headings or work sections all the items likely to arise in any construction project, with a unit rate against each item. The best known of such schedules in Britain is the Schedule of Rates for Building Works (metric edition) prepared by the Property Services Agency of the Department of the Environment.

Contractors are asked to tender percentage additions (or deductions) to the listed rates, usually set out in sections or sub-sections, thus allowing for variations in construction costs after the date of preparation of the schedule used.

Advantages of Measurement Contract based on Standard Schedule

- (a) Tenderers using a particular schedule on a regular basis soon become familiar with both the item descriptions and the rates, and are able to assess percentage adjustments relatively easily.
-

Disadvantages of Measurement Contracts based on Standard Schedule

- (a) In comparing and assessing a range of tenders, the Client's Quantity Surveyor has the task of gauging the overall effect of a number of variables, thus making the choice of the most favourable tender difficult.
 - (b) The parties are unable to have a precise indication of their respective commitments.
- (ii) 'Ad hoc' Schedule

This is a schedule specially prepared for a particular project and lists only those items that are appropriate to the project, including any special or unusual items. An 'ad hoc' schedule may be pre-priced by the Client's Quantity Surveyor, or the rate column may be left blank for the tenderer to insert individual rates against each item. The latter method, because of the absence of quantities, makes the comparison and assessment of tenders much more difficult.

Advantages of Measurement Contracts based on 'Ad hoc' Schedule

- (a) Tenderers are required to concern themselves with only a restricted list of items, thus enabling them to assess rates or percentages more accurately.
- (b) Tenderers are able to obtain a clearer picture of the scope of the work from the items listed in the schedule.

Disadvantages of Measurement Contracts based on an 'Ad hoc' Schedule

These are similar to those of Standard Schedules.

(iii) Bills of Quantities from Previous Contracts

The BOQs used are normally for a type of building of similar construction and comparable in form to the proposed project. It is, in effect, a pre-priced 'ad hoc' schedule and will be used in the same way.

Advantages of Measurement Contracts based on Previous BOQs

- (a) The time required to prepare tender documents is reduced to a minimum.
-

- (b) Tenderers have to consider only a restricted list of items.

Disadvantages of Measurement Contracts based on Previous BOQs

- (a) The parties are unable to have a precise indication at an early stage of their respective commitments.
- (b) There may be a considerable discrepancy between the successful tender and the real cost of the work due to the approximate nature of the quantities included in the compilation of the tender.

5.3.2.2 Cost Reimbursement Contract

A Cost Reimbursement Contract is one wherein the actual prime costs of labour, material, and use of plant, will be paid for at net cost to the contractor plus a fee. The fee is intended to reimburse the contractor for his management costs, overheads and profit. The fee may be a sum wholly or partly fixed in advance, or may be a percentage of the prime cost. There are three variants of this type of contract, distinguished by the way in which the fee is calculated.

Of all the types of contract, the cost reimbursement type involves the most uncertainty as to the financial outcome for the Client. Tenders contain no total sum because it is too difficult to form any reliable estimate of the final cost.

Cost reimbursement contracts are widely recognized as the most uneconomical (Ramus, 1982). There is minimal financial risk to any contractor involved in a simple cost reimbursable contract, and both parties may suffer from a lack of momentum unless the Client establishes effective controls, preferably by the operation of a planning team drawn from the Contractor's and the Client's organisations.

This type of contract is, however, one solution to a situation where the requirements of the Client are vague, or when it is necessary, or otherwise desirable, for the design to proceed concurrently with construction. It is also desirable when the Client wishes to be directly involved in the management of the project or to reduce the financial risk to the Contractor. There may also be circumstances where, to the Client, cost is a less important factor than time. Consequently, a start on site at the

earliest possible date could be financially more advantageous in the long run than the lower final construction cost which might have resulted from the time taken to prepare a different type of contract.

It is worth mentioning that no site measurement is necessary other than checks on the quantities of materials for which the Contractor submits invoices, and for the purpose of checking nominated sub-contractors' and nominated suppliers' accounts. In practice, however, there may be a need to measure the completed work so that it could be compared with the quantities of materials claimed for by the Contractor.

In order to reduce the problems of calculating and verifying the total prime cost, which involve a vast amount of investigation and checking of invoices, time sheets, sub-contractors' accounts, etc, it is in the interest of both the Client's Quantity Surveyor and the Contractor to agree at the outset, and strictly implement, a system of recording, verifying and valuing the prime cost. In addition, it is vitally important to define clearly what is intended to be included as prime cost and what is intended

to be covered by the fee. The standard form of the fixed fee variant of this type of contract is shown in the appended schedules (RIBA Publications Ltd, 1976).

The advantages and disadvantages of the cost reimbursement type of contract over the lump sum and measurement types are set out below.

Advantages of Cost Reimbursement Contracts

- (a) The time required for preparing tender documents and for obtaining tenders is minimized, thus enabling an early start to be made on site.
- (b) Work on site may proceed before the detailed design is complete.

Disadvantages of Cost Reimbursement Contracts

- (a) The parties have only rough indication of their respective commitments.
 - (b) The cost of construction to the Client is likely to be greater than if another type of contract were used.
 - (c) The computation and verification of the total prime cost is a long and tedious process.
-

As mentioned earlier, the variants described below differ in the way in which the fee for the Contractor's services is determined. Variants (b) and (c) namely Prime Cost Plus Fixed Fee, and Target Cost, are the consequence of a general acknowledgement that it is desirable to provide a positive incentive to the contractor to economize in the use of resources.

(a) Prime Cost Plus Percentage Fee Contracts

Under the Prime Cost Plus Percentage Fee Contract the Client pays fees equal to an agreed percentage of the prime costs of labour, materials and plant used in carrying out the work.

The main disadvantage to the Client is that the more inefficient the Contractor's operations are, and the greater the waste of resources, the higher the fee paid to the Contractor!

(b) Prime Cost Plus Fixed Fee Contracts

The Contractor is paid a fixed sum for his fee which normally does not vary with the total prime cost, but

is based on an estimate of the likely total. The only basis on which the fee might be varied is if the scope of the work or the conditions under which it is carried out are materially altered after the Contractor tendered. It should be noted that the fee, if considered in percentage terms, is lower when the prime cost is higher, therefore providing some incentive for the Contractor to be prudent.

(c) Target Cost Contracts

Under this form of contract, the total prime cost is paid by the Client as it is actually incurred and the Contractor's fee is paid subject to upper and lower limits. The amount of the fee is determined by comparing the actual cost of the works with the target cost submitted at the tender stage, which may be updated at regular intervals if necessary.

There are many ways of calculating the remuneration under this type of contract. The simplest is where, in addition to reimbursement of the prime cost plus a percentage fee, the Contractor is paid a share of any saving between target and actual cost, while the fee will be reduced should the actual cost exceed the target. The

benefit which may be obtained by the Client under this agreement is dependent on the agreed target price being realistic.

The administration of a target contract is more complex than in any other type of contract, as the Client or his representative is involved in the audit of actual cost and in the evaluation or adjustment of the target. It is also desirable for the Client to be involved in planning the works, and in approval of the resources to be employed by the Contractor. One of the great benefits frequently attributed to this type of contract is the consequent identity of purpose and harmony generated between the parties (Thompson, 1981).

This type of contract can be further modified to give a time incentive to the Contractor by incorporating a time bonus/penalty clause in the contract.

5.3.3 Composite Nature of Contracts

Although, for convenience, these classifications and labels of contracts are commonly used, in practice a contract often combines the characteristics of two or more

types. In his report McCanlis (1971) pointed out as an example that a lump sum contract based on firm BOQs often contains some items with provisional quantities requiring remeasurement, and therefore such items bear the characteristics of a measurement contract. Also, provisional sums included in the BOQs for daywork, and to be expended on work which is not readily measurable, or not easily priceable as measured work, may form a prime cost plus percentage fee contract within the main lump sum contract. Thus many contracts which are regarded as of the lump sum type are, in reality, a combination of several types.

5.3.4 Other Types of Contractual Arrangements

There are other types of contractual arrangements which, whilst basically classifiable under the two main contract types described above, have certain particular characteristics, and so merit particular mention.

5.3.4.1 Management Contracts

The Quantity Surveyors' Division of the Royal Institution of Chartered Surveyors, in their publication 'Checklist of Services (1988)', defined "Management Contracting" as a contractual arrangement whereby a contractor is employed to manage, organize, supervise and secure the carrying out of the work by sub-contractors. In a management contract therefore, the main contractor does little or none of the construction work himself, but sub-lets it to a number of sub-contractors who carry out the work under his direction and control.

The main Contractor provides all the necessary facilities, such as offices, storage and mess huts, power supplies, etc., and may also provide basic materials such as cement, bricks, sand, etc. He also deals with the professional team (architect, engineer and quantity surveyor) employed by the Client in the normal way, but he does no construction work.

The main Contractor is contractually responsible to the Client for the works carried out by all the sub-contractors, as in a normal contract. His role in this

kind of contract is therefore that of organizer, co-ordinator and manager rather than of the principal constructor of the project works.

5.3.4.2 Package Contracts

In Package Contracts ("turn-key" projects), the Contractor will undertake a complete package consisting of design, construction, all necessary statutory approvals, complete supervision and a full accounting service. The package may also include the provision of a site in a suitable location.

Package deals are most commonly used for industrialised system buildings, which may have been developed by the construction company offering the package. When selecting a package deal, the Client is therefore likely to benefit from the choice of alternative designs, and the option of design and construction. He is, however, in a relatively weak position to influence the detailed design of the chosen works. The Client may nevertheless consider it to be more satisfactory to deal with, and make payment to, a single firm instead a number of professional advisers as well as to a Contractor. The prudent Client, however,

will want to be assured that he is getting value for money and so a Professional Quantity Surveyor should be employed to evaluate and advise on a package offered, and on the Client's behalf to look after the financial aspects of the contract during the erection/construction period.

5.3.4.3 Term Contracts

This type of contract can be described as an extension of the Measurement Contract based on a Standard Schedule. Normally it is an agreement entered into for a period of time rather than for a specific job. Under this arrangement the Contractor undertakes to carry out works for the Client over a period of time, as the work arises. Term contracts are appropriate for the execution of maintenance work for an establishment. The Contractor submits his tender based on a schedule of the work items, and he undertakes to carry out such works at the prices quoted, for a certain period of time. His payment is determined by measuring the actual work done and multiplying the quantities by the rates already quoted. This type of contract may sometimes include provisions for daywork. In the survey in Nigeria, this form of contractual agreement

seem to be unpopular. Most respondents to the questionnaire are clearly not familiar with it.

5.4 FORMS OF CONTRACT

5.4.1 Introduction

Standard forms of construction contract are available for most contractual arrangements. Clients are advised not to draft their own contracts unless they have expert advice and special reasons for doing so (Hancock, 1984). Non-standard forms of contract are always liable to give rise to problems, as they have not had the same exposure to use as standard forms. The party to whom a non-standard form is offered should normally examine the provisions closely, as it should be presumed that the form has been put forward to serve the interests of the other party.

The advantage of the standard form is that it has usually been agreed by all sides of the building industry and therefore provides a recognised common basis for work. It should lead to fewer disputes. Several factors may determine the choice of a contract: the size; the technical complexity of the work; the form of site organisation; or the degree of supervision required. In this chapter different forms of contract will be examined, but no attempt

has been made to analyse in detail the contents of the various forms that are available.

There are four principal sources of standard forms of contract in use in the UK today.

- (a) The Joint Contracts Tribunal (JCT): this body produces building contract and sub-contract forms that cover the group of contracts which before 1963 were known as the RIBA contracts. Other forms related to these are produced by the Building Employers Confederation, and others, to cover particular sub-contract situations. These contracts and sub-contracts are the most extensively used for building work commissioned by private and local authority clients, because it is the only form of contract which commands a balanced representation from the building professions as well as the public and private sectors.
 - (b) The Association of Consulting Architects (ACA): this body produces one form of contract and related sub-contract, with one variant form of each for the British Property Federation (BPF). These forms have been produced as something of a reaction to alleged
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deficiencies in the JCT forms, and are used, in a minority of cases, by private clients. In my face-to-face interviews in Scotland and Nigeria no one mentioned using this form of contract. Most people are not even aware of its existence.

- (c) The Institution of Civil Engineers (ICE): this body produces, in consultation with the Association of Consulting Engineers and the Federation of Civil Engineering Contractors, one form of contract for civil engineering work only, and there is a related sub-contract form. Derived from the main form is another international form for works of civil engineering construction, usually known as the FIDIC form, the acronym of its French title (Fédération Internationale des Ingénieurs - Conseils). The ICE form of contract is used almost universally for civil engineering work, except where the FIDIC is employed.
- (d) The Central Government conditions of main contract and sub-contract: these are for use with either building or civil engineering work and are used with amendments by a number of statutory bodies.
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5.4.2 JCT Standard Forms of Contract

The JCT has long produced the mainstream of standard forms used in the building industry, dating from 1909 (Turner, 1983). It now consists of representatives of public and private sector clients, contractors and sub-contractors and the professions. As such, the JCT is an expansion of what for years consisted of the Royal Institution of British Architects, the National Federation of Building Trades Employers (now the Building Employers Confederation) and the Royal Institution of Chartered Surveyors. It is not strictly a tribunal, but a body whose function is limited to producing contract forms and explanatory practice notes and guides. It cannot give authoritative decisions or interpretations of its documents - this remains the prerogative of the courts. However, as its documents are published only when a consensus has been reached, they are not too likely to be construed *contra proferentum* by the courts, at least in their unamended states.

The term "standard form of building contract" (SFBC) is applied by the JCT to a set of six similar forms, which

are the descendants of the single original RIBA form, as follows:

Private with Quantities

Private with Approximate Quantities

Private without Quantities

Local Authorities with Quantities

Local Authorities with Approximate Quantities

Local Authorities without Quantities

The six forms are produced as separate documents, but they are all based on only two main documents (one for private and one for local authority clients), each containing three alternative versions (with quantities, with approximate quantities and without quantities), and each with provision for fluctuations if so required.

A single supplement allows for sectional completions, or phased completion, of the works to be written into the contract. This supplement may be used with any of the four main versions related to quantities ("with quantities" and "with approximate quantities" versions for private and local authorities). There is no provision for phased completion by the Contractor at commencement. There

are therefore available for use in combination:

- (1) Six main contract documents
- (2) Two fluctuations documents
- (3) One sectional completion supplement

Of these, one each out of (1) and (2) is needed, while (3) is optional. As with most standard forms, there is some choice of detail within each. The current editions are those introduced in 1980, but with later amendments.

A special supplement to the SFBC with quantities versions is also available for use when the Contractor performs some of the design work.

All of the foregoing relate to projects where:

- the work is extensive or complex,
- the architect designs entirely or substantially pre-contract;
- there is a firm commitment to one of the fixed price contracts described above.

There are also other forms of contract drawn up by the JCT which allow for one or more of these characteristics to be changed.

For work of limited scale (intended to be up to £250,000 at 1984 prices (Ramus, 1981)) and simple in character, so that involved sub-contracting is not needed, the Intermediate Form 1984 (IFC) is available. This is published in one version only, to cover the use of quantities (firm only) or simple lump sum contracts, and for either private or local authority clients.

For quite small projects of very simple nature, an agreement for minor building works is produced. It is limited in its provisions, except for insurance and inflation. Only simple lump sum contracts can utilize this form, eg a small extension to a house.

For design and build projects, a 1981 "with contractor's design" form is available, again to suit all types of clients. As far as possible it follows the SFBC 1980 quite closely including the revisions, but provides for design to be undertaken by the Contractor, possibly including preliminary design work by the Client or his advisers. A lump sum basis, supported by a contract sum analysis, is used.

There is also a "contractor's designed portion" supplement to the "SFBC with quantities" forms, as mentioned previously; this allows for a part only of the works to be designed by the Contractor, while the rest is designed by the Client's Architect, as with a normal SFBC case. Effectively it incorporates a subsidiary design and build contract within a "with quantities" contract, although no limit is placed on the relative proportions of the two parts.

The most recent form of contract, or rather group of contracts, covers the management contract (MANCON); and another, in several parts, between the Client and each of the various works contractors (WKCON). While each of these has some similarities to the SFBC, they have been drafted with many distinctive features to cover the equally distinctive approach of management contracting. They use a lump sum or measurement basis, as appropriate to the work. There are related phased completion supplements for both the MANCON and WKCON contracts.

For a project where reimbursement is on a prime cost basis, the Fixed Fee Form of Prime Cost Contract 1977 is

available. This is based on the 1963 SFBC which has been superseded, but is the only standard form extant. It suits only one prime cost arrangement out of several commonly used.

5.4.3 Sub-contract Forms

Two nominated sub-contract forms (NSC/1 and 4a) are published and are obligatory when there is nomination under the SFBC main contracts. They differ only in minor wording, to allow for use with one or other of the basic or alternative methods of nomination, although these methods can lead to different subsequent treatment of sub-contractors. They are intended for use with any of the several versions of the SFBC, although strictly they are not prescribed for use with the approximate quantities versions.

For those sub-contracts that are not nominated, but domestic, document DOM/1 is produced by the British Employers Confederation (BEC) and sub-contract bodies, although its use is optional in that it is not required by the main contracts.

A named sub-contract form (NAM/SC) exists for use with the main IFC, and a form (IN/SC) for domestic sub-contracts. They are all very similar to the other sub-contract forms.

For design and build, there is a short document (DOM/2) which incorporates by reference the terms of the domestic sub-contract of the Standard Form of Building Contract (SFBC). It contains adapting provisions, especially about sub-contract's design.

5.4.4 Scottish Documents to Suit the JCT Pattern

In view of the difference between Scots law and practice and those of the rest of the UK, a range of documents is available for use in Scotland. In so far as a document is a form of main contract or sub-contract, it consists principally of a substitute set of articles and appendices and some amendments to the detail of the JCT conditions. Each document then incorporates the conditions of the corresponding JCT document only by reference, while modifying or supplementing them to take in appropriate points. Special "Conditions Only" documents are issued to

accompany the Scottish forms, which contain the unamended JCT conditions for reference, but which are not required for physical incorporation in every single contract.

All of these documents, except the "Conditions Only" forms, are produced by the Scottish Building Contract Committee, which is a constituent body of the JCT. Only the JCT prime cost form is suitable for use in Scotland unamended. The IFC form is not covered by these arrangements for use in Scotland. Management contracts have yet to be covered, although there exists a document published by the Building Directorate of the Scottish Education Department for use in management contracting (Building Directory, 1988).

5.4.5 ACA Forms

One version of the ACA form (1982 revised 1984) is produced for general use, and it contains options for various applications. It is intended for use by private clients. One sub-contract form is produced for optional use with the main form.

The ACA Form of Agreement is a simpler document than JCT 80 and tends to emphasise the Client's requirements and objectives. It contains the following alternatives within the one document:

- 1 It can be used with or without BOQs.
- 2 The Architect may (conventionally) provide all the drawings; or he may produce a limited set, requiring the Contractor to prepare any further information which may be needed later.
- 3 The Contractor can be asked to assume the risk of delays in completion by any cause other than acts of the Client or the Architect. Alternatively the Architect can be empowered to grant extensions of time for a wider range of delay. It is assumed that the Contractor will price these alternatives accordingly.
- 4 It allows for the choice of adjudication, arbitration or litigation in case of disputes.

It has been argued that it provides ways of dealing with problems that beset many contracts (Hancock, 1984), but lacks the general agreement by all sides of the industry enjoyed by the JCT forms of contract.

A distinct edition (1984) of each document is produced for use with the BPF system of contract procurement. This is identical to the general edition wherever suitable. A schedule of activities takes the place of the schedule of rates option in the main form. The BPF system is distinctive in introducing related agreements to cover the work of consultants. Work is understood to be already in hand for a BPF design and build contract based on the JCT form.

The ACA forms are not being used very extensively.

5.4.6 ICE Forms of Contract

The ICE form is issued under the sponsorship of the Institution of Civil Engineers, the Association of Consulting Engineers and the Federation of Civil Engineering Contractors. The first edition was issued in 1945, followed by revisions in 1950, 1951 and 1955 up to the current edition which was issued in 1973. The last is about to be superseded by a revised third edition. The form is used extensively for civil engineering works both by private

employers and by local and some central government departments.

The forms imply a "measure and value" or "remeasurement" contract. This is made clear by the omission of any formal statement of the tender total in either the tender or agreement. The definition of contract price is the sum to be ascertained in accordance with the provisions. The Form of Tender with the Appendix printed on the back, the Agreement, the Form of Bond and the Conditions are bound together to form a single document. It will be noted that the Conditions cover constructional matters in much more detail than the JCT form and give the engineer greater powers over the mode of carrying out the work than are accorded to the Architect in the JCT form.

5.4.7 GC/Works/1 (General Conditions of Government Contracts)

This was previously known as the CCC/Wks/1 which was replaced in 1973 by the first edition of the GC/Wks/1 which in turn was amended in 1977. The second edition has been superseded by a third edition dated April 1990. It is not a negotiated document and, as one might expect, it gives the

Client greater protection than the other standard forms. However, although a number of the decisions of the authority are "final and conclusive", on most commercially important matters the Contractor may have recourse to arbitration regarding decisions of the Superintending Officer.

The contract may be used either for building or civil engineering works on either a lump sum or measurement basis. The term "Bills of Quantities" includes provisional and approximate Bills. Tenders are invited on the basis of an Abstract of Particulars relating to the particular job and there are no articles of agreement as in the JCT form; such articles of agreement are not necessary in Scotland.

There is also a GC/Works/2 which is a much simpler document for smaller jobs based on Drawings and a Specification.

5.4.8 FAS Form

This form is published by the Faculty of Architects and Surveyors. It is available in versions with and without quantities. There is also a minor works version of it

published in 1980. It is the least popular among the standard forms in use.

5.4.8 Non-standard Contract Clauses and Forms

It is occasionally necessary to introduce special clauses into standard contracts to cover unusual situations. It is also sometimes done by clients who wish to modify the standard effect of a contract in normal situations. In any such case, legal advice should be sought, as the close-knit wording of contracts can be upset by ill-considered changes. Any such change must, in the case of JCT forms, be in the beginning of the main contract document, and not in some other document in the contract, otherwise it will probably be invalid. Any such change will be construed *contra proferentum*, unless it was clearly agreed between the parties at some stage.

5.4.10 List of Standard Contract Forms

The following is a list of the more important forms at present published. In the main, they are those briefly reviewed in this study. In several cases there are other

subsidiary or related forms which, for clarity, are not included.

JCT Main Forms and Sub-contracts

Local Authority Editions

- With Quantities
- Without Quantities
- With Approximate Quantities
- Fluctuation Clauses 38, 39, 40 for use with Local Authority Editions

Private Editions

- With Quantities
- Without Quantities
- With Approximate Quantities
- Fluctuation Clauses 38, 39, 40 for use with Private Editions

Nominated Sub-contracts

- Sub-contract when NSC/1, NSC/2 and NSC/3 are used
- Sub-contract adapted for use when NSC/1, NSC/2 and NSC/3 are used
- Fluctuation Supplement, Clauses 35, 36 and 37

Other JCT Contracts and Documents

- Sectional Completion Supplement
 - Standard Form of Building Contract with Contractor's Design
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- Contractor's Design Portion Supplement for Standard Forms
 - Intermediate Form of Contract
 - Agreement for Minor Works
 - Minor Works Supplement
 - Standard Form of Management Contract
 - Works Contract for Management Contract
 - Invitation to tender
 - Tender
 - Articles of Agreement
 - Conditions of Contract
 - Employer/Works Contractor Agreement
 - Phased Completion Supplement for:
 - Management Contract
 - Works Contract
 - Fixed Fee Form of Prime Cost Contract

JCT Sub-contract Forms

For use with basic method of nomination under the SFBC

- NSC/1 Tender
 - NSC/2 Employer/Sub-Contractor Agreement
 - NSC/3 Nomination Instruction
 - NSC/4 Nominated Sub-Contract
-

For use with the alternative method of nomination under the SFBC

- NSC/2a Employer/Sub-Contractor Agreement
- NSC/4a Nominated Sub-Contract

For use with the naming method under the IFC

- NAM/T Tender
- NAM/SC Named Sub-Contract

JCT Related Sub-contracts

- DOM/1 Domestic Sub-Contract to the SFBC
- IN/SC Domestic Sub-Contract to the IFC
- DOM/2 Domestic Sub-Contract to the SFBC WCD

Scottish Forms (The "conditions only" versions required for the following are published by the JCT)

- Scottish Building Contract with Scottish Supplement
 - Scottish Building Contract with Scottish Supplement for Sectional Completion
 - Scottish Building Contract with Scottish Supplement for Approximate Quantities
 - For use with basic method of nomination under the SFBC
 - Tender
 - Employer/Sub-Contractor Agreement
 - Nomination Instruction
 - Scottish Building Sub-Contract with Scottish Supplement
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- For use with the alternative method of nomination under the SFBC
 - Employer/Sub-Contractor Agreement
 - Scottish Building Sub-Contract with Scottish Supplementent
 - Contract of Purchase where goods and materials are the property of the main contractor
 - Contract of Purchase where goods and materials are the property of the sub-contract

ACA Forms

- ACA Form of Building Agreement (suitable with or without quantities)
- ACA Form of Sub-contract
- ACA Related Documents for use with ACA Form of Agreement
- BPF Form of Building Agreement, British Property Federation Edition
- BPF Form of Sub-contract, British Property Federation Edition

FAS Forms

- FAS Form of Building Contract
- FAS Minor Works Contract

Government Contract Forms

- GC/Works/1 General Conditions of Government Contracts for Building and Civil Engineering Works
 - GC/Works/2 General Conditions of Government Contracts for Minor Works
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- Form of Sub-contract for use with GC/Works/1

Engineering Contracts

- ICE General Conditions of Contract for Works of Civil Engineering Construction
- Form of Sub-Contract for ICE Conditions
- ACE Model Form A: General Conditions of Contract for Home Contracts (IME/IEE/ACE)
- ACE Model Form D for Design and Supervision of Engineering Services

International Contracts

- FIDIC Conditions (International) for Civil Engineering Construction
- ICE Conditions of Contract for Overseas Work mainly of Civil Engineering Construction
- FIDIC Conditions (International) for Electrical and Mechanical Works

Other Contract Forms

- National Federation of Demolition Contractors: Form of Direct Contract
 - NFBTE Form of Contract for Design and Build
 - NFBTE Labour only Sub-contract conditions.
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5.5 DISCUSSION

There are basically three types of appraisal techniques viz. traditional methods; discounted cash flow methods; and cost/benefit analysis. The traditional methods, pay-back period and return on capital employed, are based on cash outlay and cash inflows without regard for either time value of money or social cost and benefits. The discounted cash flow methods, net present value and the internal rate of return, involve more information and calculations than the traditional methods. These techniques are based on the principle that money has a value related to time. Cost/benefit analysis is based on the principle that there are social costs and benefits which need to be quantified in monetary terms, if at all possible. It is the most widely used for public sector projects appraisal, although it is also appropriate for projects that are so large that they become a matter for government concern, rather than for the trading body alone.

It has been shown in this chapter that there are principally three types of tendering: Open tendering; Selective tendering; and Negotiated tendering. In practice,

however, these three are not completely different from each other: it is common for one type of tendering to incorporate some elements of other. Open tendering encourages bidding by contractors without restrictions. Selective tendering involves short listing a few contractors and inviting them to tender. Negotiated tendering is carried out with only one contractor. Negotiated tendering is normally appropriate if time is of essence, and there is not enough time to invite contractors in a competitive way, or where a contractor has particular qualities that are not shared with others.

There are basically two types of contractual arrangements: fixed price and cost reimbursement contracts. As with tendering, in practice an actual contractual arrangement may contain some features of both types. A fixed price contract may be for a lump sum based on drawings and specification, with a total fixed price for the whole of the work; or it may be a measurement type based on fixed prices for units of specific work without any quantities quoted. A cost reimbursement contract is one where the prime costs of labour, material, use of plant, etc, will be

paid to the contractor, plus a fee. The different ways in which such fees are determined underlie the different forms of cost reimbursement contract. Other forms of contractual arrangements exist in the UK, but are not popular in Nigeria. These include management contracts and term contracts.

In complement to the types of contractual arrangements are the forms of contract. Most of them are popular in the construction industry. The forms of contract are written by diverse bodies of the industry including: the Joint Contracts Tribunal, Association of Consulting Architects, Institute of Civil Engineers, UK Government (GC/Works), and the Faculty of Architects and Surveyors.

The above discussion has shown the range of standard types of contract and forms of contract currently available in the construction industry. It provides a background against which to compare the practice and problems of public sector clients in Nigeria and Scotland, that are the subject of the present work. It also draws attention to some principles that, although unpopular in current practice, may

however deserve practical application, especially in Nigeria. Such examples are the Term Contract for maintenance purposes, and the ACA conditions of contract, which specify the roles to be played by consultants much more explicitly than any of the other forms of contract.

CHAPTER 6

THE ENVIRONMENT OF PUBLIC SECTOR CONSTRUCTION

6.1 INTRODUCTION

The main objectives of this chapter are:

- to discuss the general background of Nigeria with respect to its broad economic activities, and specifically those relating to the formulation of a development plan; and the manner of the implementation of its constituent construction programmes.
- to review similar issues as they relate to Scotland, based on the information gathered by the author on visits to some of the public sector agencies, and on secondary data.
- to identify differences in construction practice in Nigeria and Scotland, particularly in the area of public sector construction.

6.2 NIGERIAN SCENE

6.2.1 Geography

The Federal Republic of Nigeria has a total land area of about 923,773 km². It is bounded on the east by the Republic of Cameroon; the north-east by Lake Chad; the north

by the Republic of Niger; the west by the Republic of Benin; and the south by the Atlantic Ocean.

Nigeria has a tropical climate. Its vegetation varies from mangrove swamps along the coast, through tropical forest to savanna grassland and semi-desert in the north. Two marked seasons - the dry and the wet - control the length of the crop year, and this varies markedly as one moves from the coast towards the northern frontier. The country's extensive land area incorporates a wide range of ferralitic soils whose suitability for intensive and mechanised cultivation has yet to be fully assessed and developed. The combined effects of topography, soil, climate and vegetation determine the land-use zoning with highly promising scope for primary production.

Physiographically, the country is traversed by three drainage systems. These are the Niger-Benue rivers with their numerous tributaries, the Komandugu-Yobe Rivers with their tributaries draining into Lake Chad, and the numerous coastal north-south-flowing rivers, all of which attest to the existence of significant water resources. From the southern coastline, the land rises to an undulating country

with scattered hills that give place to the hilly range at an elevation of some 610 meters. This range reaches heights of about 1,830 meters above sea level on the eastern frontier with the Cameroon Republic (Olayide, 1976).

Geologically, the country's rock structure is made up of Pre-Cambrian basement complex and crystalline rocks both of which form part of the main African continental mass. The crystalline rocks have been found to be fairly heavily mineralised as evidenced by deposits of tinstone, columbite, gold and iron-ore. Younger rocks of volcanic and sedimentary origin are exposed in many parts of the country. The sedimentary rock areas have been found to possess such minerals as coal, limestone and petroleum. The economic potential of the country's mineral resources appears very high and promising.

Nigeria became independent in 1960. It is the most populous and potentially one of the richest countries in Africa south of the Sahara.

6.2.2 Economic Setting

Up until 1970, agriculture was the mainstay of the Nigerian economy and accounted for over 50% of the country's Gross Domestic Product (GDP). It also constituted the main source of export earnings and public revenue. The 1970s however witnessed the transformation of the Nigerian economy to one heavily dependent on oil. The share of agriculture in the GDP declined from about 40% in the early 1970s to about 20% in 1980. By 1980 oil accounted for about 22% of GDP, 81% of Government revenue and 96% of export earnings. As a result of the "oil boom", efforts were made by the authorities to use the massive revenues from oil to restructure the economy, and considerable progress was achieved in the areas of social and economic infrastructure. However, heavy dependence on oil and imported materials rendered the economy highly vulnerable to adverse external factors. In effect the slump of the world oil market which started in mid-1981, resulted in an economic crisis whose seriousness could not be fully assessed at that time (discussed in Chapter 2).

In 1985, Nigeria had a GDP of ₦59.9 billion (at 1985 market prices) and a real growth rate of 1.3%. The per capita GDP for the same year was ₦629 with a real growth rate of -2.1%. Table 6.1 provides details of the GDP between 1981 and 1986.

	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<u>Total: ₦ bn</u>						
At current market prices	52.3	55.7	55.2	56.7	59.9 ^a	...
At constant 1977/78 factor cost	29.9	29.9	25.9	26.2 ^b	25.0	
Real growth (%)	....	-1.0	-8.5	-5.5	1.3	-3.1
<u>Per head: ₦^c</u>						
At current market prices	628	647	620	616	629	
At constant 1977/78 factor cost	359	347	307	281	275	250
Real Growth (%)	...	-3.3	-11.5	-8.5	-2.1	-6.2

^a Preliminary estimate. ^b Revised. ^c Based on IMF estimates
Source: Central Bank of Nigeria; 1987 Budget

Table 6.1: Trend of Gross Domestic Product (Nigeria)

Since 1970, Nigeria's exports have been dominated by crude oil, which in 1985 accounted for 97% (₦10.9 bn.) of total exports of ₦11.2 bn. The principal export commodities and their values for the period between 1980 and 1985 are shown in Table 6.2.

	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983^a</u>	<u>1984^a</u>	<u>1985^a</u>
Petroleum	10,632	10,681	8,003	7,201	8,841	10,891
Cocoa beans	274	137	122	226	183	230
Cocoa products	...	...	...	34	32	60
Rubber	...	...	...	15	17	21
Palm kernels & products	...	...	...	25	16	16
Total	14,187	11,024	8,206	7,503	9,088	11,215

^a Provisional data

Source: IMF, International Financial Statistics; Central Bank of Nigeria .

Table 6.2: Principal Exports (N mn)

It may be observed that total exports shrank from their record level of N14.2 bn (about US\$ 26 bn.) in 1980 to N7.5 bn (US\$ 10.4 bn.) in 1983¹. The period between 1984 and 1985 however witnessed some recovery mainly as a result of increased oil exports.

In 1982, the Government introduced import control measures. As a result, imports declined from a peak of N12.9 bn. (US\$ 21.5 bn) in 1981 to N7.9 bn (US\$ 8.9 bn.) in 1985. In the first half of 1986 raw materials accounted for

¹ Conversion at 1983 exchange rates.

44.7% of the total value of imports, while capital and consumer goods accounted for 39.3% and 15% respectively. Reductions in imports affect the construction industry in a negative way and contribute to the delay of projects that need imported materials for their implementation.

In June 1986, noting the vulnerability of the economy to factors affecting sustained growth, the Nigerian Federal Government intervened vigorously through the introduction of a "Structural Adjustment Programme", in order to restore the country's credit worthiness and to promote long-term growth. According to recent reports (West Africa, 1990) the measures introduced under that programme have been consistently followed, although the success of the programme has yet to be realized.

6.2.3 Population

It is estimated (based on extrapolation from the last census (1963)) that at the beginning of 1986 Nigeria had a population of about 116.2 million with a growth rate of 4.3% per annum (Economic Intelligence Unit, 1988). Nigeria's urban population constitutes about 22% of the

total, with an annual growth rate of between 6% and 8% per annum.

6.2.4 Building and Construction

With the exception of the civil war years 1968 and 1969, the building and construction sector showed a consistent upward trend since 1960. Its contribution to the GNP rose from ₦67.4m in 1960 to ₦821.4m in 1975 (Olayide, 1976). The rapid urbanization in Nigeria over the period 1973 to 1983 was mainly caused by the oil boom. This resulted in serious overcrowding, proliferation of slums and deterioration of the social infrastructure in most of the major urban centres. To rectify this situation, and to discourage further movement to the urban areas the Federal and all the 21 State Governments have been pursuing policies aimed at improving the social services not only in the urban areas, but also in the rural settlement areas. Considerable progress has been made in capital expenditure on building and civil engineering projects. This has led to the entry of new contractors, with the accompanying complications and tendering anomalies that have plagued the construction industry (implications discussed in Chapter2).

6.3 PRACTICE IN NIGERIA

Hearn (1980) in his study of some Nigerian Housing

Projects noted:

"Nigeria, with a sixth of the total population of the African continent, an area nearly nine times greater than that of Great Britain, rich in natural wealth but with a gross National Product per inhabitant only one tenth of that of the United Kingdom, retains a fierce desire to manage its own affairs after eighteen years of independence. Even during the colonial period it held a certain amount of autonomy."

but further observed that:

". after this long period of independence, and despite the split into a Federal system in 1967 and the two and a half year Ibo tribal war, the British legal system remains in force almost in its entirety, and one senses the desire to safeguard this particular heritage over all other foreign influences."

This is particularly evident in the construction industry where even State contracts use the basic Standard Form of Building Contract published by the JCT for the UK (see Chapter 5).

The provision of an administrative infrastructure related to construction by governments of different countries may differ in one way or the other, but the

overall concept is always similar. The Nigerian practice is summarised below.

6.3.1 Plan Development

In 1971 the Nigerian Government realised that planning had become increasingly technical. The Government decided that planning could no longer be left to general administrators, who are more concerned with broad matters of policy, and created a professional planning body. This planning body - Central Planning Office - was based in Lagos (Federal Capital) and was part of the then Federal Ministry of Economic Development and Reconstruction. The Central Planning Office has expanded rapidly with an expectation that the expansion and professionalism of the planning staff will be increasingly reflected in the quality of the plans formulated by the Government of Nigeria.

The preparation of National Development Plans is centered in the National Planning Office of the Federal Ministry of National Planning. Nevertheless the plans are the product of co-operative effort within and between the various levels of Government. In the process of formulating

the plan, extensive consultations take place between the officials of the National Planning Office and those of the other Federal Ministries and Agencies and State Ministries of Economic Planning. Each state has a planning division within its Ministry of Economic Planning or Finance. A joint Planning Board, comprising representatives of the different planning agencies, also exists to harmonize the different aspects of the plan. At the political level, there are the Council of Ministers/Commissioners responsible for economic planning; the National Economic Council, consisting of the President, the State Governors and the Governor of the Central Bank; and at the apex the President as Chairman of the Armed Forces Ruling Council. Figure 6.1 shows the relationships between these bodies. In an effort to make the planning truly national, ie to ensure that the interests of the private sector are taken into account so as to gain some valuable input to the plan, there are also consultations between the National Planning Office and representatives of the private sector bodies. Such organisations include: the National Association of Chambers of Commerce, Industry, Mines and Agriculture; and the Manufacturers' Association of Nigeria.

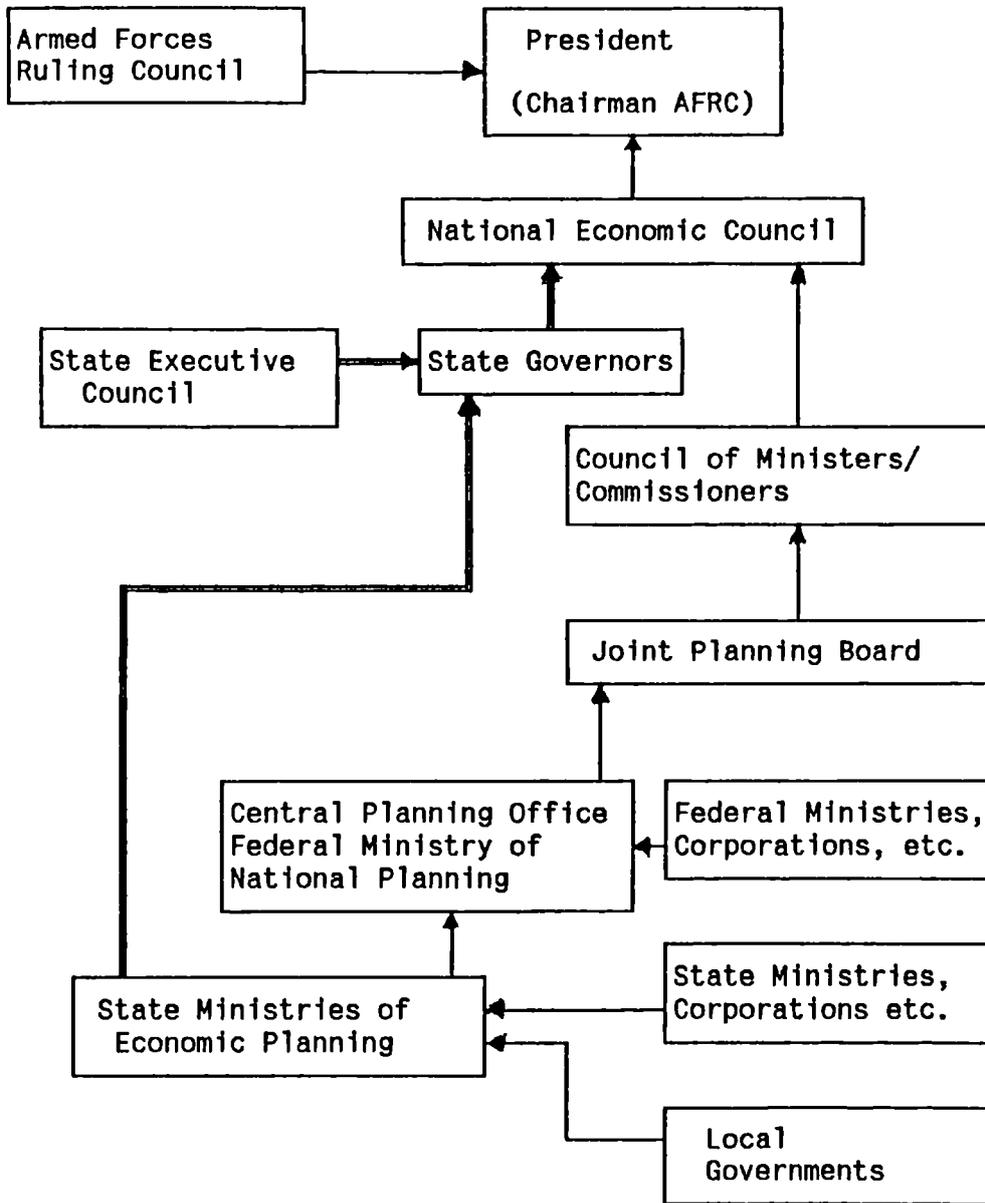


Figure 6.1: The Planning Machinery Under The Military Administration

At the initial stage of the planning process, sometimes sectoral consultants are commissioned by agencies to study a number of strategic sectors and to assist federal and state officials in articulating projects for inclusion in the plan (Federal Republic of Nigeria, 1975).

The structure of the plan document is broadly constant. The document is in two volumes. The first part of Volume I deals with general topics such as reviews of past development in Nigeria, the objectives, priorities and strategies of the plan, the general policy measures and the macroeconomic framework. This part provides the essential policy thrust on which the whole plan is based. The second part of Volume I gives a detailed programme for each sector. The sectors are classified into four broad groups - Economic, Social, Environmental Development, and Administration. The third part of Volume I gives the general nature and a summary of public sector programmes, the role of the private sector, the financing, manpower development and utilisation, and plan implementation and control of the plan. Volume II consists of a comprehensive list of approved projects by sectors and levels of

government. The information provided includes a short description of the scope of each project, together with indications of physical targets, and the approved financial allocation.

6.3.2 Plan Implementation and Control

In each of the five-yearly development plans the Federal Government sets out a policy statement, the procedures to be followed, and how the plan is to be implemented. This recognizes that, however brilliantly formulated, a plan cannot attain its stated objectives unless the projects, programmes and policies contained therein are effectively implemented. The Government sets these out in its effort to expedite the execution of projects and minimise distortions of the approved programme.

6.3.2.1 Preparing for Project Implementation

Every Ministry, Department or Parastatal (Agency) is responsible for implementing the projects approved for it under the plan. The efficiency with which the projects are executed provides a yardstick for assessing the

effectiveness of the Agency involved during the period. This implies that the Agency is directly responsible for initiating and carrying through the succession of activities necessary to accomplish the project(s).

Where the construction of a physical facility is involved, for example, a school, hospital, workshop or office block, the Agency is responsible for identifying suitable land and liaising with the relevant authorities for the purpose of obtaining an allocation of funding by the Government. The Agency is also free to engage private consultants in executing other essential tasks like the preparation of architectural and structural drawings, Bills of Quantities, and other contract documentation. Since the demand on the Ministry of Works for these services is usually heavy, procuring necessary expertise from the private sector is essential in implementing the projects. Also, in order to save valuable time and funds, executing agencies are normally encouraged to adopt existing designs for standard amenities such as classroom buildings and residential quarters.

6.3.2.2 Introduction of New Projects

Whenever a new development plan period starts the Government normally provides guidelines whereby new projects can, under special circumstances, be introduced into the various sectoral programmes. If, therefore, special circumstances compel Federal Ministries, Statutory Corporations, State-owned Companies or other Agencies to propose new projects for implementation during the development plan period, such proposals are, at the earliest opportunity, submitted direct to the Ministry of National Planning (Figure 6.2, step i).

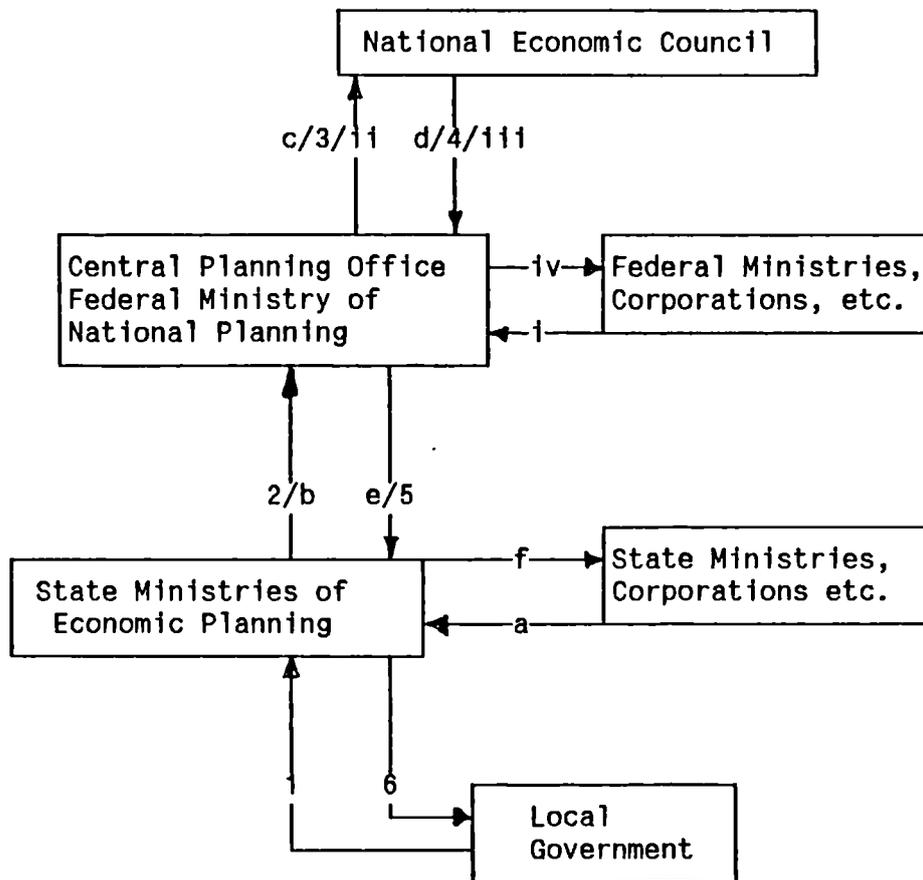


Figure 6.2 Procedure for Change in a Development Plan Within Plan Period.

Thus submission is direct if the project is initiated by a Federal Agency, or through the State Ministry of Economic Planning for State Government Agencies (step a) and Local Governments (step 1). In addition, any new project adjudged

acceptable by the Ministry of National Planning will be forwarded to the National Economic Council (ie step ii for Federal Agencies, c for State Government Agencies and 3 for Local Governments) for this consideration. Such a project cannot be included in the Agency's plan until the decision of the National Economic Council is communicated in writing to the Agency. Figure 6.2 shows the relationships between these bodies.

6.3.2.3 Change of Scope of Projects

Executing Agencies are not allowed to increase the scope of a project without written consent from the National Economic Council. A proposed increase in scope must be justified to the Ministry of National Planning, which forwards the case with appropriate recommendations to the National Economic Council. The proposed increased scope is admitted only after approval by the Council.

6.3.2.4 Variation in Project Costs

The actual cost of implementing a project very rarely, if ever, coincides with the estimated cost included in the Plan Document. The reasons for such differences constitute one of the elements explored in this study. Any increase in the cost of projects at the point of execution should be promptly communicated to the Ministry of National Planning and the Budget Department of the Executive Office of the President, giving reasons for the increase. Where the increase in cost is not more than 25%, executing Agencies may proceed with the implementation of the project. Where the increase exceeds 25% the Ministry of National Planning examines the circumstances and makes a recommendation to the National Economic Council. Further implementation of the project, and the revised cost, are subject to the decision of the National Economic Council.

All proposals by State agencies for cost increases are channelled to the Ministry of National Planning through the state Ministry of Economic Planning, the normal channel of communication between the two.

6.3.3 Contract Procurement Methods

It is apparent from most National Development Plan documents that for various reasons, Governments of Nigeria in general streamline tendering procedures early in the lifetime of a regime, with a view to expediting the execution of projects. This experience in Nigeria has resulted in a substantial rise in the value of contracts that the various Tenders Boards are deemed to be competent to award. In addition some kind of restriction has been placed on the tendering procedures allowed for use by public agencies.

6.3.3.1 Contract Limits

At the Federal level each Ministry and Parastatal has a Tenders Board empowered to award contracts not exceeding ₦2 million in value. Contracts of between ₦2 - ₦3 million must be referred to the Federal Tenders Board. Contracts in excess of ₦3 million must be referred to the Council of Ministers for approval. In addition there are the Armed Forces Tenders Board, and the Nigerian Police Tenders and Purchasing Board, who are empowered to award

contracts up to ₦5 million, subject to prior clearance with the President of Nigeria. A Federal Tenders Committee which was set up in every state has the power to award contracts of up to ₦250,000 in value (Figure 6.3).

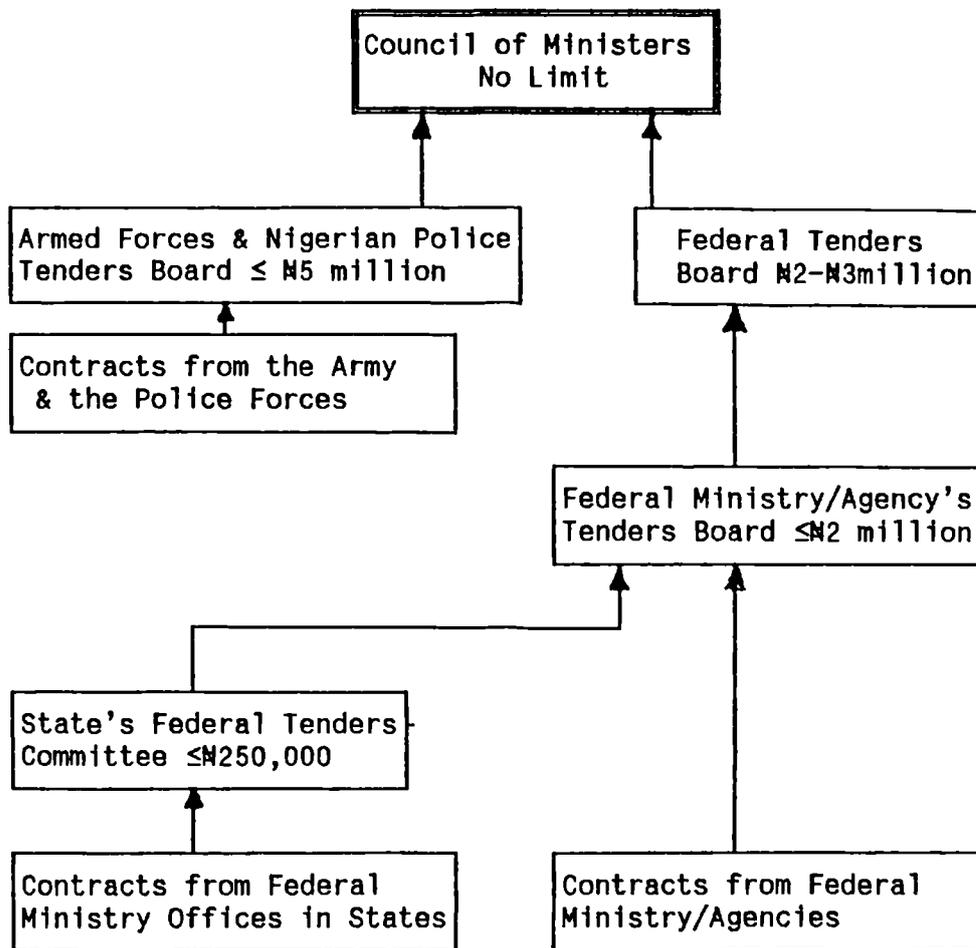


Figure 6.3 Contract Limits for Different Federal Government Establishments.

A similar system has been established in the various states and their respective agencies. The ceiling figure, however, differs from State to State, as well as the type of contract employed, differentiating between construction and supply types of contract.

6.3.3.2 Method of Letting Contracts

The Government operates the conventional method for engaging professionals to prepare contract documents for the letting of contracts. It discourages the concept of design and build on the grounds that it is more expensive and less flexible than the "conventional" method (The National Planning Office, 1981). Therefore, except in special circumstances complete design and contract documentation normally precedes the award of contract.

There are basically two methods of invitation to tender:

- a) contractors can be invited to pre-qualify, and thereafter those who are adjudged to be technically qualified are invited to tender; and
-

b) an open invitation can be issued to contractors registered in the appropriate categories of the Federal Works Registry. Depending on the size of the project in question, this open invitation is usually advertised in local, national and international publications.

However, from the late seventies, other types of tendering procedure have been increasingly used, particularly for implementing high priority projects over a limited period of time (eg Abuja projects - new Federal capital).

The first is selective tendering, where a few reputable contractors are invited to bid for a particular project.

The second is the consortium procedure which involves negotiation of a contract price for a large project or programme between the Government and a consortium of contractors specially formed for the purpose. The consortium approach was first introduced in the Third National Development Plan specifically for projects like the

road take-over programme, the communications programme, urban water supply schemes, universal primary education and the new standard gauge railway network. The aim was to benefit from that approach and to encourage foreign contractors to establish in Nigeria. It was believed that without a large package of contracts many large contracting companies from abroad would be reluctant to become involved in the country.

6.3.4 Contractual Arrangements

Many of the methods popular in the UK for contractual arrangements, eg the cost plus contracts, are no more than academic jargon in Nigeria, as they are rarely, if ever, practiced. The most popular forms of contractual arrangement are: firm fixed price; and fixed price with escalation provisions, as already explained in Chapter 3.

6.3.5 Forms of Contract

As already discussed there is no special form of contract drawn by the Nigerian Government for carrying out its projects: the old RIBA Form of Contract, and the various

editions of the JCT Conditions, are normally adapted by all Government agencies. The degree of adaptation depends on individual organizations, size of the project, and whether in-house staff or private firms are involved in the production of the documentation.

6.3.6 Monitoring of Project Implementation and Progress Reporting

It has been the practice in every Plan that systematic progress reporting be carried out as an integral part of the implementation process. Since every establishment has responsibility for the execution of its plan projects, it is also responsible for monitoring and implementing such projects, and for supplying detailed information (feedback) to the National Planning Office. The feedback information is necessary to inform Government and enable it to produce periodic reports on the progress of the Plan. Reports from these agencies are required to be made on a half yearly basis. This was found necessary in order to ensure that corrective measures are initiated before any identified problems get out of control, but investigations reveal that this requirement is not easily met. The

preparation of comprehensive national progress reports by the National Planning Office is however an annual exercise. This, as is usually stated in the Plan documents, is meant to allow sufficient time for reasonable progress before such comprehensive reports are prepared. Furthermore, when such reports are prepared they normally lack relevant information resulting in most columns showing "-", implying no information (National Development Plan Progress Report - 1985). This characteristic of the report renders it almost useless.

6.4 SCOTTISH SCENE

6.4.1 Geography

Scotland, including the Orkney and Shetland Islands, has a total land area of just over 70,000 km² and forms the northern part of the British Isles. The Shetlands lie in latitude 60° North and the northern most point of the Scottish mainland, Dunnet Head, near John o' Groats, is in latitude 58°40'. From the north to the southern border with England the mainland stretches 442km and its maximum width is 248 km.

On the north and west Scotland is bounded by the Atlantic Ocean and on the east by the North Sea. It is fringed by numerous islands: to the far north by the Orkneys and Shetlands, and on the west by the Hebrides. West coast islands include the Isles of Lewis and Harris, Skye, Mull, Islay, Bute and Arran. About 130 islands in all are inhabited. The total extent of Scotland's coastline is 10,100 km, of which 3,850 are on the mainland (Central Office of Information, 1974).

Scotland contains a rich variety of scenery and many contrasts, with mountains and lowlands, deep glens and coastal plains, temperate forests, and rivers and lochs. It is divided broadly into three regions: the Highlands, the Central Lowlands, and the Southern Uplands. The low land running between the Firths of Clyde and Forth and the Firth of Tay divides the Highlands (which include the Hebridean islands) from the rest of the country; and the Highland area itself is divided by the Great Glen into Northern and Grampian Highlands. Ben Nevis (1,342 meters) is the highest peak in Scotland (and in UK) and there are five other mountains of more than 1,200 meters. A line between Girvan and Dunbar roughly indicates the southern limit of the Central Lowlands, an area of undulating country, including some hill ranges, where most of the population centres and industry, as well as rich farmlands, are sited. The Southern Uplands contains seven major hill ranges of which the Merrick, in the Galloway Hills, is the highest peak at 842 meters. The Borderland of Scotland lies within this region.

Of the main rivers, Clyde, Spey, Tay, Forth and Tweed, the Clyde is the longest (170 km). There are over 1,500 km² of fresh-water lochs. On the Atlantic side, inlets penetrate the coast, forming deep sea lochs. On the east, where the North Sea has worn away the softer sands, there are wide estuaries with good anchorages.

The climate is temperate, to a large extent affected by the Gulf Stream from the South Atlantic. Although there are frequent changes of weather there are few extremes of temperature, and even in winter there is no month in which the average temperature falls below freezing point. Rainfall varies considerably according to area. The mountains and hilly parts are very wet, with annual rainfall exceeding 2000 mm, while the low-lying coastal strips are relatively dry. Over 5,000 km² of Scotland have an annual rainfall of less than 750 mm. (The annual rainfall for the United Kingdom as a whole is over 1000 mm.) The east coast is drier than the west and, during the summer, many districts in north and east Scotland have, on average, a total rainfall of less than 250 mm. In some winters the exposed northern counties have heavy snowstorms, with severe

drifting, but serious difficulties with snow-blocked roads are not common in the Lowlands. The ski-slopes rely on long-lasting snow beds, rather than general snow cover, for a considerable part of the season. These snow beds are formed in hollows known as "corries" and bear no relation to snow conditions outside the confines of the corries.

The windiest areas of Scotland are the Western Isles, the north-west coast, Orkney and Shetland. At Lerwick, in Shetland, the average speed varies from about 30 km per hour in January to about 23 km per hour in August. Over large areas away from the coast the average wind speed is nearer 16 km per hour. A feature of the summer in Scotland is the long twilight. On the longest day there is no complete darkness in northern Scotland. Generally there is little fog or mist, except on mountain tops, though poor visibility occurs at times between April and September, on or near the east coast. This is largely the result of sea fog, known as "haar".

5.4.2 Economic Setting

The pattern of Scotland's economy is broadly similar to that of UK as a whole, although in Scotland there is rather less dependence on manufacturing and more on other production industries, and the service industries (Scottish Office, 1988).

	Scotland		UK ¹
	£m	% of total	%
Services ²	16,148	60.2	61.8
Manufacturing	6,483	24.2	24.9
Construction	2,015	7.5	6.3
Energy and water supply	1,386	5.2	5.1
Agriculture, forestry and fishing	771	2.9	1.9
TOTAL	26,803	100.0	100.0

Notes

¹ UK excludes Continental Shelf Region; data is from Regional Accounts

² Service totals includes ownership of dwellings and adjustment for financial services; data from Regional Accounts.

Table 6.3: Gross Domestic Product in 1986

A breakdown of the Scottish Gross Domestic Product (GDP) for 1986 shows that, excluding oil and gas, manufacturing industry provided just under 25% of the total.

The other production sectors of energy and water supply, and construction, contributed 5% and 8% respectively. The agricultural, forestry and fishing industries accounted for 3% of GDP, while the service industries were by far the largest sector, with 60% of total output.

Knox & Wilson (1977) in their book on Scotland noted that:

"One of the difficulties about talking about, let alone dealing with, our economy is that he is as elusive a creature as the Loch Ness Monster. He changes his shape, position and direction so quickly that the only way we have of guessing his present whereabouts is by trying to make sense of his most recent sightings."

Scotland's economic structure in 1986 was similar to that of the UK as a whole, but with an endowment of natural resources linked to more activity in agriculture, forestry and fishing than in other sectors of the UK. Construction output was also more important, partly reflecting a high level of investment (see Table 6.5), including investment in oil and gas. The share of manufacturing and services were rather lower.

6.4.3 Population

Scotland's population in 1988 stood at just over 5 million (Scottish Office, 1988). It is the least densely populated part of the UK. With much of the country mountainous, Scotland's land area accounts for about one-third of the UK, while it has only 9% of the population.

In McGilvray's (1977) contribution to Scotland 1980, he noted that: "For many years the rate of growth of output in Scotland has been insufficient to absorb the available labour supply, and surplus labour have emigrated." The Scottish population has therefore been changing slowly. Over the decade to 1986, it fell by over 112,000. Emigration totalled almost 133,000, compared with 188,000 in the previous decade.

Of the 9 Regional and 3 Island authorities in Scotland, Strathclyde is by far the largest, and contains 46% of Scotland's population and 44% of people in employment. In the north, Highland Region and the Island Authorities account for 5% of Scotland's population and employment, and in the south, the Borders and Dumfries and

Galloway together contain a further 5% (Scottish Office, 1988).

Over the last decade the Regions to experience population loss have been Strathclyde, Tayside and Lothian, while the major gains have been in Grampian Region and the Highlands and Islands. The other 4 Regions - Borders, Dumfries and Galloway, Central and Fife - all show population increases in the range of 0-2%.

6.4.4 Building and Construction

The construction industry is one of the largest industrial sectors in Scotland, employing some 138,900 people in 1984. Construction employment accounted for 7% of total employment in Scotland compared with 5% in the UK.

	Scotland	UK	
	('000)	% of Scottish total	% of UK total
Services	1,260.2	67	67
Manufacturing	409.8	22	24
Construction	134.0	7	5
Energy and water supply	52.5	3	3
Agriculture, forestry and fishing	30.7	2	1
TOTAL	1,887.2	100	100

Source: Census of Employment 1986

Table 6.4: Employees in Employment in 1986

	1976 £m at current prices	1985	1976 % of UK excluding Continental Shelf Region	1985
Total (selected industries)	1,729	3,041	12.6	10.1
Agricultural, forestry and fishing	128	191	18.9	18.9
Energy and water supply	394	619	20.2	15.3
Manufacturing	466	861	11.9	9.9
Transport and communication	182	353	10.6	8.2
Dwellings	559	1,017	10.3	8.4
			£ per head	
Total (selected industries) per head of population	330	592	135.6	111.1

Source: Regional Accounts

Table 6.5: Fixed Investment in Scotland

The scale of fixed investment is an important determinant of the level of construction activity in Scotland. Only partial estimates are available. Out of the £3 bn total for selected industries, manufacturing accounted for 28% and energy and water supply 20%. The largest element was investment in dwellings which contributed 33% of the total. Scotland has benefited from a relatively high level of fixed investment over the past decade. For the industries for which information is available, Scotland's share of UK investment was 12.6% in 1976 and just over 10% in 1985.

6.5 PRACTICE IN SCOTLAND

Scotland has lived under one sovereignty with England and Wales since 1603, and under one Parliament and Government since the Treaty of Union in 1707. It has, however, retained many of its own institutions - including the legal and educational systems, and a distinctive local government structure. In addition it has a strong sense of national identity, and these factors have made it both convenient and desirable for special arrangements to be made for the conduct of Scotland's affairs within the system of government of the United Kingdom.

During the 1930s Scottish public opinion began to manifest itself strongly in favour of as much Scottish business as possible being transacted in Scotland, and a Committee of Inquiry was appointed to review the organisation of Scottish departments (Central Office of Information, 1974). As a result, the Reorganisation of Offices (Scotland) Act was passed in 1939, forming a system of central administration in Scotland. Under the Act, Government functions separately administered for Scotland were in the main entrusted to the Secretary of State for

Scotland, who is free to make any changes in the departmental organisation of the Scottish Office that he considers necessary to enable him to discharge his responsibilities.

In all developed countries the major political-economic goals of policy, and hence the aims of economic management, are the same. These have been to promote a rate of growth of output sufficient to provide employment for those willing to work, and provide rising standards of living. Management of the economy in the context of the developed nations refers to the instruments and methods by which the Government attempts to influence the level and distribution of resources in its economy, and their rate of change over time. In Scotland, the Scottish Development Department is the central unit responsible for general policy in regard to local government administration, and it is responsible for town and country planning, housing, roads, water and other environmental services. It is also concerned, among other things, with urban development and conservation, with all aspects of housing by local authorities, with the making and amendment of building

standard regulations and with the oversight of arrangements for public water supplies, sewerage and sewage disposal, the prevention of air and river pollution and coast and flood protection.

6.5.1 Plan Development

The Economic Planning Department has taken over what was formerly the Regional Development Division of the Scottish Office, dealing with the formulation of plans for economic development in Scotland and co-ordinating their implementation. It also includes some other closely allied divisions, such as those responsible for relations with the Highlands and Islands Development Board, the Scottish Tourist Board, the two Scottish Electricity Boards, the Scottish Transport Group and the New Town Development Corporations.

In addition to the Government structure for economic planning and regional development described above, many separate organisations represent the interest of the various groups and sectors of the country concerned with promoting economic growth. The Scottish Economic Council, of which

the Secretary of State for Scotland is chairman, has its members drawn from industry, commerce, trade unions, the local authorities, agriculture and the universities. It is the main source of advice and consultation on all matters affecting economic development. The Economic Planning Board for Scotland is mainly composed of senior civil servants representing the various Government Departments concerned with Scottish economic matters.

A number of regional bodies foster industrial and other development within their own areas. The Highlands and Islands Development Board is responsible for the seven Highland crofting counties. The board is directly financed by the Government and possesses extensive powers over the acquisition of land, building and the setting up of businesses. It gives financial aid in the form of grants and loans and offers incentives to investment. The other major regional agencies cover the west, north-east, south-west and south-east of Scotland, Tayside, the eastern Borders, the central Border counties and the new towns. The aim of structural balance is being adopted, giving equal emphasis to all regional development projects.

6.5.1.1 Priority Ranking

Priority ranking is one of the recent innovative schemes developed by the public sector in Scotland. Although it is still at an early stage of development it is nevertheless widely used, especially in civil engineering departments all over the UK.

Due to limited information on priority ranking with respect to buildings, the example available, which refers to a road project, will be explained with particular reference to the practice in Central Scotland.

Since the mid-1970s, many UK local authorities have developed analytical tools to enable them to establish a set of priorities for competing highway scheme proposals (Simon *et al.* 1988). These Priority Assessment Techniques (PATs) vary greatly in structure, complexity, data requirements, diversity of schemes to which they are applied, and role within the planning process. Nevertheless they all seek to reduce multivariate information on different projects to a common base, thereby permitting comparison and the setting of priorities in order to optimise the use of scarce capital resources.

The Department of Transport (DOT) has developed several techniques for assessing new projects - especially roads. A computer based cost benefit analysis (COBA) model is the major tool for trunk road assessment (ACTRA). The DOT found the methodology to be essentially sound, but strongly biased towards those factors which could readily be given monetary values (Simon, 1986). A priority "score" is included in the 10 year capital expenditure programme, so as to regularise the method of choosing future projects. The method of establishing this score has to balance the needs of rural and urban communities, and must adequately reflect the local council's stated transport policies.

In the following sections the method used to obtain a priority "score" is summarised. It should be emphasised that the method detailed is used only for Roads Department expenditure, and was not intended for comparisons of inter-departmental budget provision. Individual road scheme proposals are assumed to have already been proven to be the best way to solve their particular problem, therefore the following method is used to compare different schemes designed to solve a particular problem.

There are four elements used in the assessment method as presented in Simon's (1986) work:-

Policy Content

Level of Need/Demand

Level of Achievement

Value for Money

The priority assessment techniques developed by local authorities are, with few exceptions, of the points scoring variety. They are a form of multi-attribute decision making tool designed to facilitate direct comparison of diverse projects. Each element carries a points score ranging from 0 - 5, and the points score for the policy content is multiplied by the sum of the scores for the other three elements to obtain a total score for the scheme ranging from 0 to 75. Thus, while all the main elements of justification are included, the policy content will carry much more weight than the other elements.

(a) Policy Content

The policies of the Regional Council as regards transportation are published in a book termed TPP. Each of these individual policies has been given a score from 1 - 5

reflecting their relative importance, and each scheme has been allocated to particular policies thus obtaining a total policy score for the scheme. A typical example of the calculation indicating the proposed policy scores is shown in Figure 6.4.

POLICY	HM1	HM2	HC1	HC2	HC3	HC4	HC5	HC6	HC7	HC8	SL1	PK1	PK2	PK3	PK4	PT1	PT2	PT3	POLICY SCORE
POLICY WEIGHTING	4	5	4.8	5.0	4.5	4	3	2	2.5	1	3	3.8	3	4	2	4	3	3.5	
PROPORTION APPLICABLE				0.5		0.5													
WEIGHTED SCORE				2.5		2													

Source: Central Regional Council, Stirling

Figure 6.4: Policy Score Calculations

(b) Level of Need/Demand

This is intended as a reflection of the number of people affected by the particular problem being dealt with by the scheme, and in this example it is primarily related to traffic flow, ie

0 - 4,000 vehicles/average August day = 0 - 1

4,000 - 8,000 vehicles/average August day = 1 - 2

8,000 - 12,000 vehicles/average August day = 2 - 3
12,000 - 16,000 vehicles/average August day = 3 - 4
16,000 - 20,000+ vehicles/average August day = 4 - 5

Within the context of "Level of Need/Demand" a certain degree of flexibility has been retained to consider the relative severity of the problem, eg duration of delay; rate of accidents; whether alternative means of access are available; traffic noise considerations; high heavy goods vehicle content; whether it is essential for public transport; whether it is a particularly bad environmental problem. This flexibility allows for up to one point only to be allocated in special circumstances.

(c) Level of Achievement

This element in the calculations is necessary in order to reflect how well the problem will be solved, ie although the need for action may be low the achievement in terms of better traffic distribution, environmental improvement etc. can be high; or vice versa. The level of achievement is intended to differentiate between worthwhile schemes and those which may be "immaterial".

The scale adopted by some authorities to reflect level of achievement is as follows:-

Problem solved	0 - 20% = 0 - 1
Problem solved	20 - 40% = 1 - 2
Problem solved	40 - 60% = 2 - 3
Problem solved	60 - 80% = 3 - 4
Problem solved	80 - 100% = 4 - 5

(d) Value for Money

For road schemes the value for money element can be related to the first year economic rate of return (ERR). In the past the ERR for a scheme has been the only numerical indication of how worthwhile a scheme may have been, as is still the case in Nigeria. It would obviously be wrong to consider ERR as the only priority rating, as the previously unquantified considerations of policy, need and achievement have always been, and must continue to be, part of the priority rating system.

The points for the ERR are allocated as follows:-

0 - 5% = 0 - 1

5 - 10% = 1 - 2

10 - 15% = 2 - 3

15 - 20% = 3 - 4

20 - 25%+ = 4 - 5

ERR will be estimated for schemes without a full ERR calculation.

It should be noted that the policy and achievement ratings are necessarily subjective, but every effort is made to avoid bias.

6.5.2 Cost Control Techniques

Scots have generally been credited with a practical and logical turn of mind, and it is not surprising therefore that Scotland has produced a notable number of scientists and inventors whose work has been of immediate benefit to the world or has opened new areas of investigation for subsequent development.

The Scottish contribution was perhaps particularly strong in the eighteenth and nineteenth centuries, as noted in Pamphlet No 120 issued by the Central Office of Information (1974). Scotland took a full share in bringing about the economic transformation of the industrial revolution. It has been argued that Scotland pioneered the development of present day quantity surveying (Inglis, 1987a; Horne, 1987 and Phillips, 1957), the profession which now champions the development of construction cost control techniques in the UK and many other countries.

Cost control in the public sector in Scotland may vary between different organisations, but they all have one thing in common: an effective monitoring system which starts from the approval of a scheme by the Client. For local authority works, the local authority Department of Architectural and Related Services (DARS) is particularly concerned with expenditure arising from the building component of the contract and is therefore responsible for formulating the cost control procedures. There are two types of cost control (financial monitoring) methods in the public sector:

- monitoring of expenditure on the whole capital programme.
- monitoring of expenditure on individual projects.

6.5.2.1 Monitoring of the Capital Programme

This is a monitoring procedure whereby the total capital expenditure for all projects in the Council's programme is regularly reviewed to ensure that it uses up, but does not exceed, the Capital Allocation (including Capital Receipts) for the current financial year.

Housing Capital Expenditure for example is set out in the Capital Estimates, sub-divided into Cap1 for committed projects and Cap2A for uncommitted projects.

Project tender cost figures for Cap1 projects are generally derived from actual tenders approved by the appropriate committee.

Project tender cost figures for Cap2A projects are estimated by DARS on the basis of average unit costs from previous tenders, adjusted up or down according to information available on the projects at that time. They are often prepared in advance of detailed briefs.

The current year's expenditure data in the Estimates for both Cap1 and Cap2A are estimated expenditure figures. The current year expenditure figures are subject to change compared to the Capital Estimate due to the following:

- Cap1. a) Contractor's inability to keep to his indicated programme because of adverse weather, labour productivity problems, materials delivery difficulties, unforeseen structural work, etc. delaying progress.
- b) Contractor's improving on his indicated programme because of better weather, higher productivity, better materials delivery than anticipated and no delays to progress on account of unforeseen work.

Cap2A. Expenditure figures can be affected by any or all of the matters detailed for Cap1.

In addition, Cap2A figures may be affected by:-

- a) Slippage in the pre-tender programme affecting site start dates, thereby reducing the time available to spend money in the current year. Such slippage may be due to:-
-

- i) late or incomplete briefs.
 - ii) change to the briefs.
 - iii) unforeseen structural problems requiring lengthy pre-tender investigation.
 - iv) delays in Committee approval.
- b) Substantial variation between estimated tender amount and tender as received. These variations can arise, as noted earlier, due to estimates requiring to be prepared in advance of detailed briefs.

One important thing always noted is that these expenditure figures are just what they say they are- "Estimates", and are variable on account of the provisional extent of the work required on many projects, and on account of the unpredictability of some factors affecting the rate at which the Contractor is able to carry out the works.

In order to monitor, check and review these estimated expenditure figures, the monitoring report is produced for the Committee's consideration every 4 weeks.

Under this procedure the Quantity Surveyor produces for all committed projects a Monthly Financial Statement as illustrated in Appendix I for two different Scottish local authorities. This statement shows a comparison between the Approved Contract Amount (ie the Contractor's tender plus any supplementary expenditure approvals) and the Estimated Ultimate Expenditure (which is the latest assessment of the out-turn cost of the work). An estimate of the spread of expenditure over the current and other financial years is also shown. The updated expenditure is shown against each of the 13 four-weekly periods for the current year.

As soon as a project is committed (ie the tender is accepted) the project is listed in the DARS green book (it may have a different name in different organisations). The green book covers all Housing Capital committed projects whose expenditure will be set against the Housing Capital Allocation. Appendix II illustrates a typical page.

Each project has two lines of expenditure against it. The top line gives the monthly "spend" profile established when the project is committed. The bottom line shows the actual monthly "spend" achieved to date entered by

typing, with the "spend" forecast for the remaining periods in written figures.

The procedure for gathering all the figures for each project in the programme involves:

- a) site valuations of work done to be carried out within a prescribed timetable
- b) measurement of actual work to check provisional quantities, and adjust for variations, to be kept up to date.
- c) due allowance to be made in the monthly "spend" estimate for any changes in the rate of the Contractor's progress on site.

Accounts from statutory bodies for water supplies, Scottish Gas and Electricity Board charges, telephone charges, and road repair charges, are also allowed for in these expenditure forecasts, although the date of presentation of such accounts can be unpredictable.

With regard to projects in the programme which have not yet been committed, estimated expenditure for the current year is also reviewed monthly, updating figures in

the light of latest information regarding proposed work content and likely site start dates.

When DARS has reviewed the expenditure estimated for all the programmed projects, a meeting is arranged with the Finance Department and Housing Department to combine the various figures. This results in the production of the Monitoring Summary (Appendix III) which compares:-

- a) the total original estimated expenditure with current forecast expenditure, and
- b) the Housing Capital Allocation with the total current forecast of expenditure likely to result from the programme.²

The Financial Monitoring Summary is presented initially to the Policy and Resources Sub-Committee on Monitoring, together with any recommendations for action by Council if the Summary is forecasting a substantial underspend or overspend relative to the financial allocation.

² The collation of these figures is done with the aid of an Artemis or similar computer programme.

Such action might take the form of:-

- a) bringing forward more projects or other forms of expenditure to take up a forecast underspend, or
- b) delaying commitment of uncommitted projects to offset a forecast overspend.

The process of monitoring the Housing Capital Expenditure in Scottish public sector agencies is a continuous one, the preparation of each month's figures starting as soon as the previous month's figures have been completed.

In essence, the financial monitoring of the Housing Capital Programme is able to provide the Council with the best available information on the financial commitment resulting from its programme, particularly in the current year.

6.5.2.2 Monitoring of Individual Projects

Monitoring of individual projects by DARS is a process whereby the total contract cost of a project, which may be spread over two or three years, is monitored to

ensure that the amount of the Contractor's tender as approved by the Council Committee on Housing is not exceeded. If additional work on the contract appears to be necessary, and cannot be contained within the Contractor's approved tender amount, a Supplementary Expenditure Report prepared by DARS is submitted to Committee for approval. This procedure is quite separate from the monitoring of the construction programme as a whole.

6.6 DISCUSSION

It is clear that although Nigerian practice was originally copied from the UK it has remained stagnant in Nigeria while construction practice has been updated in the UK. Many improvements to the practice in the UK have been developed over the years. The most important and evident differences between the two countries are that planning is very much decentralized in Scotland; implementation strategies, eg a priority ranking technique are used; and emphasis is placed on cost control/monitoring techniques.

In current Nigerian practice, the planning process is highly centralized, whereas many regional organizations in Scotland are involved in the planning process.

Priority ranking of projects, which attaches a realistic monetary value to projects, and hence simplifies them for classification in order of priority, helps to answer the difficult question as to which projects should have priority. Without such a technique, it is quite common to start up many projects at once, and if there should be a financial squeeze, it may render all the projects at risk of

non-completion. This often happens in Nigeria, as was illustrated in Chapter 2.

The method of monitoring a project by revaluing it on a monthly basis gives more effective cost control than other methods, because it gives an early indication of overrun problems. An investigation by a Ministerial Committee in Nigeria (Federal Government Press, 1981) rightly identified inadequate monitoring as a reason for the excessive cost of building projects.

One very important observation is that many of the techniques practiced in Scotland are not yet found in books. This strongly points to the efforts in developed countries to improve their practices. Examples of these are the priority ranking and the monthly monitoring of projects. If the developing countries are to benefit from the new technologies developed in the developed countries, they must also improve working practices.

CHAPTER 7

METHODOLOGY

7.1 INTRODUCTION

This chapter discusses research methods generally, and presents the method implemented in this study for answering questions regarding problems of management and cost control of public sector construction projects in Nigeria.

7.2 RESEARCH METHODOLOGY OVERVIEW

Research has been defined by many authors in the research methodology field. For example, Howard and Sharp (1983) define research as "seeking through a methodological process to add to one's own body of knowledge and, hopefully, to that of others, by the discovery of non-trivial facts and insights". Research can also be defined as a systematic, and careful inquiry or examination to discover new information or relationships, and to expand or verify existing knowledge for some specific purpose. Kerlinger (1986) defines scientific research as "a systematic, controlled, empirical, and critical investigation of natural phenomena guided by theory and

hypotheses about the presumed relations among such phenomena". It can therefore be inferred from the foregoing that research is primarily seen as being carried out through a systematic process with the purpose of giving the researcher new knowledge, or for the purpose of adding to a particular body of knowledge. Research can be classified by different aspects, such as the field of study, the purpose of the work, the approach taken, and the general nature of the research.

There are many different possible purposes of a research project. Howard and Sharp (1983) classified research into what they call the common classification: (a) to review existing knowledge, (b) to describe some situation or problem, (c) to construct something new, and (d) to explain. Along the same lines, Kidder and Judd (1986) specify the purpose of research as (i) discovery, (ii) demonstration, (iii) refutation and (iv) replication.

If discovery is the prime purpose of research, the researcher gathers data in an attempt to discover what might be responsible for some phenomenon or behaviour. When

conducting research for this purpose, the researcher is operating in what is called an "inductive" manner, attempting to move from observation to development of an hypothesis.

However, research such as the present study often serves more than a discovery function. That is, research may be carried out for deductive as well as inductive purposes. Deductive research is designed to test, ie to support or discredit, some existing hypothesis, rather than lead to a new hypothesis.

7.2.1 Research Approach

Many different methods can be employed in exploring a problem situation, in helping to solve a problem, or in establishing whether a hypothesis is acceptable or not. Four common research methods, the last two of which are used in this study, are the laboratory experiment; the field experiment; the field study; and the survey.

7.2.1.1 The Experiment

The classical research method of physical science is the experimental method. Normally physical science researchers aim to set up a situation in which all the variables can be controlled. They usually try to hold all variables constant except one. By varying this one and monitoring changes in the outcome, the relationship between variables can be carefully studied and documented. Usually the variables may be measured as real numbers on a pre-defined scale. Such an approach clearly meets the requirements of the scientific method. It does not, however, meet all the requirements of social research, where variables are often "qualitative" and can only be ranked, or have a binary nature.

Experiments are broadly of two types: the laboratory experiment and the field experiment. A laboratory experiment has the inherent virtue of the possibility of relatively complete control, while the field experiment is a research study in a situation where one or more variables, which may or may not be independent, are studied by the experimenter

under as carefully controlled conditions as the situation will permit (Kerlinger, 1986).

The distinction between the laboratory experiment and the field experiment is in reality not always sharp. Whereas the laboratory experiment allows a maximum of control, most field experiments must operate with less control, a factor that is often a severe handicap and dictates the need for statistical analysis. Field experiments are admirably suited to many social and educational problems.

7.2.1.2 Field Studies

Many types of research, for example, geophysical and ecological, depend much on field observations (Howard et al, 1987). A case study¹ is "a non-experimental scientific inquiry aimed at discovering the relations and interactions among sociological, psychological and educational variables in real social structures" (Kerlinger, 1986). Often a field

¹ In this type of study a researcher may spend a period in an organisation and the comments and conclusions which emerge will be based solely on his experiences in that setting (Howard and Sharp, 1983)

study is implemented for the intensive examination of one entity, such as a small group of people or a single organisation. Field studies involve measuring and studying what is there and how it gets there. Results from one case study cannot with certainty be generalised, or applied to other similar cases, because the case looked at may be unique and therefore not representative of other instances. Two types of case study can be carried out, namely, exploratory studies and general hypothesis testing.

Exploratory studies have three purposes (Kerlinger, 1986): to discover significant variables in the field situation; to discover relationships among variables; and to lay the groundwork for later more systematic and rigorous testing of an hypothesis. Field studies, by their nature, do not admit rigorous control, which is both a strength and a weakness. The strength is that there is a greater "realism" ie the situation is studied as it is, not in some idealised form. The weakness is that things may get out of hand, for example, sudden incidents may erupt and destroy the validity of the research.

The field study method is extremely useful in exploratory studies where the main interest is in developing a rich variety of suggestions.

The field study method has four steps (Howard and Sharp, 1983):

- (a) determining the present situation,
- (b) gathering background information about the past and about key variables, when the research often leads to a list of possible causes of the current situation,
- (c) testing an hypothesis,
- (d) further work, depending on the result of (c).

7.2.1.3 The Survey

"Survey research studies large and small populations by selecting and studying samples chosen from the populations to discover the relative incidence, distribution and inter-relations of sociological and psychological variables" (Kerlinger, 1986). Typically survey researchers gather their data as verbal responses to predetermined

questions asked of as many research subjects as possible. In the planning of surveys, careful attention must be given to both wording of questions and the way in which the questions are presented to respondents. As a survey questionnaire is planned before the data collection begins, surveys cannot explore the responses of individual subjects in great depth, as can be done in face-to-face interviews.

On the other hand, the systematic collection of data from each respondent allows for the exploration of relationships among variables that are measured. Such relationships cannot be explored properly if each respondent or situation is not treated in the same way. Because surveys produce so much information, thought must be given before data is collected as to how it will be analysed.

Only rarely do survey researchers study a whole population. Instead they draw samples from the populations to be studied. From these samples they infer the characteristics of the whole population through statistical analysis. The study of samples from which inferences about populations can be drawn is needed because of the

difficulties of studying whole populations. Random samples can often furnish information as adequate as from a census (study of an entire population) at much less cost, with greater efficiency, and sometimes greater accuracy (Kerlinger, 1986).

The survey can be used for two quite different purposes. The first is to describe current practices and events. Such surveys are termed "polls". The main purpose of a polling survey is to obtain responses or answers to an issue. It can be used to determine the extent to which certain practices are common, or the extent to which certain trends are becoming apparent.

A second use of the survey is for analysis. Analytical surveys go beyond simply describing the current state or practice. A polling survey of one organisation may show that all its managers exercise an authoritarian style of management, but it enables us to say little else of importance. For example, why do all the managers exercise such a style, and how does that style influence the performance of the organisation? Analytical surveys may help in answering such questions.

In any research project, data may be gathered for descriptive purposes (inductive). Further data may be required to test a specific hypothesis, so that the research then becomes deductive. What data should be collected, and how is it then used in the study? The answers to these questions are the subject of the next section.

7.2.2 Data Collection Techniques

Data collection involves a range of activities, from the individual in a library, extracting from volumes of national and international statistics, to a team of thousands collecting national statistics as in a national census (Casley and Lury, 1981). Data sources can be classified, according to types of data into two general categories: secondary and primary sources (Howard, 1987). Secondary sources of data are usually more accessible than primary sources.

7.2.2.1 Secondary Data

Secondary data often means statistics that have not been specifically gathered for the present study, but for

other purposes. Secondary data also means it is collected by others, and published in some form that is nevertheless acceptable for the study at hand. Secondary data can be classified as coming from internal or external sources: the former are available within the data-collecting organization, and the latter from outside. External data can come from a variety of sources, such as government publications, books, bulletins and periodicals. Books and journals are the most important sources of what has been called textual data (Howard, 1987). Official publications are some of the most important sources of secondary data. The most frequently used official data is probably the statistics compiled by government departments. Official statistics of other countries, and those of international organisations such as OECD and UNESCO, are important parts of the international official publications. Recent developments include data stored on computer databases.

Secondary data is characterised by its ready availability and low cost. However, the disadvantage, Churchill (1983) argued, is that because secondary data has

been collected for other purposes, only rarely will it be accurately related to the immediate problem.

7.2.2.2 Primary Data

Primary data is the data which the researcher gathers himself for the purpose of a specific investigation.

Communication and observation are two basic means of obtaining primary data (Kidder *et al.*, 1986). Communication involves questioning respondents to secure the desired information, using a data collection instrument such as a questionnaire. The questions may be oral or in writing, and the responses also may be given in either form.

Observation means that the situation of interest is checked, and relevant facts, actions or behaviours are recorded.

The communication method of data collection has the advantages of versatility (the ability of a technique to collect information on the many types of primary data of interest), speed and low cost. Communication is a faster means of data collection than observation, because it

provides a greater degree of control over data gathering activities. However, observation usually produces more objective data than does communication.

The communication method of data collection has its own disadvantages, such as: the respondents' unwillingness to provide the desired information (a particular difficulty faced by surveys in developing countries); the respondents' inability to provide the desired data; and the influence of the questioning process on the respondents' answers.

7.2.3 Sample Size Specification

This section is mainly concerned with the choice of method by which the required primary data are collected. One of the methods that the researcher can use to obtain data is to question each member of the population of interest.

A complete canvass of a population is called a census. If a census is not feasible, data can be collected from a sample of the population and, on the basis of the data collected from this subset, some conclusions about the

large group may be deduced by statistical analysis (Ackroyd *et al.*, 1981), provided the sample is a random one.

A sample is a limited number taken from a large group for testing and statistical analysis, on the assumption that the sample has been taken entirely at random from the whole group or population. In theory it would seem possible to question all members of the population, but in practice this often proves difficult, or too expensive.

It is the practical advantages which account for the fact that sampling is the usual approach to collecting data, rather than a census in which the whole population must be included. Hence, sampling is frequently used because compared with a census it offers major benefits, such as saving money and time.

Sampling methods can be broadly grouped into two different categories: probability and non-probability sampling.

7.2.3.1 Non-probability Sampling

Non-probability sampling involves some personal judgement in the selection process. Respondents and interviewers are the individuals who are most likely to impose their own personal judgement in the sample selection process. There are three types of sampling procedures in the non-probability category namely: accidental sampling; purposive (judgement) samples; and quota samples.

7.2.3.2 Probability Sampling

Probability sampling has a distinct characteristic that one can specify that all elements of the population have exactly the same probability of being included in the sample. In non-probability sampling, there is no way of estimating the probability of each element being included in the sample, and therefore, no assurance that every element has the same chance of being included. Probability sampling includes: simple random sampling, stratified random sampling, cluster sampling, multi-stage sampling and stratified cluster sampling (Green, 1978; Honigmann, 1982).

7.2.4 Primary Data Collection Techniques

Choosing a method of collecting primary data implies that a number of supplementary decisions must be made. For example, should the researcher administer questionnaires by mail, by telephone, or in person? Should the answers be open-ended or closed? Churchill (1983) noted that a decision with respect to method of administration has serious implications regarding the structure that must be imposed on the questionnaire.

On this basis Kinnear (1983) classified data collection methods into four: structured-direct; unstructured-direct; unstructured-indirect; and structured-indirect, These can be described as follows.

7.2.4.1 Structured-direct

This is the commonest form of data collection technique, in which questions are asked in a face-to-face interview with exactly the same wording and in exactly the same sequence for all respondents. Some of the advantages of this technique are administrative simplicity and ease of

data processing. Analysis and interpretation are also simplified by the "structured-direct" approach. Its disadvantages are that respondents may not be able or willing to provide the required data.

7.2.4.2 Unstructured-direct

With this technique the purpose of the research study is made clear to the respondent. There is a degree of flexibility in how the questions are asked and in the extent of the probing, depending on how the interview proceeds. The response format is open-ended. The "in-depth interview", where an unstructured personal interview uses extensive probing to get a single respondent to express detailed beliefs and feelings on a topic, is an extension of this technique.

7.2.4.3 Structured-indirect

This data collection technique is often referred to as the "performance of objective task" technique. In its implementation, respondents are asked to report factual information about the subject of interest in order to

measure indirectly the direction and strength of their attitudes. A structured questionnaire is the medium used for communication between researcher and respondents, but the questioner does not constrain the responses.

7.2.4.4 Unstructured-indirect

This type of data collection is also called the "projective technique". It is basically designed to obtain data indirectly about respondents' beliefs and feelings. The communication medium is the personal interview and tape recording, and/or note taking. Asking questions in such an unstructured sequence has been found useful in exploratory research situations, but analysis of results is complicated.

7.2.5 Data Analysis

There are two principal techniques with which data from a survey may be analysed.

7.2.5.1 Qualitative Data Analysis

Depth interviews and group discussions represent the common ways in which qualitative data are collected.

Usually, each data collection session is tape-recorded. As a first step in the analysis, the researcher listens to the recorded sessions, or reads interview notes (where the interviews have not been tape-recorded), several times. During the listening or reading the analyser takes notes on points made; then in the following stage, he categorizes and classifies the answers given by the respondents.

The outcome of such an analysis is a report which indicates the range of views expressed, together with an indication as to whether or not the views were strongly held and widely supported.

7.2.5.2 Quantitative Data Analysis

Quantitative data is usually obtained from a written questionnaire. The result will be a large number of completed questionnaires containing both pre-coded or open-ended answers. In order to combine all the answers and thus make a meaningful summary of responses, there are a number of stages in the analysis process, such as data preparation (data coding), data processing, analysis, describing and testing (Kidder et al, 1986).

Editing is one of the main operations in data preparation, and its objective is to detect and eliminate errors or inconsistencies in the responses. Coding follows editing, with the aim of classifying the answers to questions into meaningful categories, so as to facilitate interrogation of the data.

Once the data has been edited and coded, it is often assembled into some kind of table or database, ready for statistical analysis. There are three main ways in which statistics are used in the analysis of data (Kerlinger, 1986): to describe; to indicate degree of significance; and to seek relationships between sub-sets of data.

Results from analysis must be reported. This is the last important stage in the process of any research.

7.3 METHOD IMPLEMENTED IN THIS RESEARCH

With reference to Section 7.2 and to the objectives and peculiarities of the present study, the selected research approach is now discussed.

7.3.1 Data Collection Technique

Howard and Sharp (1987) state that "the type of analysis and its purpose substantially dictate the type of data needed". The sources of data and the present collection procedure(s) were based on the objectives of the study, and on the constraints within which the research was being carried out. In this research study, therefore, the types of data required are those concerned with the problems of controlling public sector construction projects in Nigeria.

7.3.1.1 Sources of Data

Gaining access to data is often a problem for the student researcher, especially when it is related to work carried out in developing countries. Special facilities may

have to be sought to gain access to the required information. The sources of data used here were basically as discussed earlier: primary and secondary. The main secondary sources were books and periodicals, used mostly for the Literature Review of the related areas of the study, especially in Chapters 3, 4 and 5. Official publications such as those published by organizations like the UK government statistical department, central and local government, World Bank and Nigerian National Planning Ministry were extensively used for Chapter 6, which reviews the different practices in Nigeria and Scotland. Journals and conference proceedings were used as a basis for writing the questionnaire. Other official sources of data that are published by different public departments in Scotland and Nigeria were also used for the various chapters.

As was pointed out earlier in this Chapter, secondary data is collected by others, usually not for the present study. Often it does not completely satisfy the data requirements for a specific research project. The available secondary data was not sufficient to meet this

study's objectives. Therefore, gathering primary data was essential.

Primary data is defined as the data collected by the researcher for the purpose of the research being undertaken. Accordingly, the data collected in this study covers areas such as the background information on all the respondent organizations; type(s) of tendering used; contract letting/procurement method(s) employed in the organizations; respondents' opinions as to the causes of cost and time overruns; and reasons for delays in settling outstanding payments to contractors. These factors were defined from the literature review of previous studies in the area of this research. The sources of the data collected in this study are organizations involved in the planning, construction and control of public sector construction projects. Therefore, the target population from which data was collected was limited to the public sector and those involved in such projects. The elements of this population, therefore, include the public sector construction agencies, contractors, and consultants who are involved in public sector projects.

Each of the twenty-one states in Nigeria has a Ministry of Works and Housing and a State Housing Corporation, which is involved with public sector construction projects. There also exists a Federal Housing Authority and Federal Ministry of Works and Housing with head offices in Lagos, the federal capital, and with other supporting offices in each state of the Federation. There are, however, no published sources of information which can help identify the real number or locations of contractors and quantity surveying consultants in Nigeria. The only way available was by questioning personnel in the public agencies who from their records know those consultants and contractors involved on their projects; or by securing additional addresses from a few initial respondents. This procedure of identifying the subjects of enquiry with certain characteristics or requirements is called the "snowball sampling technique".

In Scotland was much less difficult, as there exist comprehensive records of all the desired survey populations:- agencies, consultants and contractors.

7.3.1.2 Data Collection Technique

Since the main objective of this study is to explore the problems of management and cost control of public sector construction projects in Nigeria, the exploratory design is probably the best basis for research. As already argued in Section 7.3.1, an exploratory study is appropriate when the research objectives include the identification of problems.

By using unstructured questions a pilot study was carried out in Scotland by face-to-face interview of professionals from six different public sector construction agencies (Central Regional Council, Strathclyde Regional Council, Glasgow District Council, Scottish Development Department, University of Glasgow's Works Department, and Scottish Homes). This exercise revealed that this method would not be suitable for collection of data in Nigeria, where the researcher faced many problems due to lack of effective communications, and to the lack of the personal contacts of the research supervisors that in Scotland. The pilot survey therefore provided guidance on many of the critical issues in this study, such as the format to adopt for collecting data, and how to collect the data.

A closed-ended questionnaire technique supplemented by personal recording of information from files was therefore adopted for data collection. This technique was chosen to make full use of the assistance provided by the supervisors of this study, particularly Mr T L Inglis, and resulted in a good response rate. It was chosen also because it is easier for respondents to complete a questionnaire without too much effort, and without the commitment of time that may be necessary in a face-to-face interview. Nevertheless some face-to-face interviewing was done where a further degree of interrogation was indicated.

The questionnaire was developed to provide respondents with a uniform basis on which to respond to the survey questions. It comprised (Appendix iv) in addition to questions on the environment of the respondent organizations, seventeen possible causes of construction delay; five causes of construction cost overruns; and four causes of delays in settling outstanding payments to contractors. The literature review and the pilot study carried out in Scotland and the author's personal knowledge

of Nigeria proved helpful in formulating these hypothetical reasons, which are later statistically validated.

The questioning structure implemented was partly closed-ended with ordered choices, partly closed-ended with unordered choices. Dillman (1978) defined closed-ended with ordered choices as "the structure whereby for each question, answer choices are provided; each is a gradation of a single dimension of some thought or behavior. The respondent's task is to find the most appropriate place on an implied continuum for his or her response". Unordered response is "the structure whereby answer choices are provided, but no single dimension underlines them. Respondents must choose from among discrete, unordered categories by independently evaluating each choice and selecting the one that best reflects his or her situation".

The closed-ended questions with ordered answer choices were used to gather categorical background information on the organizations surveyed. They were based on a broad generally agreed classification.

Closed-ended questions with ordered answer choices are suited for determining such things as intensity of feeling, degree of involvement, and frequency of participation (Dillman, 1978). This mode was therefore used for such questions as the degree of usage of particular types of contractual arrangement (eg Appendix IV - question 6), and other questions that require "importance" ranking.

While there does not seem to be a problem with the categorical section, the ranking questions needed evidence that the answers actually measured the factor being investigated. For this reason a statistical authentication of the questions involved was carried out, using the factor analysis technique first developed by the psychologist Charles Spearman (1904) (Lindeman R H et al, 1980).

For the Nigerian survey, hand mail was delivered with the help of many persons well connected in Nigeria with various public agencies, contractors and consultants. The organizations surveyed were diverse in terms of size and type of activity. As expected, some efforts were successful and some were not.

At the end of a 94 day visit to Nigeria, 175 completed questionnaires with usable data were obtained in addition to records of actual projects, gathered separately. The sample characteristics were as shown in Chapter 8. In all, the questionnaire return rate was impressive. That was due particularly to the assistance rendered by those mentioned in the acknowledgments.

7.4 STATISTICAL VALIDATION OF QUESTIONNAIRE

Hinkle, *et al.*, (1979) in their book "Applied Statistics for Behavioral Sciences" named the underlying characteristic or phenomenon that may be consistent across situations, tests, and so on in behavioral sciences as a *trait* or *construct*. Factor analysis was used to determine the number of constructs or traits (here called factors) that underlie each variable in the questionnaire. Since the variables consist of scores, a principal component factor analysis technique was applied. If the set of scores in response to a question measures only one construct, it is said to be factorially pure. If the set measures more than one construct it is factorially complex.

The first set of variables to be dealt with were the 17 variables (excluding those which were discretionary to rank) designed to measure the importance of causes of delay in the execution of public sector construction projects. The aim here is to verify that a measure is unidimensional, that it measures only one construct. If indeed it is unidimensional, it may still contain two or more correlated

subscales, and factor analysis was used to identify the number of those subscales. The data for the analysis consisted of the scores on the variables from the 175 respondents in Nigeria.

Item No.	Factor			
	1	2	3	4
1	0.189328	-0.062663	-0.030550	0.326931
2	0.355675	-0.089011	-0.510100	0.140353
3	0.397784	-0.097269	-0.439814	-0.321323
4	0.304245	0.306910	0.372805	0.260527
5	0.459603	0.231384	0.402476	-0.279351
6	0.442498	0.315649	0.150406	0.177662
7	0.313374	0.456913	-0.263297	-0.155614
8	0.490832	0.474093	-0.137657	-0.024357
9	0.565343	0.036995	-0.339300	0.165032
10	0.622197	-0.088266	0.065352	0.201879
11	0.624141	-0.313202	0.068476	-0.071413
12	0.518847	-0.316218	0.097854	0.109464
13	0.580709	-0.375359	0.119862	-0.087806
14	0.537917	0.185890	0.161474	-0.165502
15	0.409617	-0.254108	0.143488	-0.046037
16	0.309485	-0.140546	0.198123	-0.141055
17	0.412786	0.067778	-0.141047	0.047500

Table 7.1 Factor Matrices for Construction Delay Reasons

Item No.	Factor		
	1	2	3
1	0.329601	-0.384005	0.009568
2	0.555104	-0.132814	-0.038677
3	0.350107	0.188306	0.034033
4	0.368740	0.304928	-0.042081
5	0.311280	0.070445	0.070413

Table 7.2 Factor Matrices for Cost Overrun Reasons

Item No.	Factor	
	1	2
1	0.416789	0.202832
2	0.408561	-0.237622
3	0.632740	-0.009039
4	0.139662	0.130776

Table 7.3 Factor Matrices for Delays in Settling Outstanding Payments

The data already entered into the University of Stirling's main frame computer was first converted to ASCII format, and retrieved onto a floppy disk using a Kermit programme. Using an IBM compatible micro computer this database file was imported via LOTUS 123^R into the STATGRAPHICS^R software package for carrying out the multivariate factor analysis.

The 17 X 17 correlation matrix (the correlation coefficients between all pairs of items) was factor-analysed. The analysis produced four factors. The first factor extracted had large factor loadings² (exceeding 0.3) on all but one item. On the basis of this result there was evidence that the measures were unidimensional (Hinkle et al, 1979).

Similarly, it is even safer to conclude from the other outputs that they also are factorially pure. The results of the survey can therefore be said to be measuring the desired variables.

² the extent to which a test measures a factor

CHAPTER 8

ANALYSIS AND RESULTS

8.1 INTRODUCTION

Following the theoretical and conceptual framework outlined in the previous Chapters, a statistical and logical analysis of the survey results is presented in this Chapter.

8.2 A COMPARATIVE ANALYSIS OF SURVEY RESULTS FROM SCOTLAND AND NIGERIA

Before analysing the survey results, it is worthwhile to consider the response rate from the survey sample. The rate of return was unexpectedly high in both Scotland and Nigeria, as shown in the Table 8.1 below:

Organization	Scotland			Nigeria		
	Number sent	Number returned	Rate of return (%)	Number sent	Number returned	Rate of return (%)
Public Sector Agencies	41	32	78	198	94	48
Contractors	38	28	73	94	34	36
Consultants	46	39	85	109	47	43
All	125	99	79	401	175	42

Table 8.1: Sample Size and Response Rate to the Questionnaire.

The sample size may appear to be statistically small, but it is believed that the wide geographical distribution of the organisations is sufficient to ensure a reasonable sample of the survey population. It is also worthwhile to note that the returns represent the number of firms and not the number of people involved, ie there was one questionnaire per firm. The number of projects influencing responses was even greater, as each organization handles many projects.

The data under consideration takes two basic forms: categorical data, which is used as a means of classification; and ordinal data, which shows a rank order of importance. The analysis is done first for the categorical data, followed by the ordinal data.

Organization	Scotland				Nigeria			
	British		British/ Foreign		Nigerian		Nigerian/ Foreign	
	No.	%	No.	%	No.	%	No.	%
Consultants	38	97	1	3	47	100	0	0
Contractors	28	100	0	0	12	35	22	65

Table 8.2: Respondent Organizations' Ownership.

Table 8.2 compares the nationality of ownership of the respondent companies in Scotland and Nigeria.

It is evident from Table 8.2 that all the respondent contracting companies in Scotland are indigenous; and all the respondent consulting firms in Nigeria are indigenous.

Registration Category	Scotland		Nigeria	
	Number of Respondent Contractors			
	British	British/ Foreign	Nigerian	Nigerian/ Foreign
A	0	0	0	0
B	1	0	0	0
C	7	0	2	2
D	20	0	5	25

Key:

	Nigeria	Scotland
A	Under N 50 000	Under £ 50 000
B	N 50 000 - N 100 000	£ 50 000 - £ 100 000
C	N 100 000 - N1 000 000	£100 000 - £1 000 000
D	Over N1 000 000	Over £1 000 000

(The naira (N) had almost the same value as the pound (£) in the 1970s but currently (1989) £1.00 = N11.35)

Table 8.3: Registration Category of Contractors.

Table 8.3 gives the registration categories of the respondent contractors and of particular interest are the categories of the joint venture (Nigeria/foreign) companies: the largest firms are usually non-indigenous. A majority of those firms which operate within the major contracting business in Nigeria have foreign partners. This in itself might be expected to be a source of problems, as was also found in many of the researches on developing countries reviewed in Chapter 3.

Period of Operation (years)	Scotland		Nigeria	
	Consultants	Contractors	Consultants	Contractors
Under 5	1	1	14	5
5 - 10	3	2	21	12
10 - 15	5	4	4	5
Over 15	30	21	8	12
All	39	28	47	34

Table 8.4: Period of Operation of Respondent Consultants/Contracting Organizations.

Experience is widely acknowledged as an important factor in achieving good construction results. The concept of the "learning curve" comes into play with firms having

a long period of service to the industry. Table 8.4 clearly shows that most firms operating in the construction industry in Scotland have a long record of experience as compared with Nigerian firms. Amalgamation notices are often seen in the Scottish press, suggesting that smaller new firms expect to derive benefit from the expertise and experience of long established firms.

Table 8.4 shows that most (>74%) quantity surveying firms in Nigeria were established within the last decade. This may not be unconnected with the recent introduction of the profession into the country. The development of quantity surveying courses in Nigeria started in 1971 (Inglis, 1987), when the first degree course was established in Ahmadu Bello University, Zaria.

Within the Nigerian context, the absence of published cost information (a characteristic of developing nations) related to the construction industry places a new QS firm in a poor cost planning situation. However great the expertise of its staff, the degree of accuracy of a cost planning depends on the reliability of the input data. Since most Nigerian QS firms are newly established it is

difficult for them to have access to a sufficient history of cost records to provide this vital information. The study of South American countries clearly concluded that lack of accurate data was the principal cause of overruns (Chalabi and Camp, 1986).

Workload from the Public Sector (%)	Scotland		Nigeria	
	No. of Contractors	No. of QS Consultants	No. of Contractors	No. of QS Consultants
< 25	2	11	8	12
25 - 50	8	13	5	8
50 - 75	13	11	9	12
> 75	5	4	12	15
Total	28	39	34	47

Table 8.5: Percentage of Workload from Public Sector.

Comparison can be made of the proportion of a firm's workload that is generated by the public sector. From Table 8.5 it can be seen that substantially more firms in Nigeria than in Scotland have more than 75% of their work in the public sector. Under this scenario the average Nigerian contractor may be reluctant to go to court to claim redress from a public sector client. This is so, because a

contractor black-listed by the government is likely to be put out of business, as long as the government remains the major client of the industry. This is one of the legal problems mentioned in Chapter 4 in relation to transfer of technology. To be of benefit to a contractor, contract conditions must well laid down, and must apply equally to all parties.

It is essential for the proper control of a construction project that there is a regular and comprehensive feedback of information from the operations on site. In Nigeria, the Development Plan requirement is for firms to provide a six-monthly report on projects to Central Government, as already discussed in Chapter 3. In addition to this requirement, autonomous Government parastatals may take a free hand to set their own individual procedures for monitoring projects, and thus exert tighter control if they so wish and if they are able. However, even the government requirement is often not met.

Intervals	Scotland				Nigeria			
	Agencies		Contractors		Agencies		Contractors	
	No.	%	No.	%	No.	%	No.	%
Weekly	0	-	0	-	0	-	0	-
Fortnightly	0	-	0	-	0	-	0	-
Monthly	25	78.1	26	92.9	55	58.5	15	44.1
Quarterly	4	12.5	2	7.1	19	20.2	14	41.2
Yearly	0	-	0	-	3	3.2	2	5.9
Not practiced	0	-	0	-	5	5.3	0	-
Others	3	9.4	0	-	12	12.8	3	8.8
All	32	100	28	100	94	100	34	100

Table 8.6: Frequency of Monitoring/Reporting on the Financial Position of Individual Projects.

Comparing the frequency of monitoring/reporting on projects in Nigeria with that in Scotland, it is apparent from Table 8.6 that 25 (78%) and 26 (93%) of the Scottish agencies and contractors respectively undertake monitoring/reporting on the financial position of projects on a monthly basis; in Nigeria 55 (59%) of the agencies and 15 (44%) of contractors claim to do similarly. Here though, the result does not agree with the evidence of the

Ministerial Committee in Nigeria. The extent and detail of this monitoring may well warrant further investigation.

Information gathered during the face-to-face interviews with practising members of the construction industry in both Nigeria and Scotland revealed that the levels of information provided by the reports can vary considerably. In the Nigerian situation some reports are seen as merely a routine exercise, and thus can hardly fulfil their objective.

Interval	Scotland		Nigeria	
	Number	%	Number	%
Fortnightly	2	6	0	0
Monthly	28	88	48	51
Quarterly	1	3	2	2
Based on pre-determined project stages	1	3	37	39
Not allowed	0	0	0	0
Others	0	0	7	8
All	32	100	94	100

Table 8.7: Intervals of Interim Payments Allowed By Agencies.

The frequency of interim payments is normally specified in the Conditions of Contract, and therefore depends on the type of contract used. Table 8.7 compares the intervals for such payments on projects in each country. 28 (88%) and 48 (51%) agencies in Scotland and Nigeria respectively allow for interim payments at intervals of one month. 37 (39%) Nigerian agencies allow for interim payments to be based on predetermined contract stages, ie even more input is expected from the contractor before payments are made. Two Scottish agencies allow for payments fortnightly, a practice not used in Nigeria. This may be due to the existence and effective use of GC/Works/1 Conditions of Contract (Chapter 5) in Scotland, which allows for payment to be made fortnightly, at the discretion of the parties involved.

A possible explanation for the 88% of Scottish agencies preferring monthly payments may be due to the strict adherence to contract provisions. Use of the Formula Method of calculating fluctuation payments requires valuations to be carried out monthly, an option not available in Nigeria due to lack of monthly construction cost indices.

Range	Scotland		Nigeria	
	Number of Agencies	Percentage (%)	Number of Agencies	Percentage (%)
Less than 5%	24	75.0	20	21.3
5 - 10%	8	25.0	65	69.1
10 - 15%	0	0	6	6.4
15 - 20%	0	0	3	3.2
Over 20%	0	0	0	0
All	32	100	94	100.0

Table 8.8: Percentage of Contract Sum Allowed by Agencies for Contingencies.

The questionnaire also enquired into the level of the allowance for contingencies included within the contract sum.

From Table 8.8 it can be seen that 24 (75%) agencies in Scotland allow less than 5% of the contract sum for contingencies compared with 20 (21%) in Nigeria. Thus, it can be deduced that only 25% of Scottish agencies, but up to 79% in Nigeria allow over 5%. Nevertheless there are many cost overruns in Nigeria. The question can therefore be asked if setting aside more funds for contingencies will actually resolve the overrun problem in Nigeria. The Rand

report (Large, 1974) on US projects suggested an increase of contingency allowance would reduce the incidence of overruns. This is unlikely to be effective in Nigeria.

Watson (1979), in his survey report for the Quantity Surveyors' Committee, argued that the type of tendering procedure has an influence on the final cost, particularly for engineering services. Although the Committee's work fell short of analysing the influence of credibility of the documents and method of invitation to tenderers used with the various methods, their study was strongly in favour of using BOQs for tendering.

Methods	Scotland		Nigeria	
	mean	s.d.	mean	s.d.
Open Tendering	1.3	1.5	2.8	1.3
Selective Tendering	3.7	0.9	2.7	1.0
Negotiated Tendering	1.2	0.9	1.4	1.0

Table 8.9: Tendering and Contract Procurement Methods.
(Scores 1-4, with 4 high)

From Table 8.9 it can be concluded that Selective Tendering is the most favoured in Scotland when compared with other forms of tendering. In the Nigerian context the

trend favours Open Tendering, which implies a lack of favouritism. Selective Tendering also is widely used in Nigeria.

With regard to forms of contractual arrangements it is evident from Table 8.10 that contracts based on BOQs are the most favoured in both countries. The question to ask is: what kinds of BOQs are produced? Are they Bills with over 40% of their value made up of Provisional and Prime Cost Sums only?

It can be further observed that contracts based on drawings and specification are still popular in Nigeria. The well known problem of shortage of qualified quantity surveyors may explain this. It is clear from Table 8.10 that there is a big difference between Nigeria and Scotland in the use of Term Contracts. If the findings of both Robinson (1987) and Watson (1979) are to be relied upon, it seems that the differences in project realisation between Nigeria and Scotland are partly due to the difference in preferences for the type of tendering and the method of contractual arrangement between the countries.

Term Contracts, which are most suited for long term maintenance contracts, are not popular in Nigeria. This may be due to lack of awareness, as most of the people who responded to the questionnaire asked what it is!

Basis	Scotland		Nigeria	
	mean	s.d.	mean	s.d.
Bills of Quantities	3.8	0.7	3.7	0.8
Schedule of Rates	1.4	1.1	1.3	1.3
Drawings & Specification	1.4	1.0	2.1	1.4
Prime Cost	0.7	1.0	0.6	0.9
Term Contract	1.4	1.4	0.3	0.8
Design & Build	1.1	0.9	1.2	1.1
Others	0.1	0.5	0.1	0.5

Table 8.10: Types of Contractual Arrangement.
(Scores 1-4, with 4 high)

As already stated in the Chapter 1, one of the main objectives of this study is to investigate the problems which cause delays, and often abandonment, of projects in Nigeria. Hypothetical reasons based on the review of previous studies were therefore given to respondents in both Nigeria and Scotland to identify what is considered to be a main problems, or a reasons for cost or time overruns. If

the reasons for overruns in Nigeria are not found to occur in Scotland, further study should reveal why such problems seldom arise within the developed world, and thus show ways of resolving them in Nigeria.

For each question in the survey a mean rank, and the corresponding standard deviation (SD), was calculated over all respondents. It is interesting to note that in many cases the SD is equal to 1 or more. When the score or rank is on a scale 0 to 4, and the mean is between 3 or 4, the relatively large SD implies a skew distribution with many high values. For example, the contractors' ranking for the first reason (Table 8.11b) has mean 3.5, SD 1.0. As the rank given cannot exceed 4, this implies a very high proportion of 3s and 4s in the replies.

Reasons	Agencies		Contractors		Consultants	
	mean	s.d.	mean	s.d.	mean	s.d.
1 Frequent variation/change orders	2.0	1.2	2.8	1.2	2.4	1.1
2 Large quantities of extra work	1.5	1.1	2.6	1.0	2.2	1.2
3 Design related	1.7	1.1	2.5	1.3	2.1	1.1
4 Deficiencies in public agencies' organizations	2.0	1.4	2.0	1.2	1.9	1.0
5 Deficiencies in contractors' organizations	2.1	0.9	1.1	1.0	2.4	0.9
6 Deficiencies in planning & scheduling	1.3	1.1	1.5	1.1	1.8	1.0
7 Shortage of qualified workers	1.4	1.2	1.7	1.1	1.2	1.1
8 Unrealistic contract durations imposed by public agencies	0.8	0.8	2.0	1.0	1.4	1.0
9 Unexpected natural and social events	1.0	1.1	1.1	1.1	1.5	1.0
10 Contractors' unrealistic tenders	1.1	1.1	1.1	0.9	1.3	1.2
11 Inadequacy of site inspection	0.8	1.1	1.2	0.9	1.3	0.9
12 Difficulties in obtaining construction materials	0.9	1.1	1.4	0.9	1.1	0.9
13 Disagreement related to interpretation of contract specification and clauses	0.7	1.0	1.2	0.9	1.0	0.8
14 Contractors' financial difficulties	0.9	0.9	0.5	1.1	1.3	0.8
15 Inadequate public agencies' budgets	0.4	0.9	1.4	1.3	1.1	1.0
16 Contractors' difficulties in receiving interim payments from public agencies	0.3	0.8	0.9	1.3	0.6	1.0
17 Deficiencies attributed to construction plant and equipment	0.2	0.7	0.5	0.7	0.6	1.0
18 Other reasons	0.5	1.1	0.3	1.0	0.0	0.0

Table 8.11a: Reasons for Time Overruns (Scotland)
(Scores 0 - 4, with 4 high)

Reasons	Agencies		Contractors		Consultants	
	mean	s.d.	mean	s.d.	mean	s.d.
16 Contractors' difficulties in receiving interim payments from public agencies	3.0	1.1	3.5	1.0	3.9	0.3
14 Contractors' financial difficulties	2.6	1.1	2.4	0.9	3.3	0.7
15 Inadequate public agencies' budgets	2.4	1.2	2.6	1.5	3.3	0.9
5 Deficiencies in contractors' organizations	2.1	1.2	1.1	1.1	2.5	1.0
6 Deficiencies in planning & scheduling	2.0	1.2	1.3	0.9	2.3	1.2
1 Frequent variation/change orders	1.8	1.1	1.9	1.4	2.0	1.1
12 Difficulties in obtaining construction materials	1.7	1.2	1.9	1.5	1.7	1.2
4 Deficiencies in public agencies' organizations	1.7	1.3	1.2	1.1	2.0	1.1
10 Contractors' unrealistic tenders	1.8	1.2	1.6	1.1	1.6	1.2
3 Design related	1.6	1.2	1.6	1.1	1.7	1.3
8 Unrealistic contract durations imposed by public agencies	1.3	1.3	1.8	1.3	1.9	1.1
2 Large quantities of extra work	1.4	1.2	1.6	1.4	1.8	1.1
9 Unexpected natural and social events	1.2	1.1	1.2	1.0	1.9	1.0
17 Deficiencies attributed to construction plant and equipment	1.5	1.2	1.1	1.3	1.3	1.1
11 Inadequacy of site inspection	1.4	1.2	1.3	1.1	1.3	0.9
7 Shortage of qualified workers	1.2	1.1	1.0	1.0	1.2	0.9
13 Disagreement related to interpretation of contract specification and clauses	1.0	1.0	1.2	1.4	1.4	1.2
18 Other reasons	0.5	1.1	0.0	0.0	0.3	0.9

Table 8.11b: Reasons for Time Overruns (Nigeria)
(Scores 0 - 4, with 4 high)

The results of the survey as shown in Tables 8.11a and 8.11b are interesting in that what are clearly seen to be problems in Nigeria are not so in Scotland. From the Tables the leading reasons for construction delays in Nigeria can be seen to be: delays in settling outstanding payments to contractors; contractors' financial difficulties; and the inadequacy of public sector clients' budgets. These reasons for delay appear at the bottom of the Scottish Table. It is also worthwhile mentioning the fact that in the cover letter (Appendix IV) the Scottish respondents were urged to attempt to answer all the questions irrespective of their relevance to their own circumstances. Thus some reasons mentioned for delays in the questionnaire may not in fact be found in Scotland. This is shown when the highest rank falls below 3 in Scotland, compared with almost 4 for Nigeria in the consultants' column. The mode for Nigeria's three major reasons is found to be 4 (maximum ranking) while that for the Scottish major reasons is only 2, signifying that although topping the list, they have little significance. In other words, public sector construction delays are not a general problem in Scotland.

Reasons	Agencies		Contractor		Consultants	
	mean	s.d.	mean	s.d.	mean	s.d.
Inadequate pre-planning	2.2	1.1	2.6	1.1	2.3	1.4
Construction delays	1.9	1.1	2.5	1.6	2.5	1.2
Unforeseeable circumstances	1.4	1.2	1.7	1.2	1.9	1.3
Deficiencies in the initial estimates	1.5	1.0	1.4	1.2	1.2	0.9
Fluctuations in material, labour & plant costs	0.5	1.0	0.9	1.1	0.8	1.0
Others reasons	0.8	1.4	0.3	0.9	0.1	0.5

Table 8.12a: Reasons for Cost Overrun (Scotland)
(Scores 0 - 4, with 4 high)

Reasons	Agencies		Contractor		Consultants	
	mean	s.d.	mean	s.d.	mean	s.d.
Fluctuations in material, labour & plant costs	3.2	1.1	3.3	1.0	3.4	1.0
Construction delays	2.5	1.1	2.2	1.2	3.0	0.9
Inadequate pre-planning	2.4	1.4	2.6	1.4	3.0	1.3
Deficiencies in the initial estimates	2.2	1.2	2.3	1.4	2.5	1.1
Unforeseeable circumstances	1.5	1.0	1.8	1.0	1.6	1.2
Others reasons	0.4	0.9	0.4	1.2	0.2	0.8

Table 8.12b: Reasons for Cost Overrun (Nigeria)
(Scores 0 - 4, with 4 high)

Periods (years)	Scotland		Nigeria	
	Agencies	%	Agencies	%
Less than 1	5	14.7	76	80.8
Less than 2	25	73.5	4	4.3
Less than 3	3	8.8	3	3.2
Others	1	3.0	11	11.7
All	34	100	94	100

Table 8.13: Contract Durations for which Fluctuation Payments are not Made

From Tables 8.12a and 8.12b it is evident that fluctuation of costs due to inflation in Scotland is not really a problem in escalation of costs, because it is foreseeable. The use of construction cost price indices in the developed world makes it possible, from past records of price movements to anticipate market trends accurately. In addition to this it is clear from Table 8.13 that in most circumstances in Scotland a project must have a duration of over 2 years before it qualifies for fluctuation payments. In Nigeria most projects with contract durations over 1 year qualify for fluctuation payments. A minimum duration as long as 2 years is not practical in Nigeria due to volatile market conditions, which make it impossible for contractors

Reasons	Agencies		Contractors		Consultants	
	mean	s.d.	mean	s.d.	mean	s.d.
High level of contractual claims	1.4	1.2	1.6	1.3	1.6	1.0
Bureaucratic obstacles	1.0	1.0	2.2	1.1	1.5	1.2
Insufficient budget	0.3	0.8	1.8	1.4	1.1	1.1
Delays in receiving subventions from the Government	0.2	0.8	1.5	1.3	1.2	1.1
Others	0.2	0.7	0.2	0.8	0.0	0.0

Table 8.14a: Reasons for Delay in Settling Outstanding Payments to Contractors (Scotland) (Scores 0 - 4, with 4 high)

Reasons	Agencies		Contractors		Consultants	
	mean	s.d.	mean	s.d.	mean	s.d.
Bureaucratic obstacles	2.8	1.2	3.7	0.8	3.6	0.7
Insufficient budget	2.8	1.1	2.7	1.1	3.3	0.8
Delays in receiving subventions from the Government	2.5	1.2	2.7	1.1	3.1	0.7
High level of contractual claims	1.5	1.3	1.4	1.3	1.6	1.2
Others	0.3	0.9	0.6	1.4	0.3	1.0

Table 8.14b: Reasons for Delay in Settling Outstanding Payments to Contractors (Nigeria) (Scores 0 - 4, with 4 high)

to anticipate fluctuations with any reasonable degree of certainty.

In seeking to identify the problems which cause lack of prompt payment by public sector agencies in Nigeria, it can be seen that bureaucratic obstacles top the list (Table 8.14b), with a very high mean rating of 3.4. This cause is second in the Scottish Table 8.14, but with a very low mean rating of 1.5, meaning that although bureaucracy is appreciated as a problem, it is not a serious obstacle to payment on time. Indeed the rating given by the Nigerian respondents to the least important reason for lack of payment is comparable with the rating scored against the most accountable reason in Scotland. The reason at the top of the list in the Scottish Table is the high level of contractual claims, which may be interpreted to mean that should payment be delayed in any way, it may be the subject of a contractual claim.

8.2.1 Discussion

Many lessons can be learnt from this analysis of the survey results.

- (i) All the responding contractors operating in Scotland are indigenous, making it easy for them to accommodate themselves within the cultural and social environments of the society in which they operate. Studies on cultural dimension and project management (Chapter 4) have shown that such factors count in management efficiency.
 - (ii) Most Scottish firms are long established, which accounts for their experience in their own fields. This factor greatly enhances their ability to provide accurate cost estimates.
 - (iii) The construction industry in Scotland does not rely so heavily on Government expenditure as in Nigeria. In Scotland a slump in Government expenditure takes longer to affect contractors. In Nigeria the volatility of the Government's revenue sources (Chapter 2), such as any perturbation in the price of oil, will drastically affect the construction industry.
-

- (iv) The Fixed Price type of contract is common in Scotland for projects with a longer duration than in Nigeria. The minimum duration of a project before fluctuaton payments is normally longer in Scotland than in Nigeria, implying that less control over expenditure is expected in Nigeria. Inflation was identified as a problem in most of the of the studies reviewed.
- (v) The allowance for contingencies, irrespective of its percentage of the contract sum, has little influence on cost overruns in Nigeria.
- (vi) The use of construction cost price indices in the construction industry in Scotland, together with agreed formulae, allows fluctuation payments to be dissociated from cost overruns. Possible future increases in costs can be predicted with resonable degree of accuracy, and allowed for.
-

8.3 COMPARISON OF BUREAUCRACIES INVOLVED IN SETTling CONTRACTORS' OUTSTANDING PAYMENTS

Bureaucracy can be defined as a set of bureaus or simply a division of labour, a hierarchy of authority etc (Brown and Jackson, 1986). The survey analysis shows "bureaucratic obstacles" as the major reason for delays in settling outstanding payments to contractors in Nigeria. This in turn plays a predominant role in causing delays in construction projects. An investigation into what happens before payment is made to contractors was carried out on a small number of agencies in both countries. The aim was to discover where and why hold-ups occur. It is interesting however, to note that of the studies reviewed in Chapter 3 only the one on Tanzania identified bureaucracy as a problem that causes overruns. None of the other studies, including that on Nigeria¹, counted bureaucracy as a problem.

¹ Although the study was carried out by Ministerial Committee who are themselves the bureaucrats.

8.3.1 The Nigerian Practice

In Nigeria there is a Federal Ministry of Works and Housing (MWH) with its headquarters located in the Federal Capital, Lagos. In addition, each of the 21 states of the Federation has an MWH, with headquarters located in the state capital.

MINISTRY OF WORKS, TRANSPORT AND HOUSING

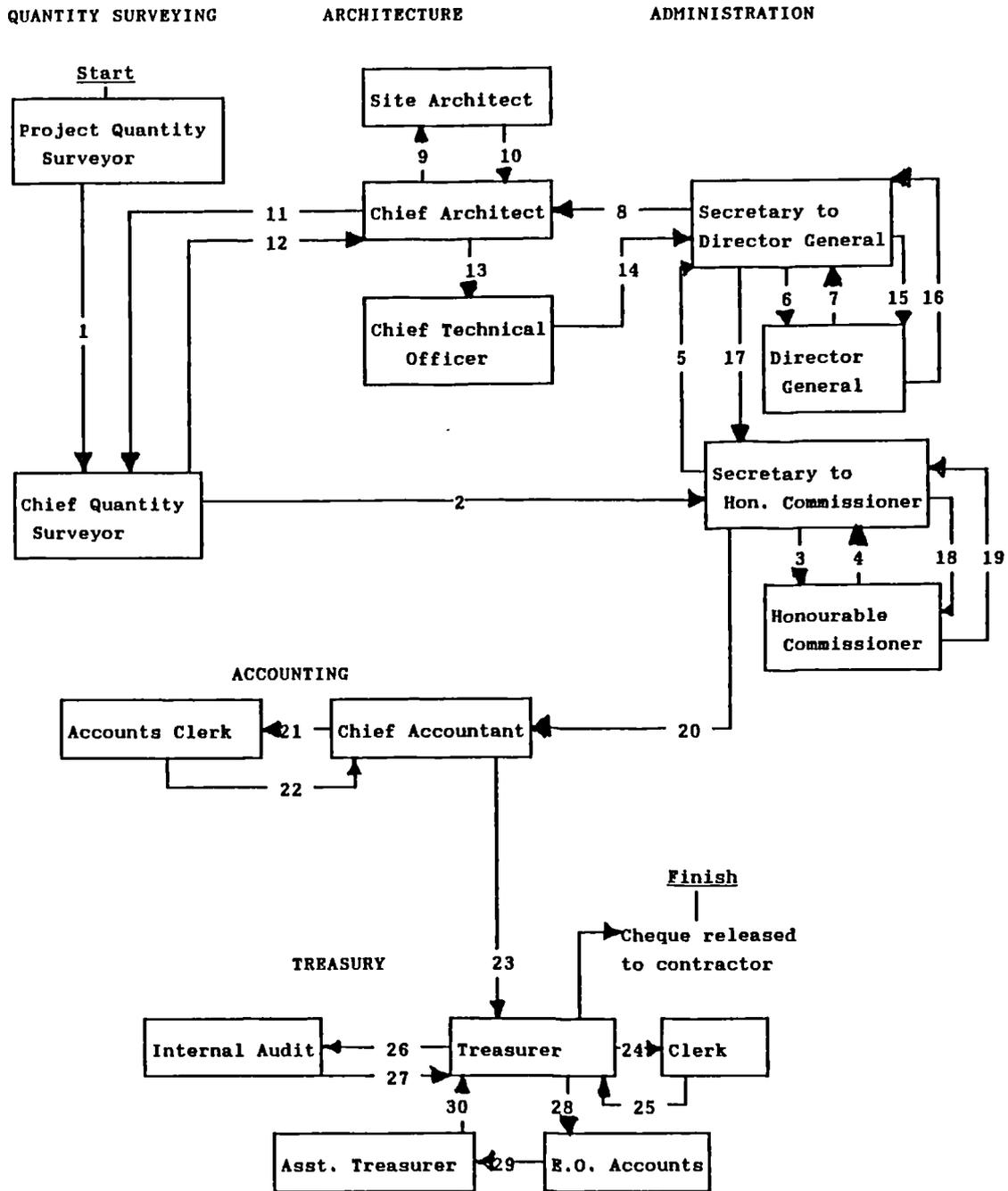


Figure 8.1 Nigerian Payment Procedure for a Project where the MWH is both the Supervisory and Client Ministry

In most public sector construction projects, the various MWH are responsible for the supervisory aspect. This includes projects that are sponsored by the supervising Ministry and by other Ministries (eg Education, Health and Justice). In Nigeria the procedure for making payments is the same in most of the Federal and State Ministries, and depends into which classification a project is placed:

- i) the supervising Ministry (MWH) is also the client;
- ii) the supervising Ministry (MWH) is not the client;
- iii) either of these cases, but with the project worth more than ₦1,000,000. It is then classed as a capital project; and given for accounting purposes a sub-head in the appropriate Ministry of Finance.

8.3.1.1 The MWH is both the Supervisory and Client Ministry for a Project.

As shown on Figure 8.1 valuation is carried out by the Project Quantity Surveyor. The value of work done to date is entered on a valuation certificate together with the

necessary deductions in accordance with the Conditions of Contract. The valuation certificate is forwarded to the Chief Quantity Surveyor (step 1) who through his Secretary (step 2) forwards it to the Honourable Commissioner (step 3).

The Honourable Commissioner² has to give his consent to any request for payment before action can be initiated. When the Honourable Commissioner approves the payment, he forwards the file to the Director General (steps 5 & 6) who is the administrative head of the Ministry.

When the valuation is endorsed by the Director General he forwards it to the Chief Architect (head of department) [steps 7 & 8]. The Chief Architect passes the certificate to the Site Architect (steps 9 & 10) of the particular project to prepare the interim payment certificate which is approved by the Chief Architect and then passed to the Chief Quantity Surveyor (step 11). The Chief Quantity Surveyor checks the certificate and passes it to the Chief Technical Officer (step 12 & 13) through the Chief Architect again.

² The Commissioner is the Accounting Officer for his Ministry.

The Chief Technical Officer's staff then enter the valuation into an appropriate record card before forwarding it to the Director General (steps 14, 15 & 16) through his Secretary, who in turn passes it back to the Honourable Commissioner (step 17 & 18) for his final approval. From the Honourable Commissioner's office the file is passed to the Chief Accountant (steps 19 & 20) who controls the financial allocation for the Ministry and is responsible for raising the voucher. He assigns his staff to write the voucher (steps 21 & 22) which he endorses and passes to the Treasury for payment (step 23).

In the Treasury, a clerk (steps 24 & 25) first checks the submission before passing it to the Internal Audit (steps 26 & 27) for certification. The cheque is written by a Financial Officer (step 28) in the Treasury and signed by two signatories, the Treasurer and the Assistant Treasurer, (steps 29 & 30) before the cheque is released to the Contractor.

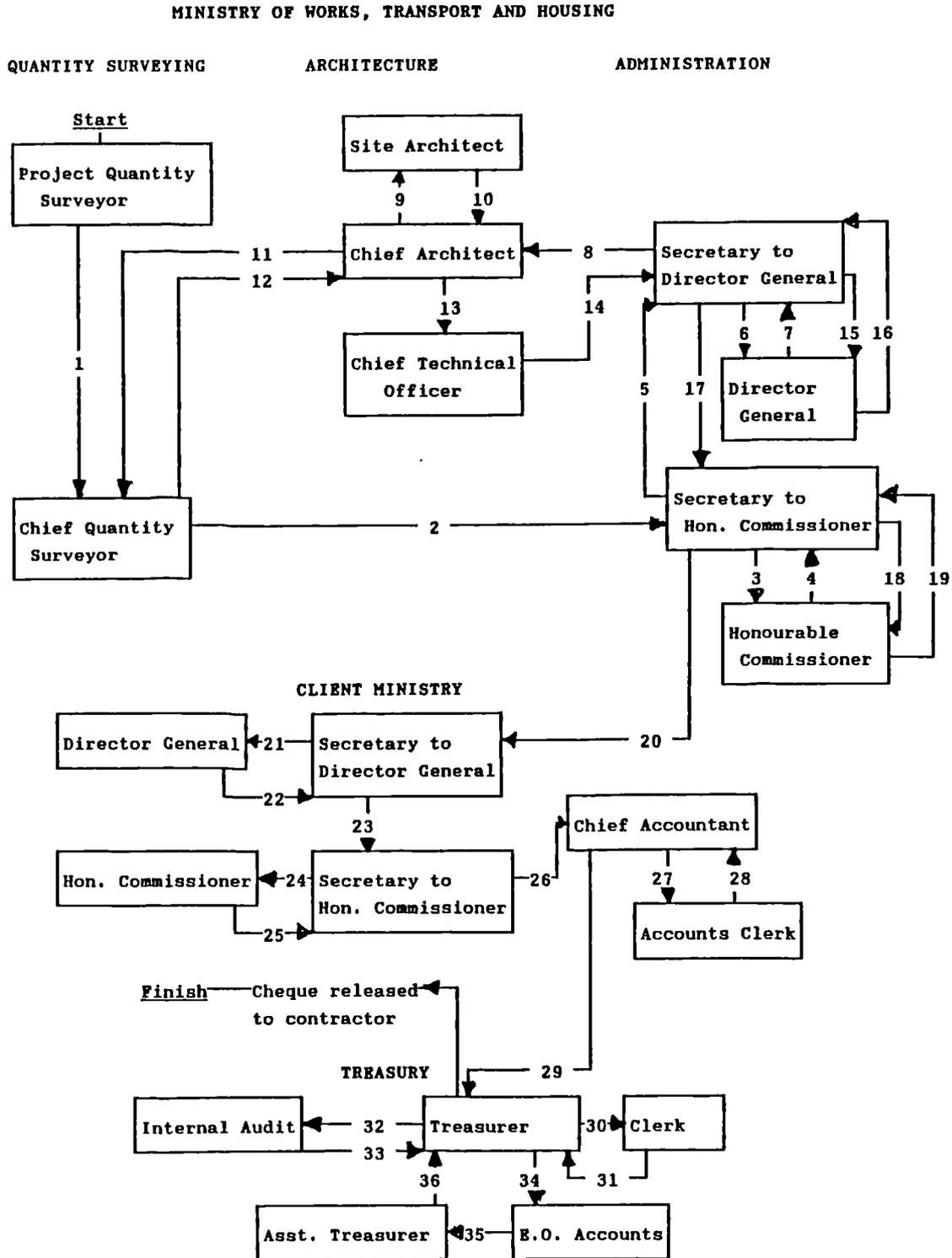


Figure 8.2 Nigerian Payment Procedure for a Project where the MWH is the Supervisory Ministry only

8.3.1.2 The MWH is the Supervisory Ministry only for a Project.

A procedure similar to that illustrated in Figure 8.1 is followed in the MWH up to step 20 when the file leaves the Secretary to the Honourable Commissioner (Figure 8.2). Then it is forwarded to the office of the Commissioner of the client Ministry through his Director General (steps 21, 22, 23 & 24). The Commissioner then approves the payment, and passes it to his Chief Accountant (steps 25 & 26) for writing the voucher. Thereafter similar steps are followed up to payment, as in Figure 8.1 again. In essence the only extra steps introduced when there is a different Client Ministry are those going through the Commissioner of that Ministry, who may not share the same building with the supervisory Ministry. The Accountant in the Client Ministry prepares the voucher.

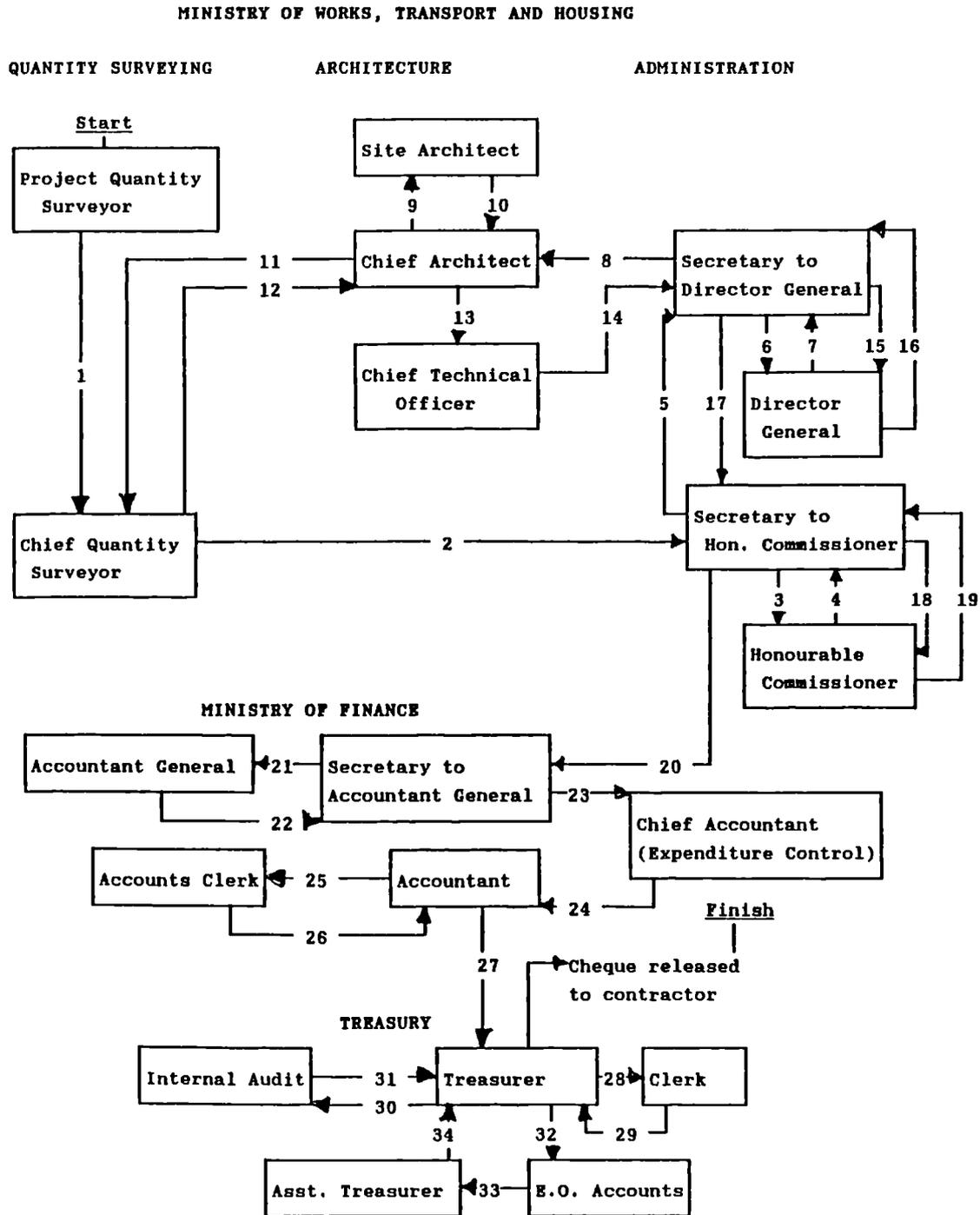


Figure 8.3 Nigerian Payment Procedure for a Capital Project Finance, where the MWH is both the Supervisory and Client Ministry

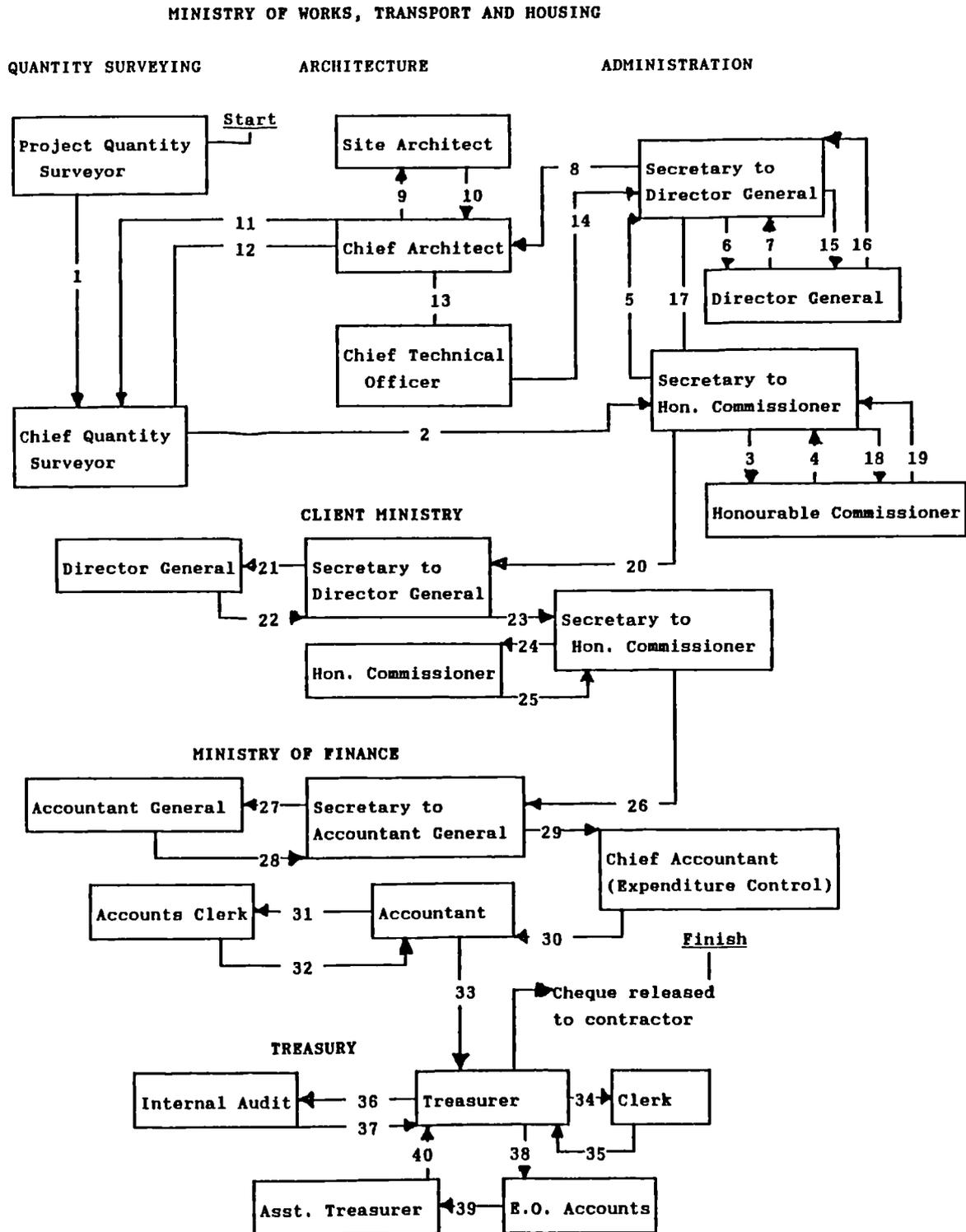


Figure 8.4 Nigerian Payment Procedure for a Capital Project with Sub-head in the Ministry of Finance where the MWH is the Supervisory Ministry only.

8.3.1.3 The Project is a Capital Project, with Sub-head in the Ministry of Finance.

The Ministry of Finance exercises special powers over capital projects, and therefore controls the disbursement of funds with respect to large projects. The procedure depends on whether the project would otherwise belong to category (i) or (ii). For the category (i) type, all the activities up to 20 are similar to those in Figure 8.1 (see Figure 8.3). Step 20 is now to the the Ministry of Finance. In the Ministry of Finance, the Accountant General has to see the certificate and approve payment. He then passes it to the Chief Accountant (Expenditure Control) (steps 21, 22 & 23) who ascertains that the project is within the approved expenditure before raising the voucher (steps 24, 25 & 26) and passing it to the Treasury (step 27) for payment, as before.

If the project would otherwise fall in category (ii) the new path is as shown in Figure 8.4. It differs from Figure 8.2 from step 20. The Director General and the Honourable Commissioner of the client Ministry are the only personnel in the client Ministry to see the file before forwarding it to the Ministry of Finance for the procedure

explained above, as the voucher will be prepared in the Ministry of Finance.

It is clear that where the project is classed as a capital project it has to pass through three ministries before it reaches the Treasury.

8.3.2 The Scottish Practice

The practice for securing interim payments in Scotland is fairly straightforward compared with that in Nigeria. Figure 8.5 shows the Scottish practice where the contract is financed and supervised by the same agency, for example, the Housing Department of a District Council.

The payment is initiated by the same person, the project Quantity Surveyor, who carries out the valuation and enters it into a contract valuation form (see Appendix V). This valuation form is passed to a clerk in the Administrative Office (step 1) who checks for arithmetical errors and reconciles entries, eg previously certified amounts, before forwarding it to the Project Architect (step 2).

The Project Architect is responsible for a particular project and therefore knows the status of the work. If he approves the valuation, he forwards it to his immediate superior, the Group Architect (step 3). The Group Architect further checks through the papers and forwards them to the Principal Architect (step 4), who endorses the valuation and forwards it to the Chief Quantity Surveyor (step 5).

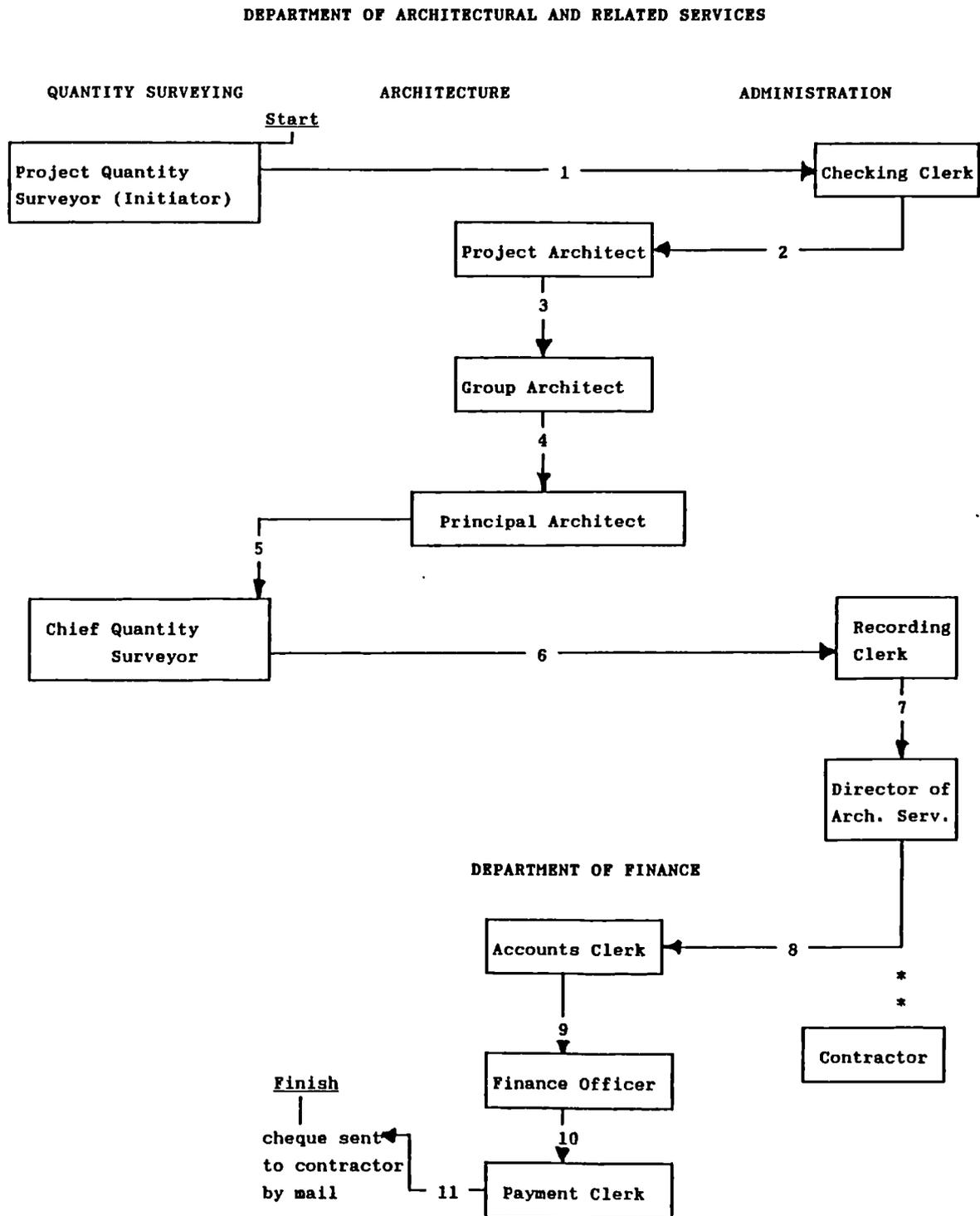


Figure 8.5 Scottish Payment Procedure for a Project Sponsored and Supervised by a District Council.

From the Chief Quantity Surveyor it goes back to the Administration Office (step 6) where another clerk records the payment onto a contract card (see Appendix VI) and types out a contract certificate for the Director of Architectural Services in four copies (step 7). Having endorsed these copies, the Director dispatches two copies to the Finance Department (step 8) for payment, one to the Contractor for his information and one is retained in his office file.

In the Finance a clerk checks the records of the payee (Contractor) with respect to tax payments. He then prepares the voucher, and passes it to a Finance Officer (step 9) who examines, checks and forwards it for payment (step 10). As the method of payment in most organisations nowadays is computerised, cheques are printed out by computer for despatch to the Contractor.

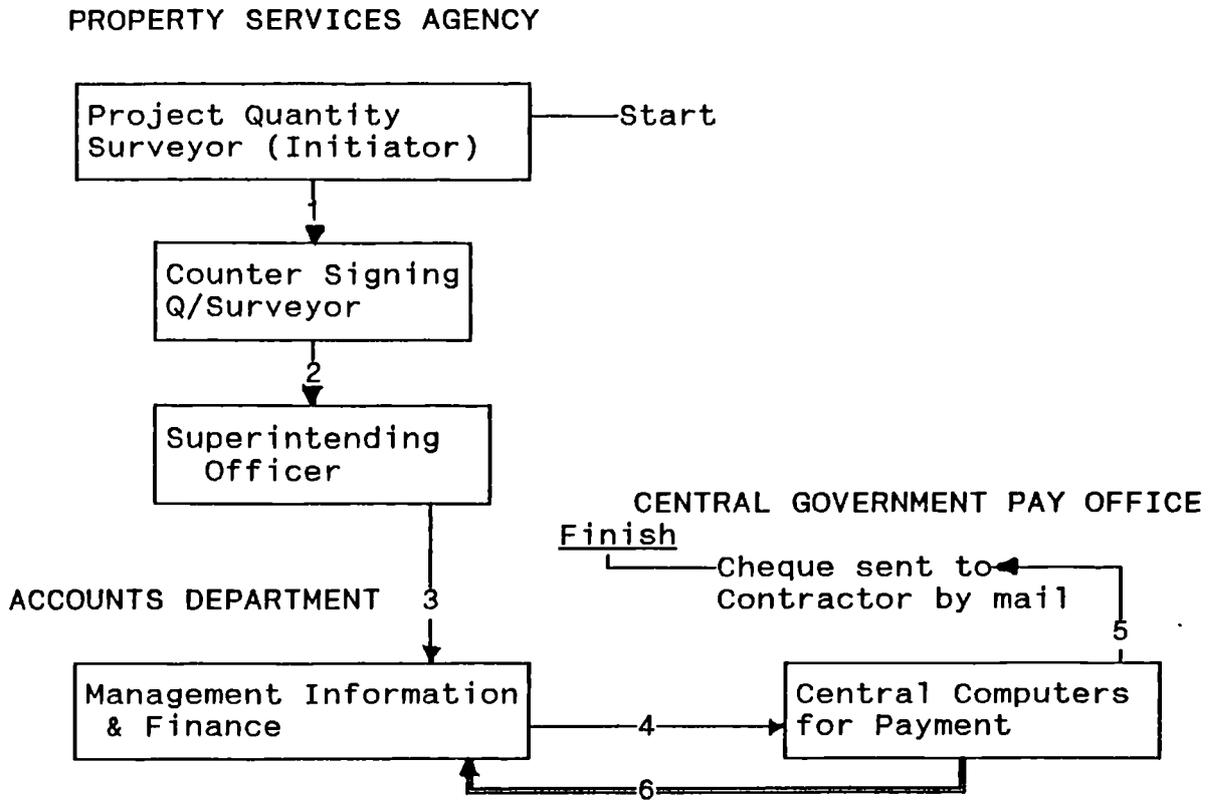


Figure 8.6: Scottish Payment Procedure for a Capital Project initiated by Central Government Department, Financed by Central Government, and Handled by The Property Services Agency of the Department of Environment

For capital projects arising from Central Government, that are sponsored by a department different from the supervising department, the process (Figure 8.6) seems surprisingly more straightforward than the District Council practice described earlier in Figure 8.5.

Again, the procedure for payment is initiated by the same person, the project Quantity Surveyor, who carried out an interim valuation, and enters it on an "interim valuation and advance certificate" (IVAC) form (Appendix VII). This IVAC form is passed to a Senior Quantity Surveyor in the same department (step 1), who checks and countersigns it. The IVAC is then forwarded to the Superintending Officer (step 2) who is the officer responsible for the project. The Superintending Officer confirms that the payment is in order before endorsing it and forwarding it to the Management Information and Finance Office (MIF) [step 3], which is responsible for internal control of all monies allocated to projects by the client. The MIF reconciles entries on the form with previously certified amounts before forwarding the IVAC to the Central Computer Payment Unit which is located in Hastings (step 4). It is from the unit in Hastings that all payments for UK Government projects are effected. The cheque is sent by post to the contractor (step 5). If a contractor is to receive more than one payment a single cheque is printed out, and a list of the projects covered by the cheque is attached. The office in Hastings sends to the MIF a monthly expenditure printout

sheet for every project (step 6). This provides the MIF with the feedback required to maintain overall financial control of public sector construction projects.

8.3.3 Discussion

It has been accepted that, among other things, the performance of any economic system depends for its success upon its institutional framework. When dealing with the public sector one of the "institutions" that is of significance is the bureaucracy.

The following points are evident from the comparison between Nigerian and Scottish practice for making interim payments:

- (i) All the personnel involved in processing payments in Scotland are technical staff, whereas in Nigeria many of the administrators (including political officers) who are involved have little or no technical background.
 - (ii) In Nigeria, the bureaucracy is far-reaching, rendering it impractical to effect payment fortnightly as is possible in Scotland. Moreover,
-

the routine handling of files by a large number of personnel complicates the situation. It is worthwhile noting that in Scotland there is a linear flow of actions between the individuals involved, and no "second time round".

- (iii) Centralization of responsibility for public sector construction activities in Nigeria ie for buildings, civil engineering, and maintenance, into one Ministry (Federal or State MWH) makes it more difficult to cope with the bureaucratic requirements. In Scotland there is less centralisation.
 - (iv) Commissioners in Nigeria are political appointees. This means that in any transitional period, either as a result of a cabinet reshuffle or a change of Government, the administration of most, if not all, projects is directly affected.
 - (v) Lack of efficient postal services in Nigeria, a characteristic of most developing nations, may result in the cheque not being delivered to the contractor. This has encouraged the practice of contractors travelling to collect their cheques in
-

person, and this has numerous drawbacks, including waste of man-hours and delays beyond those attributable to bureaucracy.

All these problems can be related to the problems of technology transfer identified in Chapter 4. It is obvious that the Nigerian environment is quite different from that of Scotland. Those bureaucracies and management practices that worked in the past in the UK have changed in line with changes in the environment, but are still current in Nigeria. It is clear that the uncomplicated mode of payment now employed in Scotland cannot be transferred immediately to Nigeria for two reasons:

- (i) there are not enough qualified personnel in Nigeria;
- (ii) there are personal problems related to advancement and seniority.

At local government level in Scotland, qualified engineers, architects, quantity surveyors, accountants and administrative staff exist at a seniority and salary level not accessible in state³ government ministries in Nigeria. In addition, the use of computers in the UK has made it

³ States in Nigeria comprise on the average over 5 million people.

possible for information to be assessed anywhere in the country, with minimal effort. Such modernization is still far from being realised in developing countries.

8.4 CASE STUDY

8.4.1 Introduction

A case study is a detailed examination of a situation involving a problem (Finch, 1976). A case study is often carried out for intensive examination of a local problem, such as in a small group of people, or a single organization. Although it can be appreciated that results from one case study may not be applicable to other cases, the aim of the present case study is to quantify the effects of payment delays, and to see how they may lead to project failures. Hayfield (1986) argued that "the causes of failure or success are often identified by carrying out retrospective reviews on past jobs".

It must be stressed at this point that the analysis below is made solely for academic purposes, and there is no intention directly or by implication to appear to reprimand any individuals or group of people. It is included because real life example provides the best basis for exploratory studies of this nature.

8.4.2 Project Background

In 1983 the Nigerian Federal Executive Council awarded contracts for a project, which was for the construction of a permanent facility for a Training Institute. The value of the project was ₦14,828,388. A mobilisation advance of ₦1,482,839 (10% of contract sum) was paid to the Contractor, to be refunded in three equal instalments by deduction from interim certificate payments. Construction started on 17th February, 1983 and work progressed steadily until 14th May, 1984 when the Contractor stopped work due to what some sources described as "cash flow problems". However, since then, the Government insisted on completion of the project.

In 1987, a panel¹ was constituted to, among other things, recommend measures to improve the standing of the Training Institute. The panel consequently recommended that Government should make funds available for completion of the project. Subsequently, the Government requested an evaluation report on the state of the project, and on the

¹ The members of the panel include: officials of the Ministry; officials of the of the Institute; Director of the Institute; legal adviser; a Senior Engineer; and the consultants.

financial requirements for getting the contractors back on site for completion of the project. The Honourable Minister of the Ministry authorised a team to re-negotiate the various submissions by the Contractor on one hand, and the Consultants on the other. The analysis that follows attempts to compare the initial anticipated cost and the current (1988) completion cost of the project, and to investigate if there are factors contributing to the escalation of the cost, in addition to those arising directly from the time overrun.

8.4.3 Contractual Arrangements

The contract was based on the JCT Conditions of Contract with minor changes, and had no provision for fluctuations.

The completion time for the project was to be 18 months from the start date. There were two different consultants: design consultants, and supervising consultants. Both sets of consultants were appointed on a consortium basis ie to provide all services viz: architectural; structural/civil engineering;

mechanical/electrical engineering; quantity surveying. The supervising consultancy agreement was entered into on the 17th of June, 1983. Excerpts relevant to this analysis are as follows:

(i) the duties of the consultants shall be to undertake the "general supervision" of the construction of the works, to ensure full compliance by the contractor with the drawings, specifications and contract provisions including any modifications, and to provide adequate qualified staff to carry out the services.

(ii) for "daily supervision", the consultants shall provide the necessary qualified staff for ensuring the entire supervision of construction works and for administration of the contract. The "minimum staff" to be provided by the consultants shall be:-

- One Chief Resident Engineer
- Two Principal Resident Engineers
- One Mechanical/Electrical Engineer
- One Quantity Surveyor
- One Land Surveyor
- Supporting Staff²

² Architects are conspicuously missing from the list either by design or accident, despite payment for architectural post-contract services.

- (iii) the client shall remunerate the consultants for the supervision of the entire works to completion and for the provision of all field supervisory staff at a fee of ₦222,000 paid on a monthly basis for a period of 18 months, or for such lesser period that the contract may last.
- (iv) in addition to the fees mentioned above, the consultants shall be paid reimbursable expenses not exceeding ₦110,000 as detailed therein.
- (v) in the event of any extension of construction time beyond the period of 18 months from the date of signing the consultancy agreement the client shall remunerate the consultants for continued supervision of the project as aforesaid at an all inclusive fee of ₦8,000 per month, for the duration of the remaining works.
- (vi) the fee for supervision shall become due to the consultants in monthly instalments (as the work proceeds) of ₦22,200 for each of the first and second months, and ₦11,100 for each of the remaining 16 months that the construction contract may last.
-

In the event of a lesser period of the construction contract, the consultants shall still be entitled to the full fees of ₦222,000

8.4.4 Project Financial Details

1. Payments made to design consultants for the design consultancy services rendered between 13th January, 1981 to 5th February, 1982.

a. Contract Sum	₦411,800
b. Printing of extra Bills of Quantities	₦ 1,948
	<hr/>
	₦413,748
	<hr/>

2. Payments made to supervising consultants as per contract agreement.

a. General supervision	₦222,000
b. Reimbursable expenses	₦110,000
	<hr/>
	₦332,000
	<hr/>

3. Breakdown of original contract sum.

Preliminaries	N455,000
Contingencies	N250,000
Builders work	N14,123,388
Original contract sum	<u>N14,828,388</u>

8.4.4.1 Analysis of Payments Made to Consultants and Contractor at the time of Project Abandonment.

	Contracted Amount	Payment made	% Paid
Design consultant's fee	N413,749	N413,749	100
Supervising consultant's fee			
General supervision	N222,000	N153,920	69.3
Reimbursable exp.	N110,000	N73,325	66.7
Total sum	N332,000	N227,245	68.4
Contractor			
Preliminaries	N455,000	N357,825	78.6
Contingencies	N250,000	N27,954	11.2
Builders work	N14,123,388	N3,677,655	26.0
Total sum	<u>N14,828,388</u>	<u>N4,063,434</u>	27.4

From this analysis, it can be seen that the supervising consultants were paid 69.3% of their contracted remuneration for general supervision, compared with only 26%

for the builder's work executed by the contractor. This difference can be associated with the method of payment; and also attributed either to gross delays on the part of the contractor, or to the estimated contract duration being grossly unrealistic.

It is also interesting to refer to the Federal Government Consultancy Services Agreement which specifically states that in addition to the fees payable under the Scale of Charges, reimbursement to consultants shall be made where applicable for what is termed "reimbursable expenses". However, this provision limits the total amount of refund to a consultant in respect of any one project to 1% of the estimated cost of the project (clause 23.8.1 of the agreement). Now, 1% of ₦14,828,388 is ₦148,284, and 50%³ of this equals ₦74,142 for each stage (ie pre- and post-contract).

It is clear that the allowance of up to ₦110,000 for reimbursables has no basis in the consultancy agreement. The consultants therefore have already claimed 99%

³ Reimbursable expenses shall be classified into two categories namely: design stage, and construction supervision stage, with 50% each for pre and post contract fees.

(N73,325/N74,142) of their contractually allowed money for a project only 26% completed.

8.4.4.2 Breakdown and Analysis of Revised Estimates

	Original Sum	Contractor/ Consultant Revised Estimate/Fee	Negotiated Sum	% Rise
Design consultant's fee	N413,749	N413,749	N.A	0
Supervising consultant's fee				
General supervision	N222,000	N1,796,503		
Reimbursable exp.	N110,000	N347,578		
Total sum	N332,000	N2,144,081	N927,245 ⁴	179.3
Contractor				
Preliminaries	N455,000	N3,975,688	N2,469,000	
Contingencies	N250,000	N3,000,000 ⁵	N3,000,000	
Builders work	N14,123,388	N39,756,688	N33,793,350	
Total sum	N14,828,388	N46,732,376	N39,262,350	164.8

The analyses in Sections 8.4.4.1 and 8.4.4.2 present not only a true picture of what happened to this particular

⁴ Provisional allowance by the negotiating team because at their last meeting (11 November, 1987) the Consultants had yet to make a submission.

⁵ Taken from the negotiated figure because the contractor did not submit any contingency figure.

project, but is typical of many Nigerian public sector projects.

It can therefore be seen that, should the project be completed based on the revised figures shown in 8.4.4.2 there will be an overall increase of 179% on the supervising consultants fee (original fee x 2.8!) and an increase of 165% (N39,000,000 instead of N15,000,000) on the originally estimated cost (original cost x 2.65!). The negotiating committee recommended, among other things, the inclusion of a fluctuations clause, and a new contract duration of 36 months.

The revised contract sum was based on accepted rates applied to the original items in the Bill of Quantities. When a site has been left non-operational for such a long period it is wise to prepare an addendum Bill for making good works on site affected by weather and vandals. This will cost a substantial amount, and the contractor is expected to present claims for it as soon as he remobilises the site. He will be entitled to it, having left the site due to default by the client.

8.4.5 Discussion

- (i) It is evident that there is something wrong when personnel involved in implementing the contract conditions, which require at the start of the project a programme for the works to be provided by the contractor, allow a project to run for two thirds of its planned duration and yet complete only 26% of the work. This provides a good example to illustrate the difficulties faced in implementing conditions of agreement, that have originated in the West, but do not take into account "the way things are done" locally. There is a clear need for some way of adapting contracts and agreements to of local conditions. These include opportunities for corrupt; lack of personal commitment to a project; and absence of the Western "Protestant work ethic."
- (ii) The system for paying the consultants who were supposed to monitor the progress of the works did not encourage them to perform their duties effectively. From the records as quoted above, it is clear that, despite the poor performance of the contractors, the consultants were being paid as
-

though the project was running on schedule. The consultants appear to have benefited more from the delays than can be justified by their contribution to completing the project.

(iii) It is also surprising to note that a contractor who has received a mobilisation advance of 10% before going to site abandoned the project after a mere 26% performance, on the grounds of poor cash flow. The question can be asked if the mobilization payment did not in fact help to conceal the poor financial standing of the Contractor.

(iv) The panel found neither the Consultants nor the Contractor at fault, and still recommended both to continue on the project. This surprising recommendation may possibly be attributed to the inappropriate qualifications of members of the panel. Such panels should always include a number of construction professionals (see Chapter 4, section 4.5).

(v) Given the large difference between the initial contract sum and the revised contract sum the possibility of an unrealistic estimate by the

contractor cannot be ruled out. This element was found to be one of the problems responsible for delays (Section 8.3).

8.5 FURTHER STATISTICAL ANALYSIS

8.5.1 Introduction

Descriptive statistics were used in the analysis in Section 8.3 above. The data have also been interrogated using non-parametric statistical analysis, to investigate possible relationships between variables. The MINITAB^R statistical package was used for this purpose, and the results were incorporated into this text using the KERMIT programme. The aim was to see if there is any evidence of association between the scores in different pairs of fields in the database. For example:

- (i) 80.8% of the Nigerian public sector agencies surveyed allow for fluctuations to be paid on contracts with durations as short as 1 year, while in Scotland only 14.7% of the agencies surveyed allow for fluctuation payments on such contracts (Table 8.13). Is there any evidence of association between contract duration for eligibility for fluctuation payments and the incidence of cost overruns?
-

(ii) In both the analysis and the case study the results tend to suggest a shortage of qualified professional staff to carry various responsibilities. Is there any evidence of association between the number of qualified professionals employed by an organization and its size?

(iii) Is there any evidence that shortage of qualified staff is associated with cost overrun?

8.5.2 Relationship Between Contract Durations after Which Fluctuations May be Paid, and Cost Overrun Problems

The respondent organizations were asked, in the questions relating to their environment, to state the minimum contract durations for which the agencies allow fluctuation payments. In the second section of the questionnaire the respondents were asked to rank their experience with payment for fluctuations as an element of cost overrun. Results taken from Tables 8.12 and 8.13, were used to compare the scores in these two fields. Contingency tables and the chi-square test were used to seek evidence of association between the two sets of responses. That is to say, to answer the question: "Is there any association

between the minimum contract periods for which fluctuations may be paid and respondents' experience of cost overruns due to fluctuations?" The null hypothesis that was tested can be phrased as:

H_0 : There is no association between the incidence of cost overruns and the minimum contract duration for which fluctuations are payable.

A contingency table generated by MINITAB from the Nigerian agency respondents is shown below:

where C715 is the minimum contract duration with the code

- 1 = period over 1 year
- 2 = period over 2 years
- 3 = period over 3 years
- 4 = others

and C751 is the ranking (from 1 to 4) for fluctuation as a reason for cost overrun (with 4 highest)

The table shows the number of records for which there were the various pairs of responses in MINITAB: column C715 and C751.

Cost overrun vs. minimum duration (Nigeria)

```
MTB > tab1 C751 C715;
SUBC> chis2.
```

ROWS: C751		COLUMNS: C715			
	1	2	3	4	ALL
0	1 1.62	0 0.09	0 0.06	1 0.23	2 2.00
1	3 2.43	0 0.13	0 0.10	0 0.35	3 3.00
2	16 14.55	0 0.77	2 0.57	0 2.11	18 18.00
3	18 17.79	0 0.94	1 0.70	3 2.57	22 22.00
4	38 39.62	4 2.09	0 1.56	7 5.73	49 49.00
	1	2	3	4	ALL
ALL	76 76.00	4 4.00	3 3.00	11 11.00	94 94.00

CHI-SQUARE = 14.959 WITH D.F. = 12

CELL CONTENTS --

COUNT
EXP FREQ

To perform the test, we compare the calculated chi-square value with tabulated values of the distribution with 12 degrees of freedom. For $\alpha = 0.05$, the table gives 21.026 (Levin, 1978) and the observed value (14.959) is much lower than this. Therefore, we cannot reject the null hypothesis, and thus we conclude that there is no good evidence that

cost overruns due to fluctuation payments are influenced by the minimum contract duration requirement for fluctuation payments.

From the contingency table we can also observe that out of the 76 agencies in category 1 (minimum period over 1 year) only 4 (5.2%) experience very few cost overrun problems as a result of settling for fluctuations, while 4 out of 4 (100%) respondents in category 2 (minimum period over 2 years) experience very high cost overruns (ranking 4) due to fluctuations.

The result from the Scottish data gives a similar value of chi-square, suggesting again there is no association between cost overrun problems due to fluctuations, and the minimum contract duration for which fluctuations may be paid.

 Cost overrun vs. minimum duration (Scotland)

MTB > tab1 c451 c415;
 SUBC> chis2.

ROWS: C451		COLUMNS: C415				
	1	2	3	4	ALL	
0	4 3.28	14 15.09	2 1.97	1 0.66	21 21.00	
1	0 1.25	7 5.75	1 0.75	0 0.25	8 8.00	
2	0 0.16	1 0.72	0 0.09	0 0.03	1 1.00	
3	1 0.16	0 0.72	0 0.09	0 0.03	1 1.00	
4	0 0.16	1 0.72	0 0.09	0 0.03	1 1.00	
	1	2	3	4	ALL	
ALL	5 5.00	23 23.00	3 3.00	1 1.00	32 32.00	

CHI-SQUARE = 8.455 WITH D.F. = 12

CELL CONTENTS --
 COUNT
 EXP FREQ

The computed chi-square value shown above is even smaller than that obtained from the Nigerian data.

It is clear from the contingency table that 4 out of 5 (80%) of the respondents from category 1, and 21 out of 23 (91%) of those in category 2 have little or no experience of cost overruns due to fluctuation problems in Scotland.

8.5.3 Relationship Between Numbers of Qualified Professionals and Size of Organization

The respondent organizations were asked in the questions relating to their environment to state the number of professionally qualified staff in their employment. A chi-square test was carried out to see if there is any evidence of association between the size of a contracting company and the number of professionally qualified staff employed, as might be expected. Table 8.3 presents the registration categories of contractors in Nigeria and Scotland. Cross-tabulating the contractors' registration categories and their levels of professional staffing generates the following contingency tables:

where C503 is the MINITAB column containing the coding for the registration category of contractors

1 = under ₦ 50,000
2 = ₦ 50,000 to ₦ 100,000
3 = ₦100,000 to ₦1,000,000
4 = over ₦1,000,000

and C508 contains the coding for the number of qualified professionals employed

1 = < 10
2 = 10 - 20
3 = 20 - 30
4 = 30 - 40
5 = > 40

Size of contractor vs. number of qualified staff (Nigeria)

MTB > tab1 C508 C503;
SUBC> chis2.

	ROWS: C508				COLUMNS: C503				
	2	3	4	ALL		2	3	4	ALL
1	2	2	7	11	1.62	1.29	8.09	11.00	
2	3	2	6	11	1.62	1.29	8.09	11.00	
3	0	0	2	2	0.29	0.24	1.47	2.00	
4	0	0	4	4	0.59	0.47	2.94	4.00	
5	0	0	6	6	0.88	0.71	4.41	6.00	
	2	3	4	ALL					
ALL	5	4	25	34	5.00	4.00	25.00	34.00	

CHI-SQUARE = 7.047 WITH D.F. = 8

CELL CONTENTS --
COUNT
EXP FREQ

The computed chi-square value of 7.047 with 8 degrees of freedom it is not significant even at the $\alpha = 0.20$ level (11.030). Therefore, there is no evidence that the size of a contracting company in Nigeria is associated with the number of qualified professionals employed, a surprising result.

From the contingency table we can also observe that out of the 25 contractors with registration for contracts over £1,000,000, 7 have less than 5 professionally qualified staff; 6 have from 10 to 20; 2 have between 20 to 30; 4 have between 30 to 40; while only 6 have over 40.

In Scotland however, the result is slightly different, but it is significant only at the $\alpha = 0.20$ level. Cross-tabulating the contractors' registration categories and their various levels of staffing from the Scottish data generates the following contingency tables:

where C203 is the MINITAB column containing the coding for the registration category of contractors

1 = under £ 50,000
2 = £ 50,000 to £ 100,000
3 = £100,000 to £1,000,000
4 = over £1,000,000

and C208 contains the coding for the number of qualified professionals employed

1 = < 10
2 = 10 - 20
3 = 20 - 30
4 = 30 - 40
5 = > 40

It will be noted from the table that the column numbers start with 2, indicating that there are no small contractors (under £50,000) among those surveyed in Scotland.

```
MTB > tabl C208 C203;
SUBC> chis2.
```

```
ROWS: C208      COLUMNS: C203
```

	2	3	4	ALL
1	1 0.50	7 3.50	6 10.00	14 14.00
2	0 0.11	0 0.75	3 2.14	3 3.00
3	0 0.14	0 1.00	4 2.86	4 4.00
4	0 0.04	0 0.25	1 0.71	1 1.00
5	0 0.21	0 1.50	6 4.29	6 6.00
	2	3	4	ALL
ALL	1 1.00	7 7.00	20 20.00	28 28.00

CHI-SQUARE = 11.200 WITH D.F. = 8

CELL CONTENTS --

COUNT
EXP FREQ

It is however clear from the contingency table that all the respondent contracting companies with registration for contracts of value lower than £1,000,000 have less than

10 professionally qualified staff, while 14 out of 20 (70%) of the large companies (turnover exceeding £1,000,000) employ more than 10 professionally qualified staff.

8.5.4 Relationship between numbers of qualified staff and cost overruns.

The need for qualified staff was investigated by relating the respondent's rating of shortage of qualified personnel as a cause of overruns to the number actually employed. The contingency table generated and the chi-square value are given below.

For the computed chi-square value of 23.149 with 16 degrees of freedom it is found to be significant only at the $\alpha = 0.12$ level (22.927). Therefore, there is only slight evidence to suggest that contractors in Nigeria recognise that shortage of qualified staff contributes to their experience of problems of cost overruns. The Nigerian public sector is not totally unaware of the problems due to professional staff shortages. The result points towards the need for provision of adequate training facilities to meet the professional manpower requirements in the construction

industry in Nigeria. The computer output for this analysis is as follows:

where C708 contains the coding for the number of qualified professionals

and C732 contains the rating for problems of time overrun due to shortage of qualified staff

Number of professionals vs. view on staff shortage (Nigeria)

```
MTB > tab1 C732 C708;
SUBC> chis2.
```

	ROWS: C732						COLUMNS: C708						
	1	2	3	4	5	ALL		1	2	3	4	5	ALL
0	6	10	3	1	10	30	7.02	7.02	2.23	3.19	10.53	30.00	
1	9	1	2	4	12	28	6.55	6.55	2.09	2.98	9.83	28.00	
2	3	9	2	5	8	27	6.32	6.32	2.01	2.87	9.48	27.00	
3	3	0	0	0	3	6	1.40	1.40	0.45	0.64	2.11	6.00	
4	1	2	0	0	0	3	0.70	0.70	0.22	0.32	1.05	3.00	
	1	2	3	4	5	ALL							
ALL	22	22	7	10	33	94	22.00	22.00	7.00	10.00	33.00	94.00	

CHI-SQUARE = 23.149 WITH D.F. = 16

CELL CONTENTS --

COUNT
EXP FREQ

From the survey results it is possible to test for association between the number of qualified staff Nigerian contractors employ and the recognition of financial difficulties as a cause of time overruns. Contractors' financial problems may be associated with lack of proper management of financial resources. More qualified professionals may prove beneficial to companies, and hence, assist in providing prudent management. The contingency table generated in this comparison is shown below:

where C508 contain the coding for the number of qualified professionals

and C535 contains the rating of contractors' financial difficulties as a cause of time overrun.

 Number of qualified staff vs financial difficulties (Nigeria)

MTB > tab1 C535 C508;
 SUBC> chis2.

	ROWS: C535					COLUMNS: C508
	1	2	3	4	5	ALL
0	0 0.65	2 0.65	0 0.12	0 0.24	0 0.35	2 2.00
1	2 0.65	0 0.65	0 0.12	0 0.24	0 0.35	2 2.00
2	4 4.21	1 4.21	0 0.76	3 1.53	5 2.29	13 13.00
3	5 4.85	8 4.85	2 0.88	0 1.76	0 2.65	15 15.00
4	0 0.65	0 0.65	0 0.12	1 0.24	1 0.35	2 2.00
	1	2	3	4	5	ALL
ALL	11 11.00	11 11.00	2 2.00	4 4.00	6 6.00	34 34.00

CHI-SQUARE = 29.144 WITH D.F. = 16

CELL CONTENTS --
 COUNT
 EXP FREQ

The computed chi-square value of 29.144 is seen to be significant at the 0.025 level (ch-square = 28.845) with 16 degrees of freedom. In other words, contractors ratings of financial difficulties as a cause of time overruns are likely to be associated with the number of qualified professionals in their employment.

8.5.4 Discussion

From the analysis it is evident that the shortage of qualified professionals constitutes a problem in the management and control of public sector construction projects in Nigeria. This is experienced more by the agencies and the contractors, than by the consultants, a result in agreement with most of the studies reviewed in Chapter 3.

The problem of making more professionally qualified staff available in the public sector has to be addressed. In the face-to-face interviews undertaken in Scotland it was interesting to note that a significant number of quantity surveyors in the public sector have had experience in the private sector before joining the public sector. The lack of incentive for such movement of staff in Nigeria greatly discourages such changes in employment. It is also known that in Nigeria the public sector are paid less than their counterparts in the private sector, and therefore the public sector finds it difficult to attract even fresh graduates from the universities, let alone attracting private sector staff.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 INTRODUCTION

In this chapter the findings derived from the research study are examined. Then some possibilities for action are recommended, and areas that require further research are suggested.

9.2 CONCLUSIONS DRAWN FROM THE ANALYSIS

There are several formidable obstacles that many developing countries seek to overcome, notably those related to the implementation of construction projects. The problems as revealed by the study are summarised below.

9.2.1 Conclusions on Differing Practices Between Nigeria and Scotland

The review carried out on the public sector construction practices in Nigeria and Scotland (Chapter 5) showed that the public sector organisation in Nigeria, and its level of success, differ from those in Scotland. However, the types of professions employed in the construction industry are similar in Nigeria and Scotland. Thus, the features of the organizational structure that may

have contributed to the difference in levels of success can be summarised as follows:

- (i) The evaluation of various development projects in Nigeria originates in the beneficiary agency, as in Scotland, but differs from evaluation in Scotland where such proposals are submitted to the Central Government only for the purpose of making the initial grant. Once such a grant has been allocated, it is the responsibility of each agency to manage the resources made available to it, and to implement the project. For an overspend on a project, the agency has to find savings on other projects, or slow down the pace of the job so that less money is involved in a particular financial period. In Nigeria on the other hand agencies are allowed to overspend up to a certain level above which a formal application has to be submitted to Central Government for approval. Such a procedure is not only time-consuming, which could well be a source of delay if the operations involved are critical, but could well discourage personnel from implementing effective cost control measures when
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extra spending may be approved by Central Government. The adoption of a Western style in this area will be hindered by the Nigerian problem of overcentralization.

- (ii) It can also be noted that, although the Nigerian practice was originally copied from the UK, it has not been updated, as in the UK. Construction practice in Nigeria therefore remains stagnant. This is particularly noticeable in the quantity surveying profession, which has over the years changed in the UK from the traditional role of cost estimating to playing a leading role in construction cost management and control. In the UK and this has led to many changes and improvements in quantity surveying practice. The Nigerian quantity surveyors, are not only far from adequate in number for the country's needs, but have also kept to traditional practices. A notable example of the quantity surveyors' resistance to change is shown by the fact that Nigeria has yet to switch from the old Standard Method of Measurement 5th Edition (SMM5) and JCT63 to the use of SMM6 and JCT80 for Bill
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preparation and contract conditions. In the UK, however, the original versions of these new documents are already obsolete; SMM7 has replaced SMM6, and many clauses in the original JCT80 have either been changed to meet some new challenge, or replaced entirely.

(iii) Nigeria lags behind the UK in implementation strategy eg the use of a priority ranking technique; and in effective cost control techniques. Priority ranking of projects attaches some monetary value to projects, thus enabling them to be classified in order of priority, to determine which project should have precedence over another. Without such techniques, it is quite common to start up many projects at once, and if there should be a financial squeeze, all the projects are at risk of non-completion. This is often happens in Nigeria.

(iv) In Scotland, the method of monitoring a project by updating its cost on a monthly basis assists in effective cost control by giving early warning of overrun problems.

All the problems discussed above are a direct consequence of poor transfer of management technology. If the Nigerian Government takes note of recent developments in the UK, from where construction practices are copied, most of the recent innovative schemes will be successfully transferred, and local practice enhanced.

9.2.2 Conclusions on Differing Construction Agency Environments

Many differences between Scotland and Nigeria, which may be significant for the success or failure of a project, are evident from the information gathered about the environment of the respondents to the questionnaire. These can be summarised as follows:

- (i) A majority, if not all, of the contractors operating in Scotland are indigenous, while in Nigeria there are many foreign contractors. Most cross-cultural studies (Wright, 1971; Hofstede, 1983; and Schaupp, 1978) have shown that local companies find it much easier to accommodate themselves to the cultural and social environments of a society in which they operate. Companies operating in foreign countries
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need to appreciate cultural differences before they can operate efficiently.

- (ii) Quantity surveying, which champions cost control in the construction sector, is a new profession in Nigeria. Hence most Nigerian quantity surveying firms were established within the last decade (Table 8.4). On the other hand, most Scottish firms are long established, which accounts for their wide experience. The study on Southern America (Chalabi and Camp, 1986) identified such lack of experience as the leading cause of overruns.
- (iii) In most developing countries the Government is normally the single largest client to the construction industry, accounting for a substantial percentage of the construction activity. The construction industry in Scotland does not rely so heavily on Government work. A slump in Government expenditure therefore takes longer to affect contractors in Scotland than it does in Nigeria.
- (iv) The availability of construction cost indices have enhanced the forecasting ability of the quantity surveying profession in Scotland, making it possible
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to let projects on a fixed price basis in Scotland with longer durations than is possible in Nigeria. That is to say, the minimum duration of a project before fluctuaton payments may be made is longer in Scotland than in Nigeria.

9.2.3 Conclusions Derived from Statistical Analysis

The major elements of the ordinal data from the questionnaires concern the reasons for overruns in cost and time. The results of the aggregate weighting by respondents are presented in Tables 8.11a and 8.11b. From these Tables it is clear that the major reasons for construction delays in Nigeria can be summarised as:

- (i) contractors' difficulties in receiving interim payments from agencies;
- (ii) contractors' financial difficulties;
- (iii) inadequate public agencies' budgets;

The causes of cost overruns were found to be:

- (i) fluctuations in material, labour & plant costs;
 - (ii) delays in construction work.
-

The main reason for delayed payment to contractors was found to lie in bureaucratic obstacles in the agencies. Cost overrun reasons are directly related to such delays.

This problem of delays in making payments to contractors differs from the findings of previous studies of developing countries in two ways: to some (Tanzania and South American Countries) they exist but with less significance, while to others (Saudi Arabia and Algeria) they are not recognized as problems. These differences can be analysed further as follows: (1) Saudi Arabia and Algeria are both oil producers; (2) Even those studies which identified payment delays as a problem (except in India, partially) did not show it as the major reason for completion delays. The reason why countries did not face the same problems of delay in payments as in Nigeria may be due to their sources of finance. Most of the projects studied were reported to have been at least partly financed by international lending institutions (South American projects by the World Bank and the Inter-American Development Bank, while Tanzanian projects were partly financed by the World Bank, the African Development Bank,

the European Economic Community and the International Monetary Fund) in addition to the Client's contribution. Nigeria therefore seems different, and can best be compared with Algeria. If this problem is not encountered in Algeria, which is not a "suplus petro-dollar" country, it strengthens the argument that Nigeria can improve its practices, since Algeria, operating under similar economic conditions, has done so.

Due to the straightforward nature of the payment process in Scotland, reasons related to bureaucracy were given conspicuously low scores in Scotland, compared with high scores in Nigeria, further indicating that simplification of bureaucracy has helped improve practice in Scotland.

Reasons which aggravate the contribution of bureaucratic obstacles in Nigeria to the failure of projects, were found to be:

- (i) non-technical personnel are not involved in processing payments in Scotland, whereas in Nigeria many of the administrators (including political officers) who are involved have little or no
-

technical background. This practice is mere bureaucracy, as it cannot be shown to be necessary, even for the purpose of accountability for public funds, since these administrators are not competent to scrutinize payments on a technical basis. As was argued in Chapter 4 such practices diffuse an individual's accountability.

- (ii) as argued in Chapter 7, in Nigeria the bureaucracy is far-reaching, rendering it difficult to implement monthly payments, and impracticable to effect payment fortnightly, as in some cases in Scotland. Moreover, the routine handling of files by a large number of personnel complicates the situation. It is worthwhile noting that in Scotland there is a linear flow of actions between the individuals involved, and no "second time round"; and a much smaller number of people are involved in processing payments in Scotland.
- (iii) centralization of responsibility for public sector construction activities in Nigeria, ie for buildings, civil engineering, and maintenance, into one Ministry (Federal or State MWH) makes it more
-

difficult to deal with all the bureaucratic requirements. In Scotland there is less centralisation.

(iv) the role played by commissioners in processing payments in Nigeria has many drawbacks, as they are political appointees who can be changed in any transitional period, either as a result of a cabinet reshuffle or a change of Government. The administration of most, if not all, public sector construction projects is directly affected in this way.

(v) shortcomings of the postal services in Nigeria (a characteristic of many developing nations) have resulted in cheques not being delivered to contractors. This has encouraged the practice of contractors travelling to collect their cheques in person which wastes man-hours, and causes delays beyond those attributable to the bureaucracy.

The statistical analysis revealed that there is a shortage of professionally qualified staff, which constitutes a major problem in the management and control of public sector construction projects in Nigeria. It was

found to affect the Agencies and the Contractors more than it does to the Consultants.

Underlying this particular problem is the low pay of public sector staff compared with their counterparts in the private sector. These problems are often recognised by foreign investors and in World Bank development projects. Projects financed by the World Bank, or other world organizations like the European Economic Committee (EEC), Overseas Development Association (ODA) etc, often adopt an "isolation technique" whereby the project is effectively isolated from the economic bureaucratic and administrative problems of the local environment. This is a common practice for Third World development projects sponsored by the World Bank (Kearns, 1986). Several isolation techniques are used, among which the popular one is to establish a special "project implementation unit" reporting only to a high official in the host Ministry or Agency. Such units are often granted authority to pay higher salaries, use expatriates for technical jobs, and make decisions free from much of the bureaucracy afflicting those who work elsewhere in the host Ministry or Agency, and in other parts of the Government.

Although such techniques may be successful in getting the project completed, thereafter it is liable to suffer in use from the effects of local bureaucracy or maladministration.

9.2.4 Conclusions Based on the Case Study

The reason for introducing the case study was to include a real life example of the problems encountered in Nigeria's public sector construction projects. The following can be concluded from the analysis:

- (i) there was a clear lack of enforcement of contract provisions in Nigeria.
 - (ii) lack of proper monitoring of the project had failed to enable the parties involved to realise at an early stage that the project was running into serious overruns of both time and cost. This resulted in the project running for two thirds of its planned duration, and yet only 26% of the work had been completed (Chapter 8). This indicates the need for more appropriately trained professionals in Nigeria.
-

- (iii) the conditions of agreement between the Client and the Consultants were lacking in that there was no contractual penalty for the Consultants if they failed to carry out their duties, eg monitoring the project. Consultants seem to benefit if projects are delayed rather than completed on schedule, as they are entitled to extra payment on a time basis; and are paid also for revaluation, if the project is halted and re-started.
 - (iv) no benefits at all were derived by the Client from making a mobilisation advance available to the contractors.
 - (v) A Contractor's unrealistic initial estimate is a factor likely to have contributed to the difference between the original and the revised contract sum.
-

9.3 RECOMMENDATIONS BASED ON FINDINGS

Projects are becoming ever more complex, and are being subjected to increasingly severe constraints on time, cost and performance (Barnes, 1985). This implies that the developing nations are moving further away from their present level of achievement in order to meet the challenge ahead. Therefore, they cannot afford to remain dormant, utilising obsolete practices for their development projects, in the hope of achieving a good result.

Rondelli (1976) noted that "wholesale transfer of Western corporate or defence management systems, too sophisticated for developing nations with limited administrative capacity, will have little positive impact on improving management skills. Techniques must be developed that are sensitive to national needs, constraints or opportunities." Chadha (1986) argued that "the efficiency in project and high project management calibre is of much greater importance to the under-developed countries." This is because in the developing countries most of the development is taking place by means of project execution, ie there is a higher investment in construction work.

Although most of the good practices found to be working well in Scotland may be adapted to Nigeria, the environmental differences between the two countries must be recognised. Results of the studies reviewed in Chapter 4 strongly suggest the need to adapt Western management technology when transferring it to developing countries. Environmental differences: cultural; social; psychological; and economical, were shown to be relevant, in one way or another, to management practices in different countries.

Therefore, if the management and control of public sector projects in Nigeria is to be improved, the following recommendations have to be considered, and all the suggested remedial measures should be tailored towards the particular characteristics of Nigeria:

- (i) the primary solution of all the problems revealed in this research is to provide sufficient numbers of competent personnel for the construction industry. Woodward (1984) classified education into five main groups:
 - a) Short courses, seminars (up to two weeks)
 - b) Medium length courses (three to twenty weeks)
-

- c) Undergraduate programmes
- d) Higher degree courses
- e) Research

In Nigeria the first two classes of education should be stressed, to tackle the current problems by enlightening those in practice, and reminding them of the applicability of the techniques they learned during their formal education. The last three types of education should include emphasis on practicability, to complement theory. Specifically, sandwich courses should be set up to ensure that students gain a good breadth of practical experience, since most of them will work using their own initiative if employed by an organization without other similarly trained professionals.

With respect to the short courses, workshops should be encouraged by Government departments so that results of research like the one at hand could be presented, and remedial measures discussed. The results should be put into practice, rather than being regarded as only an academic exercise without practical application.

To ensure the technical quality of development plans, intensive courses should be organised frequently for the officials of Federal and State Governments who participate in the formulation of plans. The courses, if properly directed, will increase the quality of the programmes submitted to the Central Planning Office. At the initial stage of a planning exercise, sectoral consultants are sometimes commissioned to study a number of strategic sectors and assist Federal and State officials in articulating projects for inclusion in the plan. An organised training programme will therefore save the cost of those sectoral consultants.

- (ii) to avoid, or at least reduce, the chance of planned projects not being started, or being left uncompleted, adequate arrangements must be made to ensure that every Agency has sufficient funds for its programme before approval. Although this is difficult to achieve, owing to the problems highlighted in Chapter 2, it is possible to make improvements in strategic planning. The system of
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revenue allocation currently being practiced may be ineffective to the point where original budgets are ignored, and expenditure depends on monthly available cash. Commitment is thus lost, making it difficult for agencies to plan their expenditure efficiently. Money is spent on projects that have influential people supporting them, rather than on those planned. Government should modify the allocation system so that Agencies are not eligible for increases until another budget period, and give the Agencies power to make savings on one project, in order to subsidise another. This practice would encourage the adoption of "capital programme monitoring", as is practiced in Scotland. The government should deliberately give higher priorities to projects already started, to help reduce the incidence of abandoned projects.

- (iii) progress reports are essential for the identification of achievements, failures and bottlenecks in the process of plan implementation. Such periodic reports facilitate the initiation of corrective measures to ensure full implementation of
-

the plan, and the realisation of its objectives. The Government should therefore make the submission of comprehensive monthly reports on projects a condition for the monthly release of funds. This practice would force the Agencies to carry out effective monitoring.

- (iv) the performance of any Government Agency is affected by its institutional framework, among other things. As far back as 1940 Sir Hasketh Bell, who served the British Government in Northern Nigeria asked, "what is wrong with Nigeria?" and further observed "Is our deplorable financial position the fault of the administration, or is the system under which the administration functions at fault?" "It may be due to either or both" he further lamented (West Africa, 1990). Government ministries therefore need to study their bureaucratic processes, especially those involved in settling outstanding Contractors' payments. The involvement of administrators and all non-technical staff should be reduced to a minimum, preferably to limit such involvement to the pre-contract stage only. This would help to eliminate
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the handicap of bureaucracy. Such a policy was proved to be capable of enhancing productivity by Kent County Council in the UK (Saville, 1990). The Nigerian Government could usefully abandon many of the statutory instruments and regulations that originated in industrialised countries, and that are no longer of value even in these countries (Dlakwa and Culpin, 1989).

- (v) it should also be recognized that unless Government ministries and agencies can in some way fill their technical staff vacancies, virtually all other actions, and certainly staff training, organizational changes and the like, would result only in wasted effort and wasted expenditure. In the face-to-face interviews undertaken in Scotland it was interesting to note that quite a number of quantity surveyors in the public sector have had previous experience in the private sector. The pay structure for the public sector personnel, particularly the professionals, in Nigeria should be improved to at least match that offered by the private sector, so as to attract competent people.
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- (vi) it is commonly the practice in Nigeria to set up review committees to report on projects that fail. Such committees should as a principle have a majority of members drawn from the technical professions. This would enhance the quality of their investigation, and of their recommendations.
- (vii) the Nigerian Government should establish a Construction Cost Information Agency, to be able to achieve more reliable cost planning for future projects; to identify cost escalation due to inflation in a good time; to clarify regional differences in construction costs; and to benefit both staff and students in their construction cost research work. Such an agency would be charged with the responsibility of providing cost information such as: construction cost indices; cost analysis of previous projects; and of setting standard cost units for government projects such as schools (cost/pupil), hospitals (cost/bed), etc. A co-ordinating committee should be set up which would have the responsibility for research directed towards establishing the Construction Cost
-

Information Agency. The co-ordinating committee should, as was recommended by Tahir Majid and Inglis (1978) to the Malaysian Government, include representatives of:-

- a) Quantity Surveyors from the academic, public sector, private sector and contracting organizations.
- b) Architects.
- c) Engineers.
- d) Suppliers of materials for the construction industry.
- e) Economists.
- f) Statisticians.
- g) Interested Government departments.

(viii) the Consultants' role in any construction project is crucial to the success of the project. The conditions of engagement, particularly for the Quantity Surveyor, should be clarified to state specifically the roles he is expected to play, and the penalties he should suffer in default. Such roles should include the crucial post-contract service of monthly financial reporting and advice to

the Client on the status of the project. The conditions should, among other things, specify the proportion of the overall fees payable for each element of the Consultant's services rendered. The Agencies should adopt a process of consultant selection on the basis of the services offered, rather than on monetary concessions.

The under-developed countries will continue to be under-developed unless they strive to transfer, adapt, and properly use, the competence already achieved in the developed countries.

9.4 RECOMMENDED AREAS FOR FURTHER RESEARCH

While some of the findings in this study are specific, some are imprecise and therefore deserve further investigation. The proposed areas have not been studied in the present research, as they have evolved either as a result of the findings from the survey, or from conflicting results between this study and other reports. Some, and certainly the last one, will require a professional input from the subjects of anthropology and sociology.

- (1) The bureaucratic framework in Nigeria should be investigated, as it is the single most important factor contributing to overruns, and hence to project failures. Such a study would help determine which particular activities are not necessary, and recommend ways of reforming the present practice within the Nigerian environment.

 - (2) 58% of respondent public sector agencies in Nigeria claim to undertake monthly monitoring of their ongoing projects (Table 8.6). The Ministerial Committee's Report (Chapter 3) and the case study
-

in this research, provide no evidence to support these claims. Further study should therefore help to establish the nature of the monitoring, if in fact it does take place, and its limitations. The details of how monitoring is being carried out in Scotland (Chapter 7) can provide a basis for comparison, and suggest what precise lessons should be learnt. Monthly reporting was found to be one of most important factors in controlling projects.

- (3) Results of the survey suggest that there are differences between the tendering and contractual arrangements in Nigeria and Scotland. Previous studies show that differences in either of these could constitute a source of overrun in construction projects. It is therefore worthwhile to investigate a number of projects in Nigeria that were let through different procedures to determine if there is a correlation between different types of tendering and contractual arrangements in relation to overruns. The results of such a study would show which type of tendering or contractual arrangement best suits the
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Nigerian context. It was shown in the review of Nigerian practice (Chapter 6) that at present, the government dictates in the Development Plan the type of tendering to be used by public sector agencies.

- (4) The literature review suggests that cultural, social, psychological and economic factors contribute to problems of non-transferability of management technology between countries. A study of Nigeria is desirable, to determine whether these factors actually hinder the application of transferred technology; and if they do, identify their levels of significance. Such research would require an input of professional expertise from the subjects of anthropology and sociology, as well as from the technical subjects. The findings of such an investigation would provide guidance as to how the best management practices from the West can adapted for use in Nigeria.
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APPENDICES

APPENDIX I
MONTHLY FINANCIAL STATEMENT

Monthly Financial Statement No. Period..... Project No.....

LOCATION

COST CONTROL STATEMENT

Page.....

A.I. No. or Bill Item	Brief Description or Instructions and Remeasurement Items	Approximate Effect on Contract Value		
	APPROVED CONTRACT AMOUNT TO DATE	E		
	ORIGINAL CONTRACT AMOUNT	Deduct	Add	Running Total
	Deduct DAYWORK/CONTINGENCIES			

SHEET A

MONTHLY FINANCIAL STATEMENT No.

SMITH STREET REWIRING & INSULATION Proj. No. 50

CONTRACTOR

ARCHITECT

QUANTITY SURVEYOR.....

APPROVED CONTRACT AMOUNT (including Approved Additional Expenditure)

£ 230,000

ORIGINAL CONTRACT AMOUNT

(Per Minute of Print No. Page No.)

	Deduct	Add
Deduct Dayworks/Contingencies	£ 30,000	£
Adjustment of Re-measured Items in Bills of Quantities	£ 2,000	£
Variation Orders Priced to No.	£ 1,000	£ 25,000
Other Miscellaneous Adjustments	£	£ 3,000
DAYWORKS (CLEARING ATTICS)		
TOTAL ADJUSTMENTS TO DATE	£ 33,000	£ 28,000

£ 225,000

ESTIMATED ULTIMATE EXPENDITURE (Excluding Fluctuations)

Gross Value of Work Done £

Deduct Fluctuations £

	1984/85			1985/86			1986/87			Balance	Total
	CONTRACT	FLUCT.	TOTAL	Current Year		Next Year					
Estimated Cash Flow	40	-	40	180	-	180	5	-	5	-	225
	50	32	25	30	25	8					10

APPENDIX II
EXPENDITURE PROFILES

APPENDIX III
MONITORING SUMMARY

HOUSING REVENUE ACCOUNT
HOUSING CAPITAL MONITORING SUMMARY
1984/85

Period 5 (17/8/84)

JOINT REPORT BY DIRECTORS OF HOUSING, FINANCE AND ARCHITECTURE

CAPITAL ALLOCATION	ORIGINAL ESTIMATE	CURRENT FORECAST
Net Allocation	40,511	40,511
Estimated Capital Receipts	6,189	6,189
Additional Receipt	1,008	1,100
Virement from non HRA	2,000	2,000*
TOTALS (£000)	49,708	49,800

*NB:- The Council may transfer up to £2m. from the Non HRA Allocation.

CAPITAL ESTIMATES	ORIGINAL APPROVED PROGRAMME	CURRENT PROGRAMME	
		<u>Committed</u>	<u>Uncommitted</u>
Cap 1 (at 31/3/84)	36,708	37,137	
Cap 2A Bisons	1,500	857	643
Dampness	4,233	4,783	
Refurbish- ment	4,918	4,068	
Ext. Repairs	1,049	1,819	
Rota Painting	1,300	830	
TOTALS (£000)	49,708 <i>Cap. Est.</i>	<u>49,494</u> <i>Top line of li. B.</i>	643

CAPITAL PROGRAMME	CURRENT PROGRAMME <i>Top line</i>	ACTUAL EXPENDITURE IN PERIOD 5	ACTUAL CUMULATIVE EXPENDITURE to PERIOD 5	ESTIMATED CUMULATIVE EXPENDITURE to PERIOD 5	FORECAST Out turn 84/85 <i>Bottom line</i>	FORECAST CARRY FWD 85/86
Cap 1	37,137	2,701	19,553	21,532	37,176	8,821
Cap 2a(c)	12,357	810	2,998	2,735	12,360	104
Total Comm'd	49,494	3,511	22,551	24,267	49,536	8,925
Cap 2a (U)	643				250	390
TOTALS £000	50,137	3,511	22,551	24,267	49,786	9,315

500 limit of permitted carry forward (70% of £49.80) = (34,860)

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- 3 SEP 1984		

COST CONTROL RETURN

Contract MOD OF (54) ORLIT HOUSES,
BANKNOCK
Contractor J. B. BENNETT
Accepted Contract Amount 1,397,478 - 29

Valuation No. 10 Date 8/12/88
Gross Value 560,590
Retention 21,030
Certified to date 539,560

Description	Amount Allowed £	Actual Expenditure £	Extra £	Saving £	Estimated Final Cost £
PRELIMINARIES	70,650	43,500	-	-	70,650
P.C & PROV. Sums	57,880	3,576	-	37,880	20,000
Exc, CONC, BWK	346,870	150,503	-	16,870	330,000
WOODWORK	250,010	98,092	-	-	250,010
ROOF TILER	46,131	25,285	15,369	-	61,500
PLUMBING & HEATING	145,865	56,146	135	-	146,000
PLASTER WORK	76,966	29,200	18,034	-	95,000
FLOOR FINISHES	21,278	2,000	-	13,778	7,500
ROUGHCAST & INSULATION	92,535	21,838	-	22,535	70,000
ELECTRICAL	39,625	15,474	5,375	0	45,000
PAINTER	69,262	17,500	-	19,262	50,000
SITE WORKS	125,931	42,660	91,833	-	217,764
FRONT PORCHES	20,386	8,910	-	-	20,386
CONTINGENCIES	34,089	-	-	34,089	NIL
MATERIALS ON SITE	-	45,858	-	-	
TOTAL	1,397,478	560,592		13,668	1,383,810 ✓

6E:-
TERMINAL
UNDER
STEEL
LINED

↑ as at 13/12/88

NOTE :- THE ABOVE FIGURES EXCLUDE :-

- Any work to the remaining front walls and front stairs.
- Cost of claim for extension of time and cost of surplus units.
- Work to kitchens of inserting 3 apt hoppers where 500mm wide worktops etc already fitted.

In/Excluding Architect's Instructions
Nos. 1 TO 28

Cost Control No. 2

Date 13/12/88

OPY TO - CLIVE HAMILTON

- A M'DONALD

APPENDIX IV
QUESTIONNAIRES



DEPARTMENT OF BUSINESS AND MANAGEMENT
UNIVERSITY OF STIRLING
STIRLING, SCOTLAND FK9 4LA
TELEPHONE: (0786) 73171
TELEX: 777557 STUNIV G
FAX 0786 63000

S A Howard
Stanley A Howard (Constr) Ltd
30 West Mill Road
Cotinton

April 25, 1989

Dear Mr Howard,

Public Sector Construction Projects
Surveys of Practices in Nigeria and Scotland

I am a doctoral research student working on a study of the implementation of public sector construction projects in Nigeria, in particular, the reasons for the large number of time and cost overruns. An important part of the study is to compare practices, and the problems arising from them, for executing such projects in Nigeria with those currently in use in Scotland.

A survey including some 200 public agencies, consultants and contractors in Nigeria has been completed, and the next stage is to seek the co-operation of a number of similar organisations in Scotland in a further survey. I should therefore be most grateful to you if you could find time to complete the enclosed questionnaire, and return it to me. A postage paid addressed envelope is enclosed for the purpose.

I must emphasise that any information you provide will be treated in the strictest confidence, and disclosed only in so far as it may have contributed to some statistical analysis.

In order to compare practices in the two countries as closely as possible, some questions have been included in the Scottish questionnaire that may seem a little strange to you. I shall be glad if you can nevertheless attempt to answer them.

Your considered response to this request will be highly appreciated.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'MAD'.

Mohammed M Diakwa BSc (QS) MSc MAACostE
Technology Management Centre

QUESTIONNAIRE

SURVEY OF PUBLIC SECTOR CONSTRUCTION CLIENTS

SECTION-A:

Please mark "X" for your response(s) in this section.

1.What type(s) of project(s) is/are carried out by your department?

- general building projects- - - - -
- civil engineering projects (eg roads dams etc) - -
- engineering construction projects (eg process plant, pipelines etc)- - - - -
- general maintenance/rehabilitation work- - - - -
- others (please specify).....\.....

2.Approximately how many people does your department employ?

- under 100 - - - -
- 101 to 200 - - - -
- 201 to 500 - - - -
- 501 to 1000 - - - -
- over 1000 - - - -

3.How many are professionally qualified?

- under 20 - - - -
- 21 to 40 - - - -
- 41 to 60 - - - -
- 61 to 80 - - - -
- over 80 - - - -

4.What numbers of professionals fall within each of the following categories?

	< 5	5-10	10-15	15-20	> 20
architects.....					
builders.....					
civil engineers.					
qty surveyors...					
others.....					

5. How often does your department undertake monitoring reporting on the financial position of an individual project?

fortnightly - - - - - - - - - - - - - - - -
 monthly - - - - - - - - - - - - - - - -
 quarterly - - - - - - - - - - - - - - - -
 yearly - - - - - - - - - - - - - - - -
 not practiced - - - - - - - - - - - - - - - -
 others (please specify).....

6. In your department, contractors are NOT allowed reimbursement in respect of fluctuations in labour, material and plant costs for contract periods of:

less than 1 year - - - - - - - - - - - - - - - -
 less than 2 years - - - - - - - - - - - - - - - -
 less than 3 years - - - - - - - - - - - - - - - -
 others (please specify).....

7. Please indicate the frequency of interim payments to contractors allowed for by your organisation.

fortnightly - - - - - - - - - - - - - - - -
 monthly - - - - - - - - - - - - - - - -
 quarterly - - - - - - - - - - - - - - - -
 based on predetermined project stages - - - - -
 not allowed - - - - - - - - - - - - - - - -
 others (please specify).....

8. In your experience, what percentage of contract value is normally included for contingencies on public sector projects?

less than 5% - - - - - - - - - - - - - - - -
 5 to 10% - - - - - - - - - - - - - - - -
 10 to 15% - - - - - - - - - - - - - - - -
 15 to 20% - - - - - - - - - - - - - - - -
 over 20% - - - - - - - - - - - - - - - -

SECTION-B:

Please indicate your response to questions in this section by circling the appropriate number between 1 to 5 where:

1 = very important/often used
5 = not important/never used.

1. What rating would you place on the frequency with which your department uses the following methods of tendering?

i. open tendering	1	2	3	4	5
ii. selective tendering	1	2	3	4	5
iii. negotiated tendering	1	2	3	4	5

2. Please rate according to importance the contract letting/procurement method used by your organization.

i. contracts based on bills of quantities	1	2	3	4	5
ii. contracts based on schedules of rates	1	2	3	4	5
iii. contracts based on drawings & specification	1	2	3	4	5
iv. prime cost contracts	1	2	3	4	5
v. design & construct type of contract	1	2	3	4	5
vii. others (please specify).....	1	2	3	4	5

3. Please rate the incidence of occurrence of each of the following in the execution of public sector construction projects with which you have been involved.

i. construction delays	1	2	3	4	5
ii. construction cost overruns	1	2	3	4	5

4. Please rate the following possible reasons for cost overruns in the execution of public sector construction projects with which you have been involved.

i. inadequate pre-planning	1	2	3	4	5
ii. deficiencies in the initial estimates	1	2	3	4	5
iii. fluctuations in material, labour & plant costs	1	2	3	4	5
iv. construction delays	1	2	3	4	5
v. other unforeseeable circumstances	1	2	3	4	5
vi. others (please specify).....	1	2	3	4	5

5. Please rate the following possible reasons for delays in the execution of public sector construction projects with which you have been involved.

- i. difficulties in obtaining construction materials 1 2 3 4 5
- ii. shortage of qualified operatives 1 2 3 4 5
- iii. deficiencies attributed to equipment 1 2 3 4 5
- iv. contractors' difficulties in receiving interim payments from public sector clients 1 2 3 4 5
- v. contractors' financial difficulties 1 2 3 4 5
- vi. inadequate public sector clients' budget 1 2 3 4 5
- vii. deficiencies in contractors' organization 1 2 3 4 5
- viii. deficiencies in public sector clients' organization 1 2 3 4 5
- ix. inadequacy of site inspection 1 2 3 4 5
- x. large quantities of extra work 1 2 3 4 5
- xi. design borne delays 1 2 3 4 5
- xii. frequent variation orders 1 2 3 4 5
- xiii. unrealistic contract durations imposed by public sector clients 1 2 3 4 5
- xiv. deficiencies in planning and/or scheduling 1 2 3 4 5
- xv. disagreement in contract clauses and specification 1 2 3 4 5
- xvi. unexpected natural and/or social events 1 2 3 4 5
- xvii. contractor's unrealistic estimates 1 2 3 4 5
- xviii. others (please specify)..... 1 2 3 4 5

6. Please rate the following possible reasons which contribute to delays in settling outstanding interim payments to contractors.

- i. insufficient budget 1 2 3 4 5
- ii. bureaucratic obstacles 1 2 3 4 5
- iii. delays in receiving moneys from the sources 1 2 3 4 5
- iv. high levels of contractual claims 1 2 3 4 5
- vi. others (please specify)..... 1 2 3 4 5

Name..... Agency.....

Position..... Town.....

Thank you for taking the time to answer my questionnaire

February 1989

QUESTIONNAIRE

SURVEY OF CONSTRUCTION COMPANIES

SECTION-A:

Please mark "X" for your response(s) in this section.

1. What type(s) of project(s) is/are carried out by your company?

general building projects- - - - -
 civil engineering projects (eg roads dams etc) - -
 engineering construction projects (eg process
 plant, pipelines etc)- - - - -
 general maintenance/rehabilitation work- - - - -
 others (please specify).....

2. In what financial range does your company operate?

under £ 50 000- - -
 £ 50 000 to £ 100 000- - -
 £100 000 to £1 000 000- - -
 over £1 000 000- - -

3. Please indicate the ownership of the company.

entirely British - - -
 British/foreign - - -

4. How long has the company been in operation?

under 5 years - - -
 5 to 10 years - - -
 10 to 15 years - - -
 over 15 years - - -

5. Please indicate approximately what percentage of your work-load is from the public sector?

under 25% - - -
 25 to 50% - - -
 50 to 75% - - -
 over 75% - - -

6. Approximately how many people does your company employ?

- under 50 - - - - - []
- 50 to 100 - - - - - []
- 100 to 150 - - - - - []
- 150 to 200 - - - - - []
- over 200 - - - - - []

7. How many are professionally qualified?

- under 10 - - - - - []
- 10 to 20 - - - - - []
- 20 to 30 - - - - - []
- 30 to 40 - - - - - []
- over 40 - - - - - []

8. What numbers of professionals fall within each of the following categories?

	< 5	5-10	10-15	15-20	>20
architects ...					
builders.....					
civil engineers.					
qty surveyors...					
others.....					

9. How often does your company undertake monitoring/reporting on the financial position of individual projects?

- weekly - - - - - []
- fortnightly - - - - - []
- monthly - - - - - []
- quarterly - - - - - []
- others (please specify)..... []

10. In your experience, Scottish public sector clients do NOT allow reimbursement in respect of fluctuation in labour, material and plant costs for contract periods of:

- less than 1 year - - - - - []
- less than 2 years - - - - - []
- less than 3 years - - - - - []
- others (please specify)..... []

3

11. In your experience, what frequency of interim payments is allowed for by public sector clients?

fortnightly - - - - -
 monthly - - - - -
 based on predetermined project stages - - -
 others (please specify).....

12. In your experience, what percentage of contract is normally included for contingencies in public sector projects?

less than 5% - - - - -
 5 to 10% - - - - -
 10 to 15% - - - - -
 15 to 20% - - - - -
 over 20% - - - - -

SECTION-B:

Please indicate your response to questions in this section by circling the appropriate number between 1 to 5 where:

1 = very important/often used
5 = not important/never used.

1. What rating would you place on the frequency with which public agencies use the following methods of tendering?

i. open tendering	1	2	3	4	5
ii. selective tendering	1	2	3	4	5
iii. negotiated tendering	1	2	3	4	5

2. Please rate in order of importance contract letting/procurement methods used by public agencies.

i. contracts based on bills of quantities	1	2	3	4	5
ii. contracts based on schedules of rates	1	2	3	4	5
iii. contracts based on drwgs & specification	1	2	3	4	5
iv. prime cost contracts	1	2	3	4	5
v. term contracts	1	2	3	4	5
vi. design & construct type of contract	1	2	3	4	5
vii. others (please specify).....	1	2	3	4	5

3. Please rate the incidence of occurrence of each of these in the execution of public sector construction projects with which you have been involved.

i. construction delays	1	2	3	4	5
ii. construction cost overruns	1	2	3	4	5

4. Please rate the following possible reasons for cost overruns in the execution of public sector construction projects with which you have been involved.

i. inadequate pre-planning	1	2	3	4	5
ii. deficiencies in the initial estimates	1	2	3	4	5
iii. fluctuations in material, labour & plant costs	1	2	3	4	5
iv. construction delays	1	2	3	4	5
v. other unforeseeable circumstances	1	2	3	4	5
vi. others (please specify).....	1	2	3	4	5

5. Please rate the following possible reasons for delays in the execution of public sector construction projects with which you have been involved.

i. difficulties in obtaining construction materials	1	2	3	4	5
ii. shortage of qualified operatives	1	2	3	4	5
iii. deficiencies attributed to equipment	1	2	3	4	5
iv. contractor's difficulties in receiving interim payments from public sector clients	1	2	3	4	5
v. contractors' financial difficulties	1	2	3	4	5
vi. inadequate public sector clients' budget	1	2	3	4	5
vii. deficiencies in contractors' organization	1	2	3	4	5
viii. deficiencies in public sector clients' organization	1	2	3	4	5
ix. inadequacy of site inspection	1	2	3	4	5
x. large quantities of extra work	1	2	3	4	5
xi. design related	1	2	3	4	5
xii. frequent variation/change orders	1	2	3	4	5
xiii. unrealistic contract durations imposed by public sector clients	1	2	3	4	5
xiv. deficiencies in planning & scheduling	1	2	3	4	5
xv. disagreement in contract clauses and specification	1	2	3	4	5
xvi. unrealistic tenders	1	2	3	4	5
xvi. unexpected natural and social events	1	2	3	4	5
xvii. others (please specify).....	1	2	3	4	5

5. Please rate the following reasons which may contribute to delays in settling outstanding interim payments to contractors by public sector clients.

i. inadequate budget	1	2	3	4	5
ii. multitude of bureaucratic obstacles	1	2	3	4	5
iii. delays in receiving moneys from the sources	1	2	3	4	5
iv. high level of contractual claims	1	2	3	4	5
vi. others (please specify).....	1	2	3	4	5

Name..... Company.....

Position..... Address.....

.....
Thank you for taking the time to answer my questionnaire

QUESTIONNAIRE

SURVEY OF PRIVATE PRACTICE QUANTITY SURVEYING CONSULTANTS

SECTION-A:

Please mark "X" against the appropriate response(s) in this section

1. On what type(s) of project(s) does your firm provide QS services?

general building projects- - - - -
 civil engineering projects - - - - -
 engineering construction projects (eg process
 plant, pipelines etc)- - - - -
 general maintenance/rehabilitation work- - - - -
 others (please specify).....

2. Please indicate the ownership of the firm.

entirely British - - -
 British/foreign - - -

4. How long has the firm been established?

under 3 years - - - -
 3 to 5 years - - - -
 5 to 10 years - - - -
 over 10 years - - - -

5. Please indicate approximately what percentage of your work-load is from the public sector?

under 25% - - - -
 25 to 50% - - - -
 50 to 75% - - - -
 over 75% - - - -

6. Approximately how many people does your firm employ?

under 10 - - - -
 10 to 20 - - - -
 20 to 30 - - - -
 30 to 40 - - - -
 over 50 - - - -

SECTION-B:

Please indicate your response to questions in this section by circling the appropriate number between 1 to 5 where:

1 = very important/often used
5 = not important/never used.

1. What rating would you place on the frequency with which public sector clients use the following methods of tendering?

i. open tendering	1	2	3	4	5
ii. selective tendering	1	2	3	4	5
iii. negotiated tendering	1	2	3	4	5

2. Please rate according to importance contract letting/procurement methods used by public agencies.

i. contracts based on bills of quantities	1	2	3	4	5
ii. contracts based on schedules of rates	1	2	3	4	5
iii. contracts based on drwgs & specification	1	2	3	4	5
iv. prime cost contracts	1	2	3	4	5
v. term contracts	1	2	3	4	5
vi. design & construct contract	1	2	3	4	5
vii. others (please specify).....	1	2	3	4	5

3. Please rate the incidence of occurrence of each of the following in the execution of public sector construction projects with which you have been involved.

i. construction delays	1	2	3	4	5
ii. construction cost overruns	1	2	3	4	5

4. Please rate the following possible reasons for cost overruns in the execution of public sector construction projects with which you have been involved.

i. inadequate pre-planning	1	2	3	4	5
ii. deficiencies in the initial estimates	1	2	3	4	5
iii. fluctuations in material, labour & plant costs	1	2	3	4	5
iv. construction delays	1	2	3	4	5
v. unforeseeable circumstances	1	2	3	4	5
vi. others (please specify).....	1	2	3	4	5

5. Please rate the following possible reasons for delays in the execution of public sector construction projects with which you have been involved.

i. difficulties in obtaining construction materials	1	2	3	4	5
ii. shortage of qualified operatives	1	2	3	4	5
iii. deficiencies attributed to construction plant and equipment	1	2	3	4	5
iv. contractors' difficulties in receiving interim payments from public sector clients	1	2	3	4	5
v. contractors' financial difficulties	1	2	3	4	5
vi. inadequate public sector clients' budget	1	2	3	4	5
vii. deficiencies in contractors' organization	1	2	3	4	5
viii. deficiencies in public sector clients organization	1	2	3	4	5
ix. inadequacy of site inspection	1	2	3	4	5
x. large quantities of extra work	1	2	3	4	5
xi. design related	1	2	3	4	5
xii. frequent variation/change orders	1	2	3	4	5
xiii. unrealistic contract durations imposed by public sector clients	1	2	3	4	5
xiv. deficiencies in planning & scheduling	1	2	3	4	5
xv. disagreement in contract clauses & specitn	1	2	3	4	5
xvi. contractors' unrealistic tenders	1	2	3	4	5
xvii. unexpected natural and social events	1	2	3	4	5
xviii. others (please specify).....	1	2	3	4	5

5. Please rate the following possible reasons which may contribute to delays in settling outstanding interim payments to contractors by public sector clients.

i. insufficient budget	1	2	3	4	5
ii. multitude of bureaucratic obstacles	1	2	3	4	5
iii. delays in receiving moneys from the sources	1	2	3	4	5
iv. high level of contractual claims	1	2	3	4	5
vi. others (please specify).....	1	2	3	4	5

Name..... Company.....

Position..... Address.....

.....

Thank you for taking the time to answer my questionnaire

APPENDIX V
CONTRACT VALUATION FORM

APPENDIX VI
CONTRACT CARD

APPENDIX VII
INTERIM VALUATION AND
ADVANCE CERTIFICATE

APPENDIX VIII
FORM OF TENDER

T E N D E R

CITY OF GLASGOW DISTRICT COUNCIL

DEPARTMENT OF ARCHITECTURE AND RELATED SERVICES

* Insert Project Name and
Project Number

The Housing Committee of Glasgow District Council

Ladies and Gentlemen,

I/We hereby offer to execute and complete the Several Works of

all in accordance with the Drawings, Conditions of Contract and Bills of
Quantities for the sum of:-

_____(£)

I/We agree that should errors in pricing or in arithmetic be discovered before
acceptance of this offer in the priced Bills of Quantities submitted by me/us,
then these errors will be adjusted in accordance with Alternative 1 contained
in Section 6 of the Code of Procedure for Single Stage Selective Tendering,
published by R.I.B.A. Publications Ltd. for the National Joint Consultative
Committee for Building.

I/We agree that our offer remains open for acceptance for a period of three
months from the date fixed for submission of Tender.

Signature: _____

Address: _____

Date: _____ Telephone No. _____

* Tenders under sealed cover and endorsed "Tender for the Several Works of
to be delivered to the Town Clerk, City of Glasgow District Council, Public
Office, Ground Floor, City Chambers, 78 Cochrane Street, Glasgow, G2 1DU not
later than 10.00 a.m. on

Priced Bills in a separate envelope endorsed as above with the Contractor's
name thereon must accompany Tenders in every case.

Plans may be seen at

* See attached note for details of procedure to be followed in lodging offer.

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