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THE IMPACT OF CLIENT ATTRIBUTES ON PROJECT SUCCESS:

A STUDY OF UK PUBLIC CONSTRUCTION PROJECTS

By

MOHAMED ABD ASSLAM AGGIAG

A thesis submitted in partial fulfilment
of the requirements of the
University of Northumbria at Newcastle
for the degree of

Doctor of Philosophy

School of the Built Environment

May 2005

Abstract

In the literature that deals with the causes of time and cost overruns in building construction there is a certain amount that highlights the role of the client. However, most studies are limited in their approach and they do not fully recognise the potential association between client-related attributes and project success in building projects.

In fact, the challenge of investigating client-related attributes in public-sector building projects is of vital importance if society is to gain the high-quality, cost-effective municipal buildings of the future. The selection of the client as the main focus in this research project came as a consequence of the author's working experience. An intensive literature search then showed that only a limited number of studies had examined the client's attributes in relation to project success.

The study's results indicate that the client and its project manager are essential factors in driving project outcomes. Unified organisation, and consistent actions and attitudes of the client organisation are crucially linked to keeping the schedule and budget within their limits and ensuring project functionality. Project functionality was also associated with the client's level of proficiency. In the case of the client's project manager, its actions, attitudes, proficiency and experience appear less likely to effect the duration of the project, but are critical in reducing cost and improving the project's functionality. It also appears that the procurement types used within the surveyed projects had an influence on these associations.

The findings underlined the major role that clients have to play in constructing public buildings. More consideration has to be taken by clients as to their actions and attitudes during the process of building construction; furthermore, they have to be aware that any changes in their organisation might affect project outcomes. Clients should choose their project manager carefully given that consistent actions, attitudes, proficiency and experience of the project manager are key elements in attaining the successful completion of projects.

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ACKNOWLEDGMENTS

I wish sincerely to thank his mighty ALLAH who given me this opportunity to complete my PhD degree.

I wish to express my sincere gratitude to Dr. David Greenwood, Dr. Allan Osborne, and Mr. Keith Hogg for their guidance, support and encouragement, which has eventually transformed my project proposal into a valuable work.

I would like to acknowledge the help and support given by the staff of Graduate Research School of the Built Environment of Northumbria University during the course of this research. My special thanks are extended to Mr. David Carney, Phil Hardacre, Neil Patterson, and Nicky Wise for their generous help, and valuable feedback on different issues.

I would like to thank all of staff of Mansell, Newcastle Council and Gateshead Council who agreed to take part in the study, for their time throughout the project and without whom this project would not have been possible.

I am indebted to my loved country Libya for its continuous financial support without which this project would not have been possible. My respect goes to the soul of my father, my mother, brothers Saad and Emhemed, sisters and all relatives and friends in Libya. Finally, my special thanks and respect goes to my beloved family - wife Zeinab and sons Anas, Taha, Mallek and sweeties Nairuz and Noor for their patience, understanding and encouragement throughout my study.

I wish to dedicate this entire work to my country in which I am keen that this research will be a benefit in its aim to develop a better future for the new generation.

CHAPTER ONE: INTRODUCTION

1.1 Background to the Research

The process of managing large-scale construction projects is fraught with difficulties for all of the parties concerned. Many factors contribute to this scenario: some related to the parties themselves; others related to the environmental conditions surrounding the projects.

The timely completion of a construction project tends to be one of the principal objectives for all parties concerned, and one of the most universal measures for a project's actual success (Egan, 1998; Bourn, 1998). Nevertheless, it is still common for construction projects to be handed over late (Chalabi, 1984; Chan and Kumaraswamy, 1996; Sasanuma, 1998). According to Dlakwa and Culpin (1990), Assaf *et al.* (1995) and Al-Khalil and Al-Ghafly (1999), delayed completion appears to be a particular problem for large-scale public-sector projects.

On the other hand, in each construction project, cost is considered as vital for both client and contractor (Davenport, 1997; Turner, 1999; Holt and Proverbs, 2001). Graves and Rowe (1999) stated that two-thirds of UK public projects investigated exceeded cost estimates.

Measuring client satisfaction involves many issues from different perspectives some of them contradictory (Ramsay-Dawber, 1995; Ribeiro, 1998). One of the main aims of the client is to maintain the project on its mission as planned. Functionality then, is crucial issue for the parties concerned.

Among the most important responsibilities for the numerous health authorities that are located around the world are the planning, design and construction of new hospital buildings. As hospitals tend to be very large, technologically complex and expensive to build, the emergence of unexpected delays, risks and cost overruns can lead to severe problems for everybody associated with the project – most notably the client (i.e. the health authority).

Work-related experience on the Tripoli Medical Centre, Libya, greatly influenced the author's desire to investigate the client-related factors that affected large public-sector project delays and cost overruns.

1.2 Research Problem

The study commenced by examining two large hospital projects. In the UK one of the most publicised of recent hospital projects has been Guy's Hospital in London, which was completed four years late in 1997. It is a project that has been the subject of study by the National Audit Office (Bourn, 1998), whose report and data are publicly available. In Libya the Tripoli Medical Centre (TMC) was completed almost 13 years late in 1996. The Ministry of Follow-Up [1] (MFU) (1998) in Libya has investigated the project, and although the data are not readily available for public consultation, acquisition of this data has been facilitated by the fact that the author had prior work-related experience on this project from 1982 to 1999. More details of time overruns in TMC are presented in Chapter 2.

There are a number of published studies on the causation of construction-related delays. A review of the literature over the last three decades has resulted in 16 relevant studies being identified. The projects examined are spread out across the globe and include a total of 13 countries.

This literature review has identified a number of factors (summarized in Table 1.1 page 4) that influence construction-related delays. The following observations can be made from this data:

- The most significant factor that influences project-related delays and cost overruns is client-initiated design variations.
- The remaining factors, although fairly dispersed, can be categorised into the following broad grouping according to environmental context: financial difficulties, materials shortages and late deliveries, poor subcontractor performance and productivity, and shortages of skilled labour.

These findings indicate that the client is the key player in construction projects as far as delays and cost overruns are concerned. If all of the parties involved in the process

[1] Libya's equivalent of the National Audit Office (NAO).

of constructing buildings therefore acknowledge this observation and operate accordingly, then it is hypothesised that *project success* in terms of time, cost and functionality is much more likely to occur. This highly desired outcome, however, is conditional upon the client body effectively communicating its project expectation during the construction process. Clients, and their timely instructions, are therefore crucial to the overall success of construction projects.

Bresnen and Haslam (1991) and Kometa *et al.* (1995) have examined the enormous influence of clients upon project outcomes. They have shown that client experience has an important impact upon the many decisions made during the course of constructing a building, and that inadequate client-related briefings can cause significant problems during the design and construction of buildings. However, despite the value of their findings, Bresnen and Haslam and Kometa and his associates have overlooked the opportunity to relate their findings back to the actions, attitudes and proficiency of clients.

This Ph.D. study will therefore, attempt to bridge this knowledge gap by investigating the dominant client-related attributes that influence delays, cost overruns and functionality of public-sector building projects, whilst examining the correlations that exist between these variables (see Figure 4.2 on page, 47 for the hypothetical relationships between the independent and dependent research variables).

Country	US	UK	Developing C.	*Turkey*	Nigeria	Nigeria	Nigeria	Nigeria	Ghana	Saudi Arabia	Saudi Arabia	Lebanon	Jordan	Thailand	Indonesia	Hong Kong
FACTORS CAUSING PROJECT DELAYS	Baldwin, *et al.*	NAO, NEDO	Chalabi	Arditi, *et al.*	Okpala, Aniekwu	Dlakwa, Culpin	Mansfield *et al.*	Aibinu, Jagboro	Frimpong, *et al.*	Assaf, *et al.*	Al-Khalil, Al-Ghafly	Mezher, Tawil	Odeh, Battaineh	Ogunlana, *et al.*	Kaming, *et al.*	Chan, Kumara.
Weather conditions	X	X														
Labour shortage, low labour productivity	X		X	X		X				X			X		X	
Poor subcontractors' performance	X	X	X						X	X		X	X	X		
Inadequate technical coordination		X	X						X							
Frequent clients' changing orders		X	X	X						X	X	X	X	X	X	X
Lack or inadequate construction planning			X										X		X	
Poor site management			X									X		X		X
Poor organization			X	X												
Excessive bureaucracy			X							X						
Economic or political instability			X							X						
Poor communication, conflicts between parties			X									X				
Uncooperative client representatives			X													
Procurement methods			X		X		X									
Slowness of clients' decision-making			X							X			X			X
Lack of design information, delays in design work			X	X						X						
Financial difficulties				X	X	X	X	X	X	X	X				X	
Unforeseen ground conditions		X														X
Shortages of materials, late materials delivery		X	X		X	X	X		X					X	X	

Table 1.1 Causes of Delays in Construction Projects in Several Countries

1.3 Aims and objectives of the research

The research project aims to investigate and evaluate the main client-related factors that influence the various components of project success. Furthermore, the aim is to develop a model that reflects the way in which these major client-related factors may be associated with aspects of project success (namely: time, cost and functionality) and to expose this model to empirically derived data. By populating the model with these data from real projects, some indication is sought of the relative strengths of association between client attributes and measures of project success. The results should eventually assist in evaluating clients' roles in public projects and focus the attention of all of the parties involved upon the potential influence of the client and how that can affect the successful construction of public projects. In particular the objectives of the current research project are:

1. Exploration of the elements of project success in terms of time, cost and functionality;
2. The definition and evaluation of the major client-related factors that influence project success;
3. The development of a model that reflects the outcomes of empirical study and highlights the major client-related factors and their association with aspects of project success (namely: time, cost and functionality);
4. The population of the model with representative data derived from actual projects;
5. The refinement of the model, in the light of data analysis;
6. The presentation of the model and the results by critical examination of a panel of industry experts;
7. An assessment of the usefulness of the model, the limitations of the work, and recommendations for future research.

1.4 Methodology

The research project aims to investigate aspects of the consistency, continuity and proficiency of the client organization and client project manager attributes towards the project outcomes of time, cost and functionality. The design concept of the research project has been established to combine both qualitative and quantitative approaches. Past experience in constructing a large public project has illuminated the path for the author to develop this study with the support of two case studies. These were used to

generate some preliminary findings identifying the causes of delays and cost overruns in public building projects. Following the literature review, both a pilot study and main study were designed to be an integral part of the research project. Yin (1994) has explained that case study research can include both single-and multiple-case studies. Yin further added that case studies could be based on any mix of qualitative and quantitative evidence. The observations and data collected from the two case studies were undertaken in order to obtain qualitative data, while a structured survey was arranged for the main study to obtain quantitative data.

It was anticipated that Structural Equation Modelling EQS software could be used to analyse the data collected. However the chosen software proved troublesome and the decision was made to use the more traditional SPSS software in order to analysis the data.

1.5 Outline of the Research Project

As it has been indicated in the previous section, the study focused on the investigation and evaluation of the main client-related factors that influence project certainty in the construction of public projects in the North East of England. Following this section, the theoretical framework for the current research has been developed via the literature review of client attributes and their involvement within the process of constructing public projects. It should be pointed out that whilst it might be relatively easy to identify causes of delays and cost overruns it is more difficult to track the effect of client attributes during their involvement in building construction. Qualitative and quantitative data were collected during the case study and the main study through field and structured survey.

Chapter One looks at the background of the research and defines the research problem by investigating the main client-related attributes that appear to influence delays, cost overruns and functionality during the construction of public-sector building projects. This section also schedules aims and objectives of the research study. Chapter Two presents in more detail the background, history, reasons, preliminary analysis and findings in relation to the negative project outcomes. Chapter Three looks at methodological issues that relate to the current study. It presents the research rationale and methodological notions of the research. Chapter Four highlights the structure of the research model and focus in more details upon the criteria for project success and

factors that affect project success. Chapter Five explains the research model validation and operation. Chapter Six explains the data analysis, Chapter Seven contains discussion and Chapter Eight gives the conclusions and recommendations that flow from the research.

1.6 Limitations

The two initial case studies were from different geographical region, London and Tripoli. However, the main body of research has been obtained from convenient accessible public projects within the North East of England.

1.7 Summary

This Chapter has described the structure of the thesis and establishes the foundation for the research study. It provides an overview of the causes of delays and cost overruns. It presents the research problem and provides a clear rationale for the research and considers the impact of client attributes upon project outcomes in public projects. Furthermore, the methodology has been briefly outlined. The thesis was outlined and the limitations of the study were given.

CHAPTER TWO: CONTEXT

2.1 Introduction

Delays and cost overruns in construction have been a focus of substantial research interest due to their direct effect on projects. It has been an area of research in both developed and developing countries. The importance of timely completion of construction projects is well recognized. It tends to be one of the principal objectives for all parties concerned, and one of the most universal measures for a project's actual success (Egan, 1998; Bourn 1998). Similarly, completing projects on time is a sign of an efficient construction industry (NEDO, 1988). Nevertheless, despite this high level recognition it is still common for construction projects to be handed over late (Chalabi, 1984; Chan and Kumaraswamy, 1997, Sasanuma, 1998). According to the literature, delayed completion appears to be a particular problem for large-scale public sector projects (Dlakwa and Culpin, 1990; Assaf, *et al*, 1995; Al-Khalil and Al-Ghafly, 1999). In this chapter an attempt is made to establish a clear outline of the causes of delays and cost overruns in construction that occur around the world. For better understanding of the context of one of the case studies, a brief history of the construction and the health provision in Libya is presented. The study will focus in more field detail about the causes of delay and cost overruns in the construction of Tripoli Medical centre in Libya and Guys Hospital in London, UK. The Chapter ends by presenting the findings and similarities from the two case studies.

2.2 Causes of delays in construction

The construction sector is essential to development and economic growth. Governments all over the world contribute to the development of the construction industry in different ways. However, there are some restrictions and even drawbacks to these efforts.

The time required to complete the construction of public projects is frequently greater than the time stipulated in the contract (Dlakwa and Culpin, 1990; Assaf, *et al.*, 1995; Chan and Kumaraswamy, 1995a; Al-Khalil and Al-Ghafly, 1999). Time overruns

occur for various reasons, including; design changes, clients' changes, adverse weather, late materials deliveries and financial difficulties.
Literature relevant to project delay is extensive. This reflects the importance of delays as a determinant of client and public satisfaction with the performance of the industry.

Kraiem & Diekman (1987) classified delays into three categories: 'compensable', 'excusable' and 'non-excusable'. Generally, if delay occurred due to the negligence, the fault or within the control of the client then the contractor receives compensation. Excusable delays arise when neither the contractor nor the client have contributed. Where the contractor's own action and/or inaction is the cause of the delay, it is referred to as non-excusable, or culpable. This approach is similar to Antill and Woodhead's (1990) categorisation of delays:

1. those which neither party to the contract has any control;
2. those which the client or his/her representative has the ability to influence;
3. those which the contractor has the ability to influence.

2.3 Causes of Delays and Cost overruns: A Critical Review

There have been a number of published studies on the causation of construction delays. A review of the literature between 1971 and 2002 has identified studies from 13 different countries.

In the US, Baldwin, *et al.* (1971) surveyed the causes of delays to the construction process from the viewpoints of American architects, engineers and contractors. Their findings indicated that weather, labour supply and poor subcontractor performance were the major causes of delays. The study also proposed a range of remedial actions including attention and detailed weather forecast, widespread use of labour training programmes, effective job coordination and programme scheduling.

In the UK, the Office of Government Commerce (1995) published the results of a survey related to cost and time overruns in public sector construction projects. The study reviewed 20 projects and covered examples of both good and bad performance and the possible influence of the procurement route. The results demonstrated that the 20 projects showed an increase of £500 million over their approved costs (representing

about 24 per cent cost overrun), as well as undefined time overruns. The CUP publication "Government Procurement-Progress Report to the Prime Minister 1995-96" (Office of Government Commerce, 1995) summarises average cost overruns by category in 1994-95 as shown in table 2.1 below:

Category of Project	Number of Projects	Average Value of Project in £ M	Cost Overruns post Tender Stage %
Hospitals	123	9	6
Buildings [other]	538	8	11
Civils [other]	93	16	33
Roads	53	34	4
All Projects	807	11	13

Table 2.1 Average Cost Overruns by Category in the UK public sector construction projects, 1994-95

This shows that in 1995 the average cost overrun varied considerably from 33% in the case of civil engineering projects to 4% in roads.

In 1994, the National Audit Office published a report entitled "Control of Prison Building Projects" (1993-94). The summary indicated that expenditure on construction exceeded the estimated costs at tender stage by 18.2 %. In analysis, changes in the design had led to about half of the additional costs. These changes originated in: inadequate review of drawings by project manager and client before construction, inadequate coordination of drawings and specification between the individual professional disciplines; client changes have led to delay and added to costs. In Australia, Bromilow (1974) found that the average time overrun exceeded 40% and that only one-eighth of building contracts were completed within the time limit.

Chalabi, (1984) investigated causes of delays and overruns of construction projects in developing countries. The study classified delays into two categories, the first related to those occurring in the pre-bidding phase and secondly to those occurring in the construction phase. With regard to the pre-bidding phase of the project it was found that delays were caused by a range of factors including lack of planning, poor

management, poor organization, excessive bureaucracy and economic or political instability. Correspondingly, in the construction phase, reasons for delays included lack of information, poor communication, uncooperative client representatives, materials delivery, specialized or heavy equipment breakdown, conflicts between parties, rejection of 'quantitative management techniques', contractor's poor performance, and quality of labour supply.

Arditi, *et al.* (1985) investigating reasons for delays in Turkish construction projects indicated that the effects of construction delays are not limited to the construction industry but influence the overall economy of a country. Their analysis indicated that the most important source of delays included: shortages of some resources, financial difficulties experienced by public agencies' and contractors', organizational deficiencies, delays in design work, frequent change orders resulting in considerable extra work.

Dlakwa and Culpin (1990) identified the reasons for time and cost overruns in Nigerian construction projects. The results show that lack of timely payment by clients to contractors and fluctuations in material, labour and plant costs are the major causes of time and cost overruns. Similarly, Mansfield, *et al.* (1994) reviewed the reasons behind the causes of delay and cost overruns in major Nigerian construction projects. The findings suggested that overruns are attributed to finance and payment arrangements, poor contract management, materials shortages, inaccurate estimating, and overall price fluctuations. The study concluded by suggesting that proper action should be taken at both the conceptual and detailed planning stages of projects in order to improve the situation. Aibinu and Jagboro (2002) studied the effects of construction delays on project delivery in the Nigerian construction industry. The results show that time and cost overruns were the two most common effects of delay in Nigerian construction industry, furthermore, delay had major effect on actual project duration, whereas, loss and expense claims and fluctuation claims during the delay period had a major effect on cost overruns. Odeyinka and Yusif (1997) concluded that client-related delay was found to be significant in the Nigerian building projects. Frimpong, *et al.* (2002) conducted a survey to identify causes of delay and cost overruns in Ghana groundwater construction projects. The results showed that the main causes were; monthly payment difficulties, poor contractor management, material procurement, poor technical performances and escalation of material prices.

In the Middle East, Assaf, *et al.* (1995) outlined the main causes of delay and their relative importance in large building projects in Saudi Arabia. The most important delay factors according to clients were design errors, excessive bureaucracy in project-client organization, labour shortages and inadequate labour skills. However, for the architects and engineers the reasons for delay were considered to be poor coordination, cash problems during construction, and the slowness of the clients' decision-making process. A differing opinion was given by contractors who cited several reasons for delay including: inefficient preparation and approval of shop drawings; delays in payment; design changes by clients.

Al-Khalil and Al-Ghafly (1999) carried out a survey to investigate the delay in public utility projects in Saudi Arabia. The result showed that in most situations delays were attributes to cash flow and financial difficulties, problems in obtaining work permits to be issued by various government bodies, the government practice of assigning contracts to the lowest bidder without regards to qualification, client tendency to underestimate duration, and changes in the scope of the project by the client. It was also found that clients and consultants allocated the major responsibility for delay to the contractors while contractors thought that the client was mostly to blame, supporting findings of Assaf, *et al.*(1995).

Mezher and Tawil (1998) presented the major causes of delays in the Lebanese construction industry from the viewpoints of clients, contractors and architects and engineers. In most situations the major delay factors viewed by clients were related to project financing and scheduling of subcontractor's work. The contractors' position however, indicated that contractual relationships and design changes by clients were the major factor. The architects and engineers perspective indicated that lack of personnel training and management support, and preparation of shop drawings were the most importance causes of delay. Odeh and Battaineh (2002) presented the findings of a survey to identify the major causes of delays in construction projects with traditional type contracts in Jordan from the contractors and consultants perspectives. Results of the study show that both contactors and consultants agree that among the ten most important factors are client interference, inadequate contractor experience, financing and payments, labour productivity, slow decision-making, improper planning, and subcontractors.

In the Far East, Ogunlana, *et al.* (1996) examined and analysed the delays experienced on high-rise building construction projects in Thailand. The results of the study indicated that delays could be categorized into three sections;

- Problems of shortages or inadequacies in industry infrastructure such as resource supply and shortages of materials;
- Problems caused by the clients and consultants such as the frequency of client design changes leading in many situations to coordination problems for site staff;
- Problems caused by contractor incompetence including inadequacies such as low technical and managerial skills.

Kaming *et al.* (1997) highlighted factors that influence construction time and cost overruns on high-rise projects in Indonesia. Their findings showed that the main causes of cost overruns were an increase of material cost due to inflation, inaccurate material estimating at tender stage and project complexity. With regard to time overruns, design changes, poor labour productivity, inadequate planning and resource shortages were considered to be major causes.

Chan and Kumaraswamy (1996, 1997) reported their findings relating to a survey regarding reasons for delay in civil engineering projects in Hong Kong. The results identified that the significant causes of delays in civil engineering works were unforeseen ground conditions, poor site management and supervision, low speed of decision-making from project teams, and client-initiated variations. The findings also indicated that clients and consultants considered that contractors were the main cause of delays due to their lack of experience in planning and supervision on site. In the same study, contractors expressed an alternative view that many delays were due to deficient design experience of the consulting engineers.

In summary, the above literature review demonstrates that many factors may be the cause of construction delay, cost overruns and performance. These factors are summarized in table 2.2 page 14.

COUNTRY	AUTHORS	RESEARCH METHOD	DATE	RESULTS AND FINDINGS	FACTOR	A				F				T				U
						CL	CT	CU	OT	CL	CT	CU	OT	CL	CT	CU	OT	U
LEBANON	Toufic, Tawil	1-Literature review	1998	1-Clients: Financing and scheduling of subcontractors	A* + F*	x	x			x	x							
		2-Questionnaire		2-Contractors:Contractual relationships,design changes														
				by the clients.	A*	x	x	x										
				3-Arch &Eng Project management, shop drawings	A* + T*	x	x	x						x	x	x		
TURKEY	Arditi, *et al*	1-Mailed questionnaire	1985	1-Shortage of many resources.	A* + T*	x				x				x				
				2-Contractors and public agencies financial difficulties.	F*					x	x		x					
				3-Orgnizational deficiencies,delay in design work.	A* + T*	x		x	x					x		x	x	
				4-Frequent change orders resulting in extra work	A* + T*	x		x						x		x		
INDONESIA	Kaming, *et al*	1-Questionnaire	1997	1-Design changes.	A* + T*	x		x						x		x		
		2-Interviews		2-Poor labour productivity.	A*		x											
				3-Inadequate planning and resources shortages.	A*	x	x	x										
				4-Lack of experience of project type.	A*	x	x	x										
				5-Materials cost increases due to inflation.	F*						x		x					
				6-Inaccuracy of estimates	A* + F*	x	x	x		x	x	x						
THILAND	Ogunlana, *et al*	1-Interviews	1996	1-Inadequancies in industry infrastructure.	A*	x		x										
				2-Problems caused by client and consultant.	A*+F*+T*	x		x		x		x		x		x		
				3-Contractor's incompetency/ inadequacy	A* + T*		x								x			
HONG KONG	Daniel,	1-Literature review	1996	1-Unforseen ground conditions.	T*									x		x	x	
	Kumaraswamy	2-Interviews		2-Poor site management and supervision.	A*	x	x	x										
		3-Maild questionnaire		3-Slow decision making from all project teams.	A* + T*	x	x	x						x	x	x		
				4-Client-initiated variations	A* + T*	x		x						x		x		
HONG KONG	Chan,	1-Questionnaire survey	1997	1-Poor site management and supervision.	A*	x	x	x										
	Kumaraswamy			2-Unforseen ground conditions.	T*									x		x	x	
				3-Slow decision-making from all project teams.	A* + T*	x	x	x						x	x	x		
				4-Client-initiated variations.	A* + T*	x		x						x		x		
SAUDI ARABIA	Assaf, *et al*	1-Literature review	1995	1-Financial difficulties.	F*					x	x	x	x					
		2-Interviews		2-Design changes.	A* + T*	x		x						x		x		
		3-Questionnaire		3-Preparation of shop drawings.	T*									x		x		
				4-Poor coordination of subcontractors.	A* + T*		x								x			
				5-Slowness of client's decision-making process.	A*	x		x	x									
				6-Design errors.	T*									x	x	x		
				7-Excessive bureaucracy in client orgnization.	A*	x		x	x									
				8-Labour shortages.	A*		x		x									
				9-Inadequate labour skills	A* + T*		x								x			
SAUDI ARABIA	Al-Khalil,	1-Field survey	1999	1-Cash flow and financial difficulties.	F*					x	x	x	x					
	Al-Ghafly			2-Difficulties in obtaining required work permits.	A*	x			x									
				3-Lack of technical support.	T*									x		x	x	
				4-Changes in the scope of the project.	A* + T*	x		x	x					x		x	x	
				5-Ineffective planning and scheduling.	A*	x	x	x	x									
				6-Shortage of manpower	A*		x											
JORDAN	Odeh,	1-Questionnaire survey	2002	1-Client-initiated variations.	A* + T*	x		x						x		x		
	Battaineh			2-Contractor's incompetency/ inadequacy.	A* + T*		x								x			
				3-Financial difficulties.	F*					x	x	x	x					
				4-Slowness of client's decision-making process.	A*	x		x	x									
				5-Ineffective planning and scheduling.	A*	x	x	x	x									
				6-Poor subcontractor performance	A*		x											
GHANA	Frimpong, *et al*.	1-Questionnaire survey	2002	1-Financial difficulties.	F*					x	x	x	x					
				2-Contractor's incompetency/ inadequacy.	A* + T*		x								x			
				3-Fluctuations in material,labour	A*+F*	x	x	x	x	x	x	x	x					
NIGERIA	Aibinu, Jagboro	1-Questionnaire	2002	1-Design changes.	A* + T*	x		x						x		x		
				2-Client-initiated variations	A* + T*	x		x						x		x		
NIGERIA	Diakwa,	1-Mailed questionnaire	1990	1-Prompt payment by the agencies to contractors.	F*					x		x	x					
	Culpin			2-Fluctuations in material,labour and plant costs	A*+F*	x	x	x	x	x	x	x	x					
NIGERIA	Mansfield, *et al*	1-Questionnaire survey	1994	1-Poor contract management.	A*	x	x	x	x									
				2-Materials shortages.	A*		x		x									
				3-Inaccurate estimating.	T*									x	x	x	x	
				4-Overall price fluctuations	F*					x	x	x	x					
USA	Baldwin, *et al*	1-Questionnaire	1971	1-Weather.	U*													x
				2-Labour supply.	A*		x		x									
				3-Poor subcontractor performance	A*		x											
UK	NAO	1-Report	1994	1-Design changes.	A* + T*	x		x						x		x		
				2-Client-initiated variations.	A* + T*	x		x						x		x		
				3-Inadequant review and coordination of shop drawings	T*									x		x		
DEVELOPING COUNTRIES	Chalabi	1-Survey Study	1984	1-Designers do not have the technical,environmental,														
				social and statistical data.	A*	x	x	x	x									
				2-Foregin contractors may not be familiar with the														
				material and human resources.	A*		x											
				3-Knowledge of the cultural and government factors.	A*		x	x										
				4-Andequate planning at the early stage of projects	A*	x	x	x	x									

Factors:														
	A. Administration	F Financial	A 61 citations = 27%	*S. sub-total*	36	31	34	16	13	11	10	10	20	8	19	6	1
	T Technical	U Unforseen	F 28 citations = 12%	*S. total*				117				44				53	1
			T 20 citations = 9%	*S. sub-ratio%*	31	26	29	14	29	25	23	23	38	15	36	11	100
			A+T: 83 citations = 37%	*Total*													225
	CL Client	CT Contractor	A+F 26 citations = 12%	*S. total ratio%*				52				20				28	0.01
	CU Consultant	OT Others	A+F+T 6 citations = 3%	*Total ratio %*													100%

Table 2.2 Comparison of Causes of Delays and Cost Overruns in some Countries

The analysis of these studies was undertaken with a view to categorising the causes of identified delays. In the 16 studies, respondents cited 40 different factors that contribute to delays. These can be grouped into four primary categories: *administrative, financial, technical* and *unforeseen* events; and three secondary categories that represent more complex combinations of the four primary ones. As already noted, the 16 studies represent the views of clients, consultants, contractors (with the majority of the studies using all three sources), and in some cases 'others'. Some of the respondents concurred in their assessment of some factors, while other factors were not identified by all the groups. This meant that, in fact, there were 225 citations by the different respondent groups. The next step was to rank the categorise that had been identified.

The most frequently occurring category (appearing in 27% of the 225 citations) was that of delays due to *administrative reasons* (A). These include slow decision-making and excessive bureaucracy on the part of the client, and contractor-deficiencies in areas such as planning, site management and supervision, and contractual relations. The second primary category (12% of the citations) was *financial causes* (F). These appear as contractors and public agencies financial difficulties (particularly cash flow), which often result in lack of prompt downstream payment. An additional problem can be that of inflationary increases in the cost of resources. The third most common primary category (9% of the citations) was what could be described as *technical reasons* (T), examples being design errors, problems in the production of working drawings, and inaccurate estimating. These often result from inadequacies in industry infrastructure, poor labour productivity, or lack of social, statistical or operational data. Finally there is the influence of *unforeseen events* (U), which can range from ground or weather conditions, to major political or social upheavals. Such factors were mentioned in less than 1% of the citations.

The secondary delay categories are combinations of one or more of the primary categories. It was found that some of the specific causes cited by respondents did not fit exactly into any of the four primary categories, but could be accommodated by a combination of two or three of them[2]. The most frequently encountered (in 37% of the citations) was the integrated *administration* and *technical* cause (A+T). An example is

[2] The fourth primary category - *unforeseen events* - remained a 'stand alone' category.

where the effects of frequent client-initiated variations are exacerbated by slow or bureaucratic decision-making. The fifth category was the combination of the *administration* and *financial* categories (A+F) (12% of the citations). Typical examples included inaccurate estimating and difficulties encountered by the client in financing and making payments. The final 3% of the citations involved multiple problems, chiefly involving the client and consultant, which could best be categorised as a combination of *administrative, financial* and *technical* causes (A+F+T).

Although this ranking is crude, and exposes little in terms of causation frequency, the point of interest is the key role of administrative issues: they form a part of four of the seven categories identified, which together amounted to 79% of the citations in the studies reviewed.

These findings and others that have been cited previously indicate that the client is the most crucial player in construction projects. Unless all parties involved in the process realize this and act to assist the client in understanding their vital role, the outcomes of any project may be put at risk.

2.4 Case Study 1: Tripoli Medical Centre

The Tripoli Medical centre comprises three ward blocks, each with nine storeys providing 165,000 m^2 gross floor area in 6200 rooms with eight open courts, and ancillary works, including a link to the medical school. The project covers 67 acres on a wide site and houses 65 clinical, academic and support departments. The Ministry of Health considered TMC as the pinnacle of its achievements in the construction of health projects in Libya. The construction journey begins in November 1973 when the first contract for the civil works was signed for the amount of £ 31 million; in October 1975 the cabinet approved the contract ceiling to £45 million. In July 1977 the construction was frozen. In August 1981 the second contract was signed for the completion stage in £ 78million. At the same time many technical and planning issues had arisen. Those revisions added another £ 78 million to the civils contract. Following completion in August 1996, the Final Account for the second stage civils contract (settled in December 1999), showed that the cost had reached £156million. The project was planned to be completed in August 1984. However, it was beset by many difficulties, which led to several extensions to the project completion date. The

project finally completed in August 1996, 12 years and 7 months late. The hospital was opened to patients in September 1996. The design and construction of TMC demonstrates the turbulence of the market associated with Libyan government policy (see Appendix A).

2.4.1 Role of the clients in TMC

Within the life of the TMC construction, many bodies were engaged in the construction process, which was started in the middle of 1960. The real time for construction commenced in 1973 when the foundations were excavated. Different client organisations and contractors were also appointed to the project. The following sections address their role.

2.4.1.1 Role of Ministry of Housing

The Ministry of Housing was engaged in the preliminary planning and design of TMC, which was started in 1964 and took responsibility to complete it by 1976. However force major led to the project to suspension in July 1977, which related to the difficulties with the main contactor. Subsequently the Ministry of Housing took responsibility to complete Tripoli Medical Centre in September 1980. At that time the Ministry had the expertise and the authority to do the job as well as the privilege that was given to it to supervise and control all state projects. This power was gained from its engagement in the supervision and follow up of state projects throughout the country incorporating several different kinds of building and civils projects. The scope and variety of projects gave the Ministry the opportunity to build its own staff base including the recruitment of personnel to deal with engineering, finance, administration and legal aspects. The housing ministry was organised in specialist departments (administration, legal affairs, financial, design, planning and construction follow up), and each department was divided into committees. Within the construction department there were six committees; housing projects, sports projects, industrial projects, health projects, educational projects and utility projects.

The first committee nominated by the Cabinet in September 1980 to complete TMC, consisted of four specialist experts (chairman of construction department, chief engineer of design department, an administrator and a member from Ministry of Health). The committee was supervised and monitored by the Minister of Housing

with the cooperation of Minister of Health. The committee formed several sub-committees related to engineering, medical and financial affairs as shown in figure 2.1.

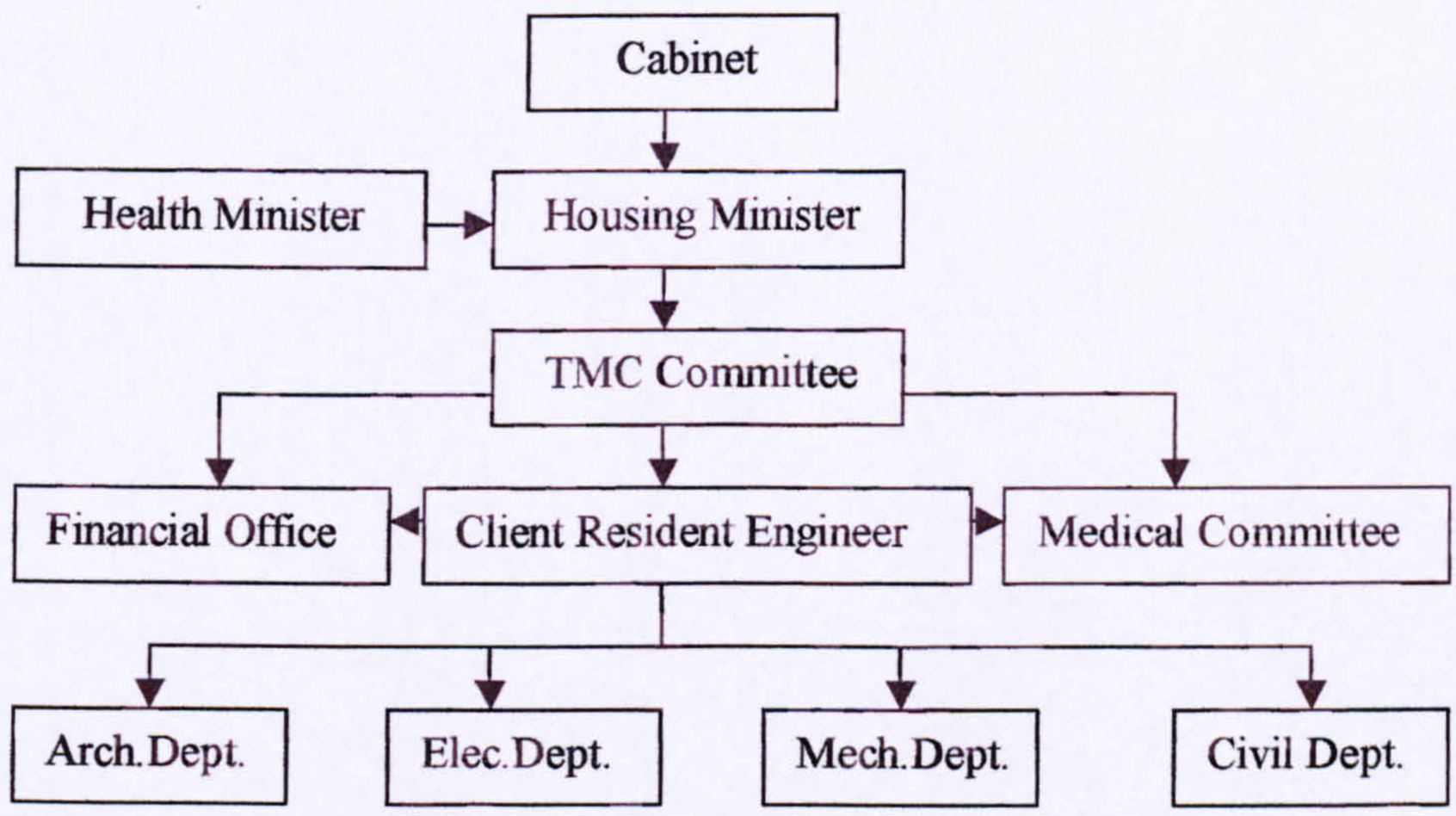

Figure 2.1 Structure of Tripoli Medical Centre Committee

2.4.1.2 Continuity of Ministry of Housing

Table 2.3: illustration of the periods of control of the two Ministers of Housing (MOHO1, MOHO2) over the development period.

No	Year	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Duration Month	Ratio %
1	MOHO1																		36	40
2	MOHO2																		55	60
	Total																		91	100
Note: role of Ministry of Housing in TMC was completely stopped in April 1988																				

Table 2.3 Continuity of the Ministry of Housing in TMC

1. Out of 196 months that TMC took to be completed, the Ministry of Housing had been responsible for the project for 91 months (i.e. 46% of the total time).

2. Two ministers took responsibility during this stage; one of whom was the chairman of the supervision committee in TMC. He was considered to have a good familiarity with the project. At that time the project had not created any difficulties in Cabinet or Treasury with regards to obtaining the necessary administration, funding and legal support from decision-making authorities.

3. The period in question shows relative stability in the supervision committee. The membership remained almost constant for 91 months except for the head of the committee where changes occurred. The first due to the election of the head as Minister of Utility, and the second due to the nomination of the head as member of the Great Man-Made River project. The role of resident engineer required one change, which was to occur in the early stage of construction as a response to the wishes of the committee to engage a local engineer.

The relative stability of the remaining bodies in TMC organization such as, chairman of the committee (CE), member of the committee (ME) and the resident engineer (RE) are shown in the following tables number 2.4, 2.5 and 2.6.

No.	Year	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Duration Month	Ratio %
1	CE1																		18	9
2	CE2																		20	10
3	CE3																		53	27

Table 2.4 Continuity of Chairman of the Committee in TMC

No	Year	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	D/Month
1	ME1																		18
2	ME2																		97
3	ME3																		91
4	ME4																		10
5	ME5																		51
6	ME6																		91

Table 2.5 Continuity of Members of the Committee in TMC

No	Year	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Duration Month	Ratio %
1	RE1																		8	4
2	RE2																		156	80
3	RE3																		16	8
4	VAC																		16	8
Total																			196	100
Note: there was no resident engineer in the period from 1st September1980 to 31 December 1981																				
RE1= Foreign resident engineer													RE2= Local resident engineer							
RE3= Local resident engineer													VAC= Vacancy							

Table 2.6 Continuity of Resident Engineer in TMC

The Ministry of Housing ended its involvement in TMC in April 1988, at that time the construction progress was nearly 90% complete, outstanding work related to the installation of the medical equipment. At that stage 80% of the technical specification of the medical equipment was established and the requirements to equip and furnish the hospital had been determined and approved by the medical committee.

2.4.1.3 Role of the Ministry of Health

Similar to the organisation and stability at the Ministry of Housing, the same condition was noted in the structure of Ministry of Health. From 1980 up to April 1987, two ministers managed the project, the first (MOH1) remaining in post for 70 months, the second (MOH2) for 10 months.

Up to that stage the relationship between the Minister of Housing and Health was positive, and regular co-ordination meetings took place at the site. They considered their involvement as a partnership seeking to achieve one target. However, when a third minister (MOH3) came to power at the Ministry of Health a new approach was taken to deal with the project. The new strategy was outlined in a formal proposal addressed to the cabinet on 27.05.1987. The memorandum was finalized as Cabinet Decision no. (445/87), which gave the Ministry of Health the full and only authority to deal with the project. Table 2.7 shows the continuation of engagement of the Ministry of Health in that particular period.

No	Year	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Duration Month	Ratio %
1	MOH1																		70	36
2	MOH2																		10	5
3	MOH3																		41	21
4	MOH4																		23	12
5	MOH5																		52	26
Total																			196	100

Table 2.7 Continuity of the Ministry of Health in TMC

Eight months after the cabinet decision, which formed a new scope of works for the supervision committee, the Minister of Health (MOH3) formed a new committee on

20th April 1988. All the members of the new committee came from Ministry of Health with no member from Ministry of Housing being nominated to join the committee. The only exception to this was the resident engineer who carried on with his duties as before. A hand-over protocol was prepared and signed between two parties. The chair of the new committee was the previous Minister of Health, whilst the rest of the committee, comprising 4 members were members of the medical team.

On 13 October 1988, nearly 6 months after nomination, the Minister of Health formed a new committee. This change came about as a result of the need to coordinate the construction procedures for Tripoli and Benghazi Medical Centres. In addition to this, a localized committee in each centre was formed with 7 members. This was the first time that an engineer became a member of the supervision committee in the Ministry of Health era. The committee proceeded to obtain tenders for the medical equipment and specialized international companies were invited to survey the site and review the specifications. Many local medical staff members were engaged at this stage. On the construction side, progress was deeply affected by lack of information and details of the pre-installation documents, at this stage the contractor started to execute preventive maintenance programme for most of the finished items.

On 5th June 1989, the Minister of Health reformed the Tripoli based committee by adding 3 new members. The change coincided with the declaration and the approval by the Cabinet that 3 contracts would be placed to equip and furnish the TMC. The first contract, for the medical gas network system, the second for X-ray equipment and the third for the remaining packages. The total approved amount for these contracts was around £15 million.

On 15th September1989, the Minister reformed the committee. The three contracts outlined received Audit approval with some remarks; which were mostly concentrated upon financial aspects. Despite signing the contracts, this was not the end of the story. More formal work had to be undertaken by the Ministry of Health and contractors to meet the conditions demanded by the Central Bank of Libya.

On 2nd June 1990, the Minister of Health further reformed the committee by changing its chairmanship. On 15 September 1990, a new committee was formed. Four new members were introduced and involved. This committee lasted for a mere 4½ months. Until that stage only one out of the three letters of credit had been opened with the

medical gas contractor, the remaining two were under negotiation between the Central Bank of Libya and the Ministry of Health. A long delay forced the main contractor to reduce its labour force to the minimum to permit preventive maintenance only. In January 1991, the Cabinet nominated a new Minister.

On 6th February 1991, the fourth Minister (MOH4) formed a new committee, that consisted of 11members (the largest ever) including 8 new members. The major obstacle facing this group was to push forward the conclusion of the remaining letters of credit. After several meetings, the letter of credit for the remaining package contract was opened. The delivery of the medical gas network materials was finished. The pre-installation drawings were submitted by two contractors to the main contractor. This necessitated a new bill of quantities for the pre-installation work. This extra work obliged the committee, as well as the Ministry of Health, to acquire Cabinet approval. Three parties (resident engineer, main contractor, and medical equipment contractors) were involved in setting the scope of work, time schedule, materials delivery and site work permission for each contractor. However, one item that was not progressed was the letter of credit for the x-ray equipment, due to poor communication between the related concerned authorities.

Due to the air embargo imposed by the UN in April 1991, the transport of medical equipment to the site was done through trailer transport from Austria to Tripoli via Italy and Tunisia. Around 120 trailers were engaged in this task. Special customs clearance procedures were arranged to facilitate the arrival of medical goods and minimise any delay. A local inspection committee was formed to inspect the goods on arrival, following which the materials were stored or transported to their permanent location.

After his nomination, the new Minister (MOH5) reformed the committee on 20th December 1992. The new committee consisted of 10 members with only 5 members from the previous committee; the remaining five included 3 new members and 2 from previous committees. In his first meeting with the new committee the new Minister expressed his desire to end the continuous delays. To expedite this objective he requested that the committee prepare a report of all the pending problems that may affect the completion of the project regardless of their nature (whether they were medical, engineering, financial, administrative or related to other authorities). The

committee responded with their reports, which outlined the following perceived difficulties:

1/ The main contract

- Delay in the approval for x-ray equipment had affected pre-installation work and abortive work may occur.
- As a consequence of flooding to the basement a new drainage line was urgently required.
- Delay in commissioning the water desalination plant, and the lack of suitable water quality necessitated the postponement all the performance tests for medical and electromechanical equipment.
- Shortages of engineering staff (only four engineers were available to supervise five contracts).
- Lack of information relating to the involvement of local technical staff required for maintenance and operation.
- Payment delay for the contractor relating to an issued certificate resulted in slow progress and delay in material delivery.

2/ Medical gas contract

- Payment delay to contractor in local currency.

3/ X-ray contracts

- Delay in paying the first portion required by the terms of a letter of credit. This resulted in a warning from the contractor about failure to achieve the required commission date.

4/ Medical package contract

- Contractor's delay in providing the specification and cost estimate of the new items.
- The inability to deliver some US- sourced equipment due to the UN embargo. This caused a delay and forced the committee to change some specifications.
- The contract didn't include the delivery of consumable materials
- The urgent need to provide water of a suitable quality to enable the contractor to begin the performance tests for the medical equipment.

- Disagreements concerning partial handing over.

- Disagreements related the commissioning strategy.

- Full attention and consideration should be given to the training and maintenance contract, requiring the opportunity of qualified staff who are able to work with personnel from the various manufactures organizations.

5/ Water desalination plant contract

- The committee clamed that they were unaware of the existence of a signed contract.

- The final location of the plant was yet to be confirmed. The volume of rejected water from the plant had to considered during the design and execution of the new drainage line.

- The progress in this contract is critical to that of other contracts.

In order to finalize and obtain Cabinet approval for a 'cost ceiling' on the civils work, a meeting was arranged. The Minister of Planning, Minister of Health, the chairman of the executive committee for the Tripoli Benghazi medical centre, the chairman of TMC, the chairman of Benghazi Medical Centre, the resident engineer of TMC, and the resident engineer of BMC attended this meeting. The result of this meeting was beneficial for TMC as the preliminary approval was given for the civil contract ceiling of £78 million; however, Benghazi Medical Centre was postponed due to the continued uncertainties and insufficient detailed information. Finally on 28th July 1993, the Cabinet issued its approval by increasing the civils contract ceiling. With the approval given by the cabinet, smooth progress was foreseen in the project for the pre-installation work.

Parallel to that progress, more effort was made to solve the existing problems in the other contracts. On 9th November 1994, in his meeting with the members of the committee, the Minister of Health declared his desire to open the centre in August 1996. Technical administration and financial obstacles were raised, and the Minster formed a specialist sub-committee to deal with the difficulties facing the progress of the work at all levels. Weekly meetings were recommended to review the progress and report any obstacles.

On 31st August 1996, Tripoli Medical Centre officially opened to patients. Tables 2.8 and 2.9 shown on page 25 and 26 summarize the continuity of the related bodies during the period that the Ministry of Health controlled TMC

No	Year	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Duration Month
1	ME1																	6.5
2	ME2																	32
3	ME3																	69
4	ME4																	13
5	ME5																	16
6	ME6																	156
7	ME7																	8
8	ME8																	55
9	ME9																	20
10	ME10																	39
11	ME11																	8.5
12	ME12																	8
13	ME13																	3.5
14	ME14																	24
15	ME15																	5
16	ME16																	5
17	ME17																	5
18	ME18																	23
19	ME19																	42
20	ME20																	23
21	ME21																	67
22	ME22																	23
23	ME23																	42
24	ME24																	23
25	ME25																	67
26	ME26																	35
27	ME27																	19
28	ME28																	14
29	ME29																	26
30	ME30																	26
31	ME31																	26

Ministry of Housing Period

Table 2.8 Continuity of members of the committees in TMC

No.	Year	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	Duration Month	Ratio %
1	CE1																	6.5	6
2	CE2																	11	11
3	CE3																	8.5	8
4	CE4																	8	8
5	CE5																	23	22
6	CE6																	35	33
7	CE7																	13	12
Total																		105	100

Table 2.9 Continuity of Chairman of the Committee in TMC

2.4.2 Causes of delay in TMC

Ten Extensions of Time (totalling 155 months) were granted to the contractor from August 1984 up to the completion and commissioning of the project, which was certified as practically complete in August 1996. Outstanding works were commenced until June 1997. In table 2.10 shown on page 27, the factors given for the cause of each delay are categorised as follows:

- Administrative **A**
- Technical **T**
- Financial **F**

Some reasons may relate to more than one factor.

2.4.2.1 Analysis of delays at TMC; Discussion

An analysis of the causes of the delays in Tripoli Medical Centre was undertaken with a view to categorizing them, see table 2.13 on page 27. The findings were taken from official documents as part of the procedures to extend the contract time validity. From the 10 extensions given to the contractor, 37 different factors that contribute to delays were given. These were grouped into four primary categories (*administrative, financial, technical*, reasons and *unforeseen* events) and one secondary category that represent combinations of the two primary ones. The bodies that might be responsible for each delay were classified as; clients, contractor, consultants and others.

E/N	Time/M	Reasons of the extensions	Factor	A				F				T				U
				CL	CT	CU	OT	CL	CT	CU	OT	CL	CT	CU	OT	U
1	17	1-Designing new building and redesigning the														
		existing one led to a extra works and led to														
		a massive variation orders	A+T	X		X						X		X		
		2-Removal and execution of executed works														
		done by the previous contractor.	T												X	
		3-Execution of new building; Intersection,														
		Nuclear medicine and Forensic medicine.	A+T	X			X					X				
		4-Modification of the general site plan.	A+T	X								X				
		5-Late decisions of the medical equipment.	A+T	X								X				
		6-Testing the stocked equipment, materials														
		supplied by the previous contractor	T									X	X	X		
2	12	1-New extra variation order.	A+T	X		X						X		X		
3	12	1-New extra variation order.	A+T	X		X						X		X		
4	13	1-Rehabilitation of another Hospital (KH).	A	X			X									
		2-New extra variation order.	A+T	X		X						X		X		
5	11	1-New extra variation order.	A+T	X		X						X		X		
		2-Building water treatment plant.	A	X												
		3-Delay in payment certificate.	F					X			X					
		4-No plans in technical staff recruitment.	A	X			X									
6	12	1-New extra variation order.	A+T	X		X						X		X		
		2-Delay approval for pending works	A+T	X		X						X		X		
		3-Delay in pre-installation drawings.	A+T	X		X						X		X		
		4-Delay handing over for completed works.	A	X												
		5-Delay in payment certificate	F					X			X					
7	6	1-Delay approval for pending works.	A+T	X		X						X		X		
		2-Delay in pre-installation drawings.	A+T	X		X						X		X		
		3-Delay handing over for completed works	A	X												
		4-Delay in payment certificate	F					X			X					
8	24	1-Delay handing over for completed works.	A+T	X	X	X						X	X	X		
		2-Delay in pre-installation drawings	A+T	X		X						X		X		
		3-Delay approval for pending works and														
		the new contract addendum.	A+T	X		X						X		X		
		4-Delay in payment certificate	F					X			X					
9	24	1-Delay approval for project ceiling amount	A	X			X									
		2-Delay in pre-installation drawings.	A+T	X	X	X						X	X	X		
		3-Execution of works in new addendum.	A+T	X	X	X						X	X	X		
		4-Delay in payment certificate	F					X			X					
10	24	1-Delay in payment certificate.	F					X			X					
		2-Delay approval for x-ray equipment	A	X			X									
		3-Construction delay for MRI building	A	X			X									
		4-Construction delay for water treatment														
		delayed performance tests for others	A+T	X			X					X			X	
		5-Constructing delay for new sewerage line.	A+T	X			X					X			X	
		6-Delay approval for the technical documents														
		for new workd led to late delivery of materials	A+T	X		X						X		X		
			Σ Sub-total	29	3	16	8	6	0	0	6	22	4	17	3	0
			Σ total				56				12				46	0
			Σ Sub-ratio%	52	5	29	14	50	0	0	50	48	9	37	6	0
			Total													114
			Σ total ratio%				49				11				40	0
			Total ratio%													100

Factors: A. Administration, F: Financial, T: Technical, U: Unforseen

CL: Client, CT: Contractor, CU: Consultant, OT: Others

Table 2.10 Reasons of time extensions in Tripoli Medical centre

The most frequently occurring category (appearing in 22% of citations) was that of delays due to *administrative* reasons (A). These included: rehabilitation works of another hospital based as annex to the existing ones; delays in forming a preliminary handing over committee; delays in approving the ceiling amount of the project; delays in approval of the medical equipment procedures. The next frequently occurring category (appearing in 16% of citations) was financial causes (F). These appear to be due to the client and other authorities getting into financial difficulties particularly relating to cash flow, which often result in a lack or delay of prompt payment. The third most common category (appearing in 5% of citations) was *technical* reasons (T). Examples of these included the removal and execution of executed works done by the previous contractor and checking the performance of the stocked equipment and materials supplied by the previous contractor.

The secondary delay category is a combination of two of the primary categories. It was found that some of the specific causes did not fit exactly into of the primary categories, but could be accommodated by a combination two of them. In this case the most dominant cause in 57% of cases was the integration between *administration* and *technical* factors (A+T). An example of this is the effect of frequent client-initiated variation orders, the problems of which are exacerbated by slow or bureaucratic decision-making, and the speed at which decisions were made concerning the supply of the medical equipment.

The point of interest is the client influence in each of the four categories identified. In the administration factor (A) it was 52% of cases, while in the financial factor (F) in 50% of the cases and in the technical factor (T) in 48% of the cases.

2.5 Case Study 2: Guys Hospital London

2.5.1 Introduction

Guy's Hospital Phase III development project, now known as Thomas Guy House, was completed in April 1997 at a cost of approximately £160 million. The project comprises an eight storey block (50,000 m^2 gross floor area in 2400 rooms) four atria, and ancillary works including a link to London Bridge Station. The project covers 1.5 acres on a landlocked site and houses 40 clinical, academic and support departments.

The Department of Health and Social Security (DHSS) promoted Phase III as a model of co-operation between the private and public sectors: Guy's Hospital Special Trustees and other private and charitable donors contributed 45 per cent of the original funding for the project. In December 1986, the Treasury had approved the project at an estimated cost of £35.5 million; in September 1989 this was formally revised to £74.6 million. At the same time the Department agreed that, for budgeting purposes, a site location factor of £8.5 million should be added to the revised approval to give a budget cost figure of £83.1 million. Following completion in April 1997, the Final Account (settled in December 1997), showed that the cost had increased to £151.8 million plus £8.1 million for modification works. The project was planned to be completed in December 1993. However, it was beset by difficulties, which, despite adopting various strategies to maintain the programme, led to several extensions to the project completion date. The project was finally completed in April 1997, 3 years and 4 months late. The new building was opened to patients in July 1997.

2.5.2. Causes of Delay in Guys Hospital

The anticipated completion date was December 1993 but actual completion was not until April 1997. Key factors that influenced the delay are listed below. In each case they have been categorised (A, F, T etc) in line with the classification that was proposed in section 2.3 (above).

- Delays in establishing the design team in place (A).
- Delays in resolving cost and funding problems (A+F).
- The failure to freeze the design, and significant subsequent design changes (A).
- Delays in designing the engineering services and producing associated drawings (A+T).
- Problems with the service installation, the insolvency of works package contractors, technical problems, rectification and modification works (A+T).
- The project has been marked by numerous changes in management and control. Between 1986 and 1993 there were four changes in client body with overall responsibility, six project sponsors responsible for day-to-day issues on behalf

of the client, and five project managers see table 2.11 page 31. There were several attempts to mitigate the delays and to deliver the project on time. These included changes to the project management arrangements and the adoption of an accelerated programme and subsequently a management contract for the main construction stage (A).

- When the decision was taken to use a management contract, the main perceived advantages were a quicker re-commencement and a shorter construction period. The management contract provided for completion of stage 2 in May 1993. However, it was recognized that experience with this approach in the NHS had not been wholly successful and that it carried additional risks and greater uncertainty over costs. In the event, deemed practical completion for stage 2 was in June 1996 and final completion was in April 1997 (A).

- Following the receivership of the mechanical and electrical engineering subcontractors in January 1994, the Trust agreed a supplemental agreement with the management contractors to bring more certainty to the project in terms of time and cost. However, delays continued and the terms of the agreement were not met. In September 1996 a second supplemental agreement was needed to ensure completion (A+F).

- At the time of completion in April 1997, the management contractors still had various modification works to complete. This work, and the commissioning work, was completed in July 1997 (A+T).

The point of interest is the key role of the administration issues (A); they form a dominant factor as part of all the factors that effected delays in Guys hospital.

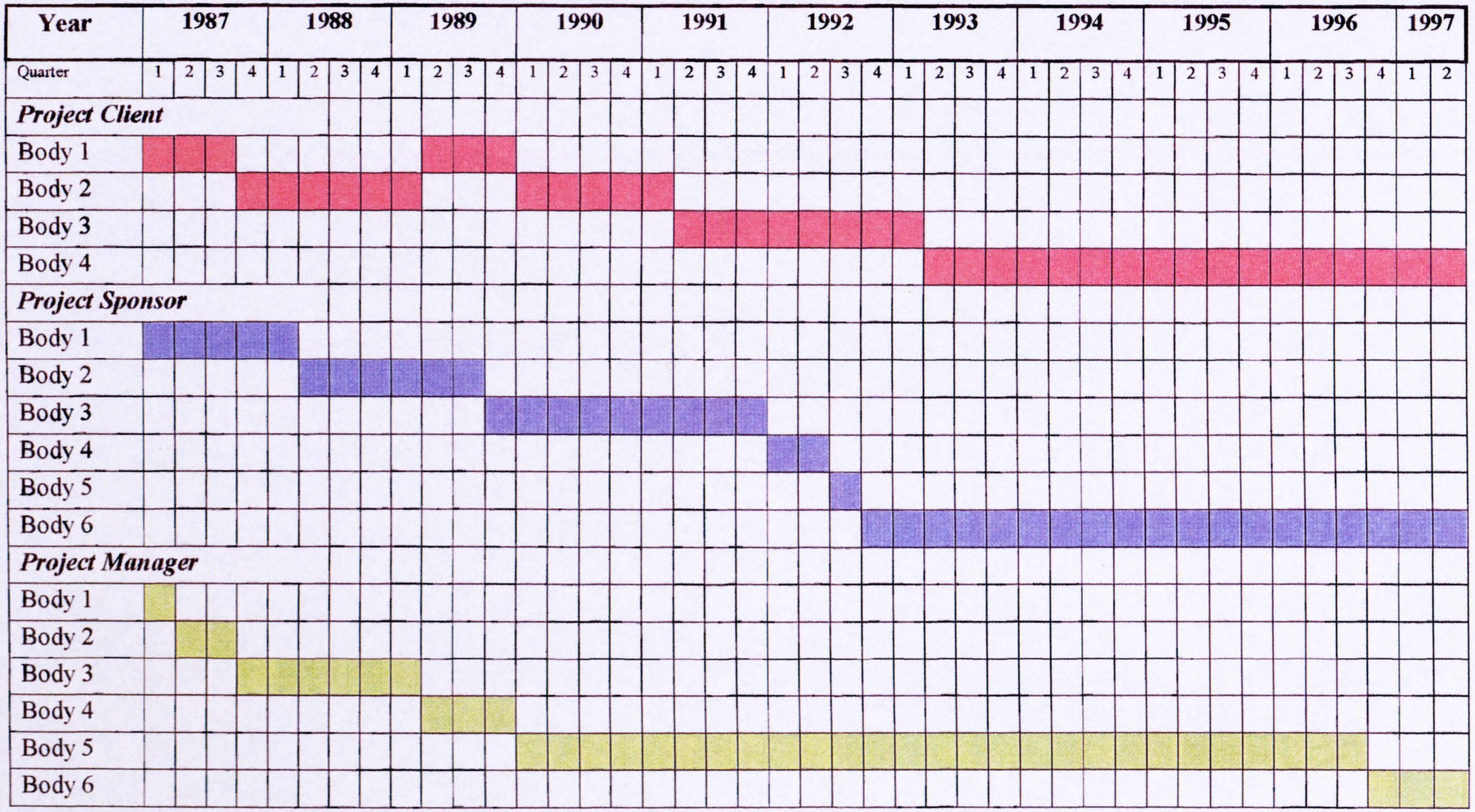

Table 2.11 Changes in the management and control responsibilities for Guys phase III project

(Source: the National Audit Office, 1998 page. 49)

2.6 Case study comparison and discussion

The reasons given as causes of delays and cost overruns in Libyan projects were delays related to: new design scheme; new buildings; variation orders; pre-installation issues; cost and funding approval; continuous changing in the top management structure; lack of experience in client management in dealing with complex projects. For Guys hospital reasons given were: delays in establishing the design team; cost and funding approval; significant post-contract design changes; pre-installation issues; new design scheme; numerous changes in management and control; lack of experience by the client in the use of a management contract.

Despite the differences between Tripoli Medical Centre and Guys Hospital, the problems encountered by the two projects exhibit some interesting similarities. Table 2.12 below shows a comparison of the two projects indication scale and final outcomes.

Description		***Tripoli Medical Centre***	***Guys Hospital***
Cost	Original	£ 78 Million	£ 35.5 Million
	Final	£ 156 Million	£ 160 Million
Duration	Programme	August 1984	December 1993
	Actual	August 1996	April 1997
Funding method		Treasury 100%	Treasury 55% private 45%
Gross floor area		165 000.00m^2	50 000.00 m^2
Number of rooms		6200	2400
Number of buildings		65	40

Table 2.12 Comparison approach between TMC and Guys hospital

An analysis of the delays and cost overruns on the two projects suggests that there are similar administrative failings associated with large public sector projects regardless of factors such as geographical location, relative level of economic development and political stability.

2.7 Summary

Although the literature review highlighted a range of factors that cause delays and cost overruns, these have been taxonomised and show a reasonable regularity, which reflects the following:

- Slow decision making;
- Late approvals;
- Changes to the make-up of administrative teams.

This is further supported by Tripoli Medical Centre and Guys Hospital case studies. What has become apparent is that the client is the key player in construction projects as far as delays and cost overruns are concerned. This is a critical issue to be addressed.

There has been some published work (Bresnen and Haslam, 1991; Davenport and Smith, 1995; Naoum and Mustapha, 1995; Kometa *et al.* 1995a) about clients' influence upon project outcomes, and this has shown that:

- client experience can have an important impact upon the many decisions made during the course of constructing a building;
- inadequate client-related briefings can cause significant problems during the design and construction stages.

However, there has been no large-scale investigation into precisely what is the effect of clients' consistency, continuity, and proficiency upon project outcomes in terms of time, cost and functionality.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The primary interest of the study is to investigate the main client-related attributes that influence delays and cost overruns in public-sector building projects.

Sekaran (1992) has illustrated a general model of the process for applied research (see figure 3.1 page 39). His recommended process is considered appropriate for this PhD study, and has been adhered to during its development.

In order to gain a better understanding of the client attributes that might affect delays and cost overruns, a review of literature has been carried out. In addition, the findings that have emerged from the two case studies, Tripoli Medical Centre and Guys Hospital provide further evidence upon which the investigation has been developed.

With the aim of corroborating and adjusting this grounded opinion established in the preliminary literature review and case studies, a workshop was held to elicit opinion from participants engaged in public sector projects. The attendees represented several different areas of construction, and associated industries and bodies based in the North East of England. These included, two managing directors of major regional construction companies, a NHS representative from the Royal Victoria Infirmary Newcastle, the Chief architect from North Tyneside Council and a consultant architect The details of the focus group meeting shown in Appendix G.

The two concepts of internal and external validity are fundamental to developing research designs (de Vaus, 2001). Internal validity is the certainty that the research design can maintain the fundamental conclusions that are claimed for it. External validity refers to the extent to which results from a study can be generalised beyond the particular study. Ideally, research design should produce results that are both internally and externally valid. The current research project is therefore, composed of a model that is subjected to two levels of test; a pilot study, which exhibits internal

validity, and the main study that is aimed at creating external validity. In summary, the purpose of the pilot study was to test the robustness of the data collection instruments and assure the efficiency of the intended questionnaire survey to be applied in the main study.

This Chapter presents the research rationale and methodological principals of the study that provide a means of monitoring the design and progress of the research project. The Chapter also examines the criteria for project success and the factors affecting it. Finally, the Chapter explains the actual steps that were undertaken in collecting the data.

3.2 Research Rationale

The aim of this research is to examine clients' attributes in relation to the impact of client organisation and client project manager upon project outcomes.

The research commenced with a pilot study, which examined two hospital projects. In the UK, one of the most publicised of recent hospital projects has been Guy's Hospital, in London, which was completed four years late in 1997. It is a project that has been the subject of study by the National Audit Office (Bourn, 1998) whose report and data are publicly available. In Libya, the Tripoli Medical Centre was completed almost 13 years late in 1996.

By reviewing the literature on time, cost and quality in relation to construction projects, it has been possible to discover that the poor performance of projects has been a significant issue in the construction industry over the last three decades. The details of these studies are presented in Chapter 2.

Bresnen and Haslam (1991) and Kometa *et al.* (1995a) have demonstrated that client experience has an important impact upon many of the decisions made and inadequate briefing continue to cause problems during construction.
However, although these findings are illuminating, Bresnen and Haslam and Kometa *et al,* have not used the opportunity to relate their findings to a wide and systematic analysis of the clients' actions, attitudes and proficiency.

Therefore, this research will attempt to overcome this knowledge deficiency by observing clients' attributes from the point of view of both client organisations and client project manager, and examine the relationship that exists between these attributes and project certainty. This will involve the observation of the client organisations' and the client project managers' consistency, continuity and proficiency, and their correlation to project time, cost and functionality.

3.3 Research Methodology

3.3.1 Introduction

Cherns and Bryant's (1984) study, referred to elsewhere in this thesis, concluded that it is feasible to obtain access to relevant decision-makers within a client organisation and also to valid data about client involvement in the construction process. However, certain conditions need to be in place to achieve success in data collection;

- A basis must exist between the researchers and the client system for negotiating a relationship, which has something to offer to the client as well as to the researchers.
- Access must accommodate deep and continual penetration into the client organisation from the earliest possible stage of the building project, preferably before the decision to build.

Walker (1997) reported that linking a suitable existing research approach to a particular research problem, or building up an appropriate new methodological solution, is a significant research skill.

Normally, research starts with the desire of the researcher to resolve a particular problem through being aware of some facts surrounding the problem.

Thus, Zikmund (1994) defined business research as:

> The systematic and objective process of gathering, recording and analysing data for aiding making business decisions.
>
> (Zikmund 1994; p. 7)

Zikmund additionally noticed that *re-search* literally means to *search again*, which recommends that part of the research process is to re-examine problems from new and different perspectives.

In this regard, the research carried out in this project presents new ways of looking at well-appreciated problems.

3.3.2 The background of the research

It was the author's extensive construction field experience in a large public sector project in Libya (the Tripoli Medical Centre) that inspired him to investigate the client-related factors that influence large public-sector project delays and cost overruns. Many problems were faced during the construction process at the Tripoli Medical Centre, and this experience has raised several questions in the author's mind, for example; why had it taken so much time to build? Why did the cost of the works increase? Who or what was responsible for the delays and cost escalation? These questions and the practical experience gained convinced the author of the significant role of the client in the outcome of such public projects, and that this role was worthy of investigation.

Therefore, as stated earlier, the aims of the research are to:

(1) investigate, explore and evaluate the dominant client-related factors that influence the various components of project success;

(2) develop a model that reflects the outcomes of empirical study by highlighting the major client-related factors and their association with aspects of project success (namely: time, cost and functionality).

This leads to the following objectives (re-stated from Chapter 1):

a. Exploration of the elements of project success in terms of time, cost and functionality;

b. The definition and evaluation of the major client-related factors that influence project success;

c. The development of a model that reflects the outcomes of empirical study and highlights the major client-related factors and their association with aspects of project success (namely: time, cost and functionality);

d. The population of the model with representative data derived from actual projects;

e. The refinement of the model, in the light of data analysis;

f. The presentation of the model and the results by critical examination of a panel of industry experts;

g. An assessment of the usefulness of the model, the limitations of the work, and recommendations for future research.

The main steps taken to fulfil these objectives were:

1. Conducting a literature search to develop the research idea and establish the basis upon which to identify
   a. Clients' attributes that might be relevant to project outcomes, and
   b. Criteria for evaluating project success.

2. Developing a model that accords with the aforementioned literature, describing the model components and hypothesising the anticipated model results.

3. Presenting the model to a focus group of local construction experts, thereby verifying its internal validity;

4. 'Operationalising' the elements of the model to ensure that its components can be properly measured by the collection of empirical data in a field study;

5. Collecting empirical data from actual projects with which to populate the model;

6. Statistically analysing these data and presenting the results;

7. In the light of the statistical analysis, evaluating the robustness of the model as a descriptive representation of reality,

8. Following this, re-examining the model, and, if necessary, amending it to reflect the inferences that could be drawn about the relative strengths of associations that emerged from the statistical analysis of the data;

9. Exposing the model and the research findings to critical examination by a panel of industry experts, and recording their comments;

10. (In the light of the last activity), discussing the findings of the research, its contribution to knowledge, and producing, recommendations for further work, and making suggestions for possible refinements to the model if necessary.

3.3.3 The research process

Sekaran (1992) illustrated a general and useful model of a research process for basic and applied research and this model has been reproduced below.

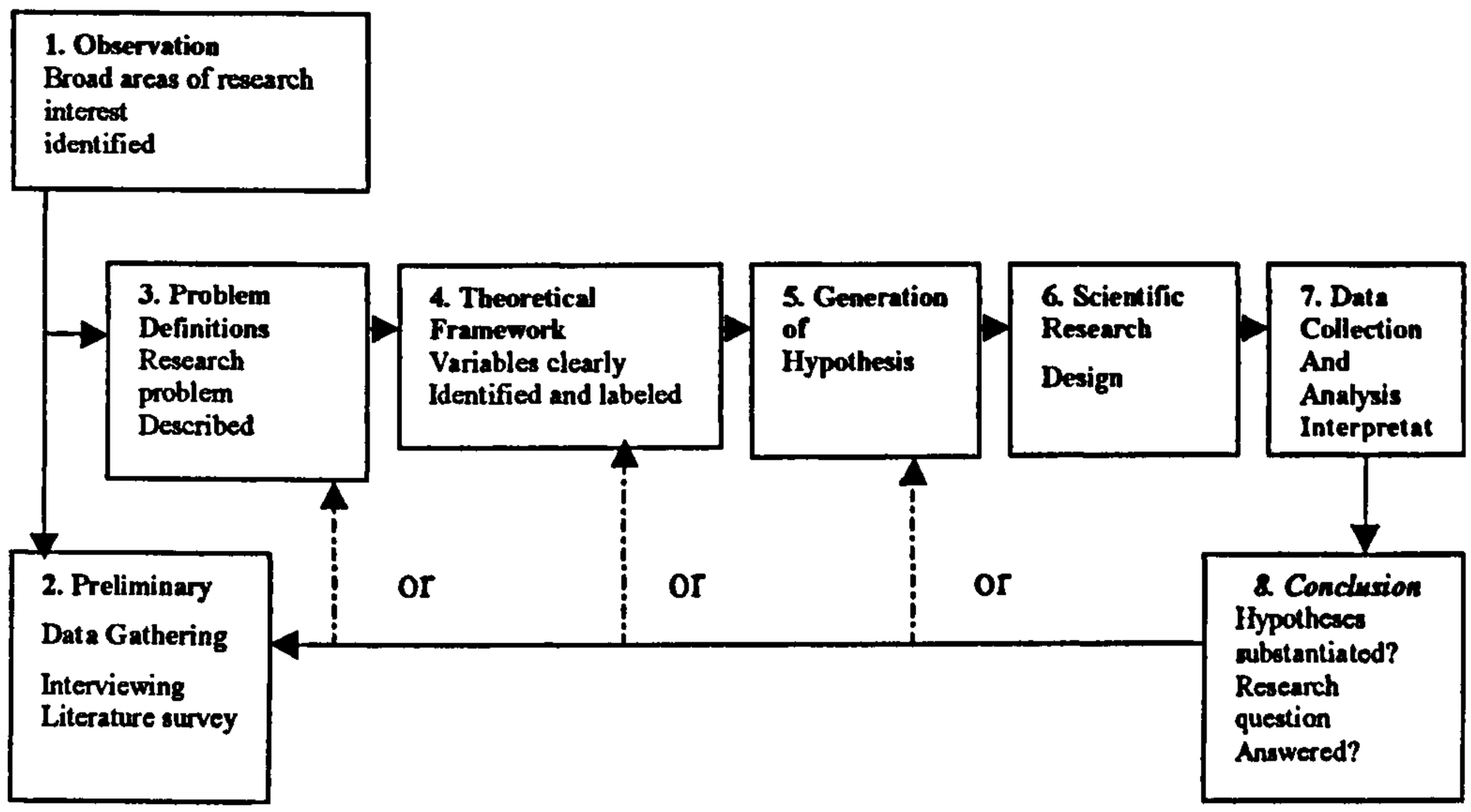

Figure 3.1 Research process for basic applied research
(Source: Sekaran 1992; p. 31)

The model shows how the process starts with the identification by the researcher of a potential problem that is worthy of research. The research problem is refined by review of others' work in the field, which also serves to generate a theoretical framework and working hypothesis, or hypotheses. From these, research questions will be designed to test the anticipated hypotheses, and hence the theoretical model. The intention is that analysis of the results will provide answers to the research question(s) and at the same time add to the body of knowledge on the topic.

One of most important issues that challenge researchers is the decision on what kind of research should be done: should it be quantitative or qualitative, or should it be both? According to de Vaus (2001) research designs are frequently equated with qualitative or quantitative research methods. Qualitative methods are perhaps most frequently used for exploratory research, quantitative methods for explanatory research. There are academic arguments in the social and behavioural sciences concerning the dominance of one or the other of the two research design methods. However, in most cases researchers tends towards a balanced viewpoint. Perry (1994) also considers that qualitative research is exploratory in nature and tends to attempt to presume answers to 'how?' and 'why?' questions. The major issue as seen by Perry was the determination of the variables to be used in the research. He explains that quantitative research answers the questions 'how much?' or 'how many?' and believes that in this kind of

research, relationships may have been established prior to investigation. He also considers that in quantitative research the hypotheses deal more with the analysis of which variables are significant. Sidwell (1982), Ireland (1983) and Naoum (1991) illustrated further support for utilising a quantitative approach in PhD work.

In the present work a combination of approaches was used. The basic research problem and theoretical framework were generated by a combination of literature review (see Chapter 2) and qualitative data gathering, in the form of the two hospital case studies (described above in Chapter 2, sections 2.4 and 2.5). From these a framework was constructed in order to model the hypothesised effects of client attributes and actions on projects outcomes. At this point, a focus group was assembled to explore the 'internal validity' of the model: namely, whether the hypothesised workings of the model accorded with the experience of the focus group members. The focus group is described above and reproduced in full in Appendix G. The remainder of the data collection was primarily quantitative, and aimed at generating survey data with which to populate the model and seek statistical associations between its elements.

3.3.4 Implementation of the Research Methodology

The following section describes the actual process of undertaking the research that was adopted.

Stage 1 and 2: Observation and Preliminary Data Gathering

The initial research proposal was about investigating why construction projects were faced with time and cost overruns especially in the public sector. This proposal came as a result of the author's experience in constructing a large hospital project in Tripoli, Libya. Hospitals are large, complex projects, with a variety of technological requirements, some of which are remarkably volatile, presenting some unique challenges for those planning their procurement. At the same time, hospital projects appear to be particularly subjected to significant delays, and many of the causes are generic to the construction of large hospitals wherever they are built. The preliminary investigation of the research involves two large-scale case studies of completed health projects in Tripoli Medical Centre, Libya and Guys hospital in London, UK. Both projects have been separately subjected to scrutiny by the relevant agencies. Access has been gained to both sets of data as the basis for a comparative study, which is

reported in Chapter 2. There have been a number of published studies on the causation of construction delays. The detailed study of the causation of construction delays can be seen in Chapter 2.

Stage3: Problem Definition

In Chapter Four (see Sections 4.3 and 4.4) the criteria for project success and the factors that affect project success were presented in more detail. Factors such as client decision-making, changes in the client organization, and changes in the client's consultants emerged as potentially significant causes of delays and cost overruns in public projects.

Stage 4: Theoretical Framework

Stage 4 in Sekaran's generalised research process model, relates to the creation of a theoretical framework for the research. Models arise in a range of types and for many purposes. Reporting the various classifications of models, Churchman *et al.* (1957) suggested that the common forms of models are:

- *Iconic*, related to visual or pictorial representation of certain aspects of a real system, such as detail drawings of parts of a building,
- *replications*, related to display significant physical similarity to the reality, such as a doll,
- *analogues*, related to utilize one set of properties to represent some other set of properties which the system have, (e.g. electrical circuit to mimic heat flow through a cavity wall),
- *symbolic*, that requires logical or mathematical operations, (e.g. equation of 'S curve' of project cash flow).

Fellows and Liu (1997) indicate that one of the main functions of models is to assist reasonably precise prediction. Here it is useful to consider Mihram's (1972) illustration of the process of model development shown in figure 3.2.

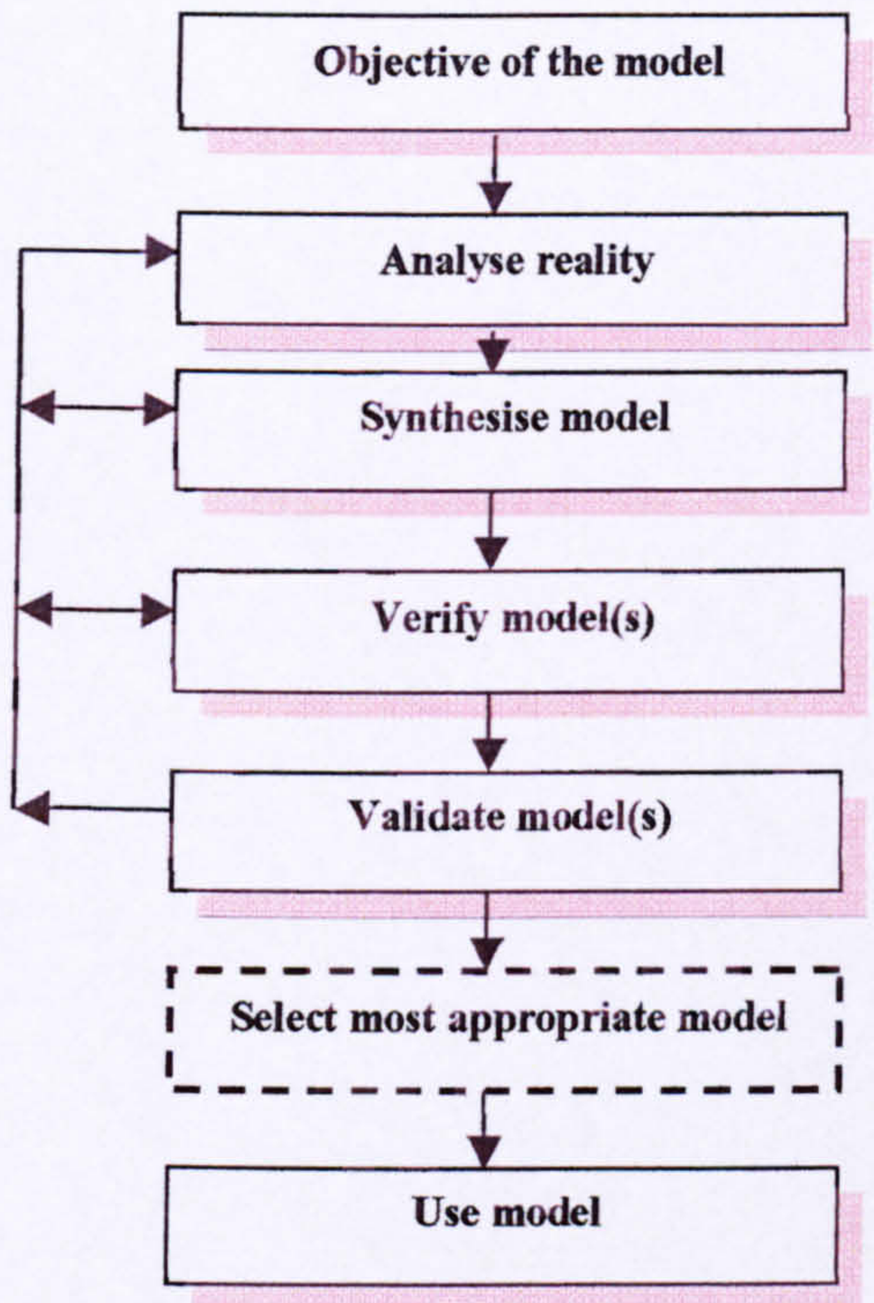

Figure 3.2 The modelling process (developed from Mihram 1972)

(Source: Fellows and Liu 1997; page. 66)

Following the decision on the objectives and limitations of the research, the primary stage is to investigate existing theory and principles from the existing body of knowledge. Literature was researched to establish the client attributes that could reasonably be said to have an impact upon project outcomes. These constructs are described and justified in detail in Chapter 4.

Stages 5, 6, and 7: Hypotheses, research design, and data collection

Stages 5, 6, 7, and 8 in Sekaran's model relate to the generation of hypotheses, research design, data collection and analysis, interpretations and conclusions. Having first subjected the model and its constructs to review by a focus group of construction industry practitioners, the next stage was to operationalise them, that is, to design measurable indicators of the presence, absence and extent of each. The details of how this was done are presented in Chapter 5. This work formed the basis of a questionnaire survey designed for empirical data collection, which was administered to participants on a number of construction projects in the North of England. The details

of how participants were identified and selected, and their responses to the survey, are described in Chapter 6.

Stages 7, and 8: Data analysis and conclusions

The data collected were used to populate the model. Hypothesised associations (to be introduced in Chapter 4) were tested using the SPSS statistical software, and the results reviewed and discussed in Chapter 7. The research model was presented to an invited focus group of construction experts, from industry, practice and academia to make comments on it. The results of this meeting are discussed in Chapter Eight. These results fulfilled two functions. First, the aim of exposing the results to industry practitioners was to validate the practical significance of the model and its elements, as well as the strength of association that had been found between them; secondly, to assess the contribution of the research work to knowledge, both in practice and in academic terms. The theoretical model also provides the opportunity for Client Organisations to apply it in practice. This will support the decision-making process related to specific project scenarios. These contributions are summarised in Chapter 8.

3.4 Summary

This chapter has presented the research methodology adopted. The chapter shows the research rationale, which covers four stages; observation; preliminary data gathering; problem definition and theoretical framework. Two components were isolated; the client organisation and the client project manager. Chapter Four will show the structure of the research model, and explain the background theory on which it is based, while Chapter Five will explain how the model's variables are operationalised and rendered suitable for measurement purposes.

CHAPTER 4: MODELLING THE IMPACT OF THE CLIENT ON PROJECT OUTCOMES

4.1 Introduction

This chapter will explain the structure of the model used in the research, followed by an exploration of operationalization of model constructs (its dependent and independent variables).

4.2 Model Structure

The aim of this research is to investigate, explore and evaluate the dominant client-related factors that influence the various components of project success. Project success has been defined in a number of ways, but the aspects that occur most frequently in the literature are completion on time and within budget, as well as the functionality of the project when it is handed over. In Chapter 2 a broad examination was carried out of recent literature concerning the causation of delays and cost overruns on construction projects. There was strong evidence of the impact of client-related factors, and this was amplified by consideration of the two preliminary case studies at Tripoli and Guy's (also described in Chapter 2). From the Tripoli case study three such client attributes were hypothesised, namely: consistency, continuity and proficiency.

It is, however, evident that the concept of 'Client' is not a simple one in all construction projects. Franks (1984) classified clients into a number of groups and concluded that the more experienced and knowledgeable the client, the more he/she tends to identify a single point of contact, a person to act as his/her representative and leave that person to manage the project. Gardiner and Simmons (1992) have usefully differentiated between the Client Organisation itself and the [Client's] Project Management Organisation. They argue that this is typical of the vast majority of projects, where the *project management* role is shared between the *client project organization* (CPO) and at least one member of a *project organization* (PO).

This approach has prompted the writer to differentiate in the model between the attributes (etc.) of the Client Organisation itself, and those of its Project Manager.

Thus, on the client attributes side of the model (the independent variables) two separate groupings were identified namely: *client organization* (CO) and *client project manager* (CPM). Each will be evaluated according to its *consistency*, *continuity* and *proficiency*. While on the other side of the model, the dependent variables of project outcomes will be measured as *time*, *cost* and *functionality*. This model is illustrated below in Figure 4.1. The sections that follow will attempt to explain the constituent parts of the model in more detail.

The construction of a model requires a variety of inputs. Following the decision on the objectives and limitations of the research, the primary stage was to investigate existing theory and principles from the existing body of knowledge. Literature can be searched to establish the application of these theories and findings. This investigation will designate appropriate variables to define, isolate and measure with the intention that performances of the individual variables and their relationships can be assessed. Once the structure of the model has been established, then appropriate values can be input for the necessary variables and the resultant outputs calculated. As illustrated in Chapter 3, the focus of this study will be the attributes of the client organization and the client project manager, as regards to impact of their consistency, continuity and proficiency upon project outcomes, namely, time, cost and functionality.

The formulation and construction of the research model of this study has involved the following procedures:

- Addressing the study to the client organization and client project manager and investigating their role in public projects;
- Exposing the main client attributes that exist in the literature (as described in Chapter 3, 4);
- Reporting new factors that were not considered by previous scholars (as described in Chapter 3, 4);
- Illustrating major criteria for measuring project success (as explained in Chapter 3, 4);
- Presenting the client's role in constructing public projects (as described in Chapter 2, 3);
- Exploring construction delays (as described in Chapter 2).

As a result, it has been possible to formulate the following research model.

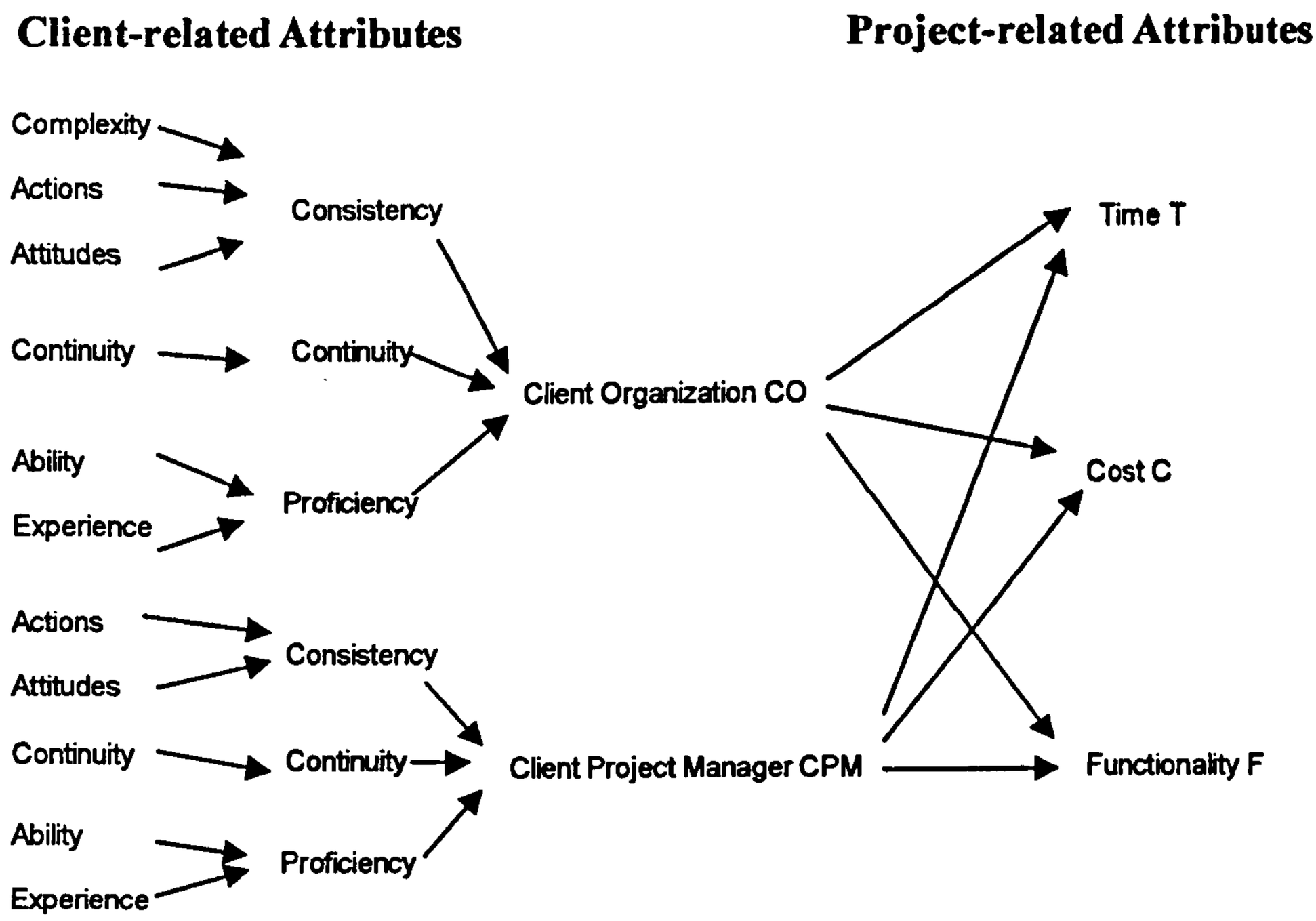

Figure 4.1 Proposed Model illustrating the Hypothetical Relationships between Client attributes and Project attributes

4.3 Criteria for Project Success

4.3.1 Introduction

Many projects experience extensive delays and thereby exceed cost estimates and initial time allowance. Investigating the reasons for cost overruns and delays has become an important issue in contributing towards the construction industry's performance.

There are many parties involved in any construction project: clients, architects, quantity surveyors, consultants, contractors, subcontractors and suppliers. The construction process, and in particular the progress of a project, can be considered to be a dynamic activity. Unless the relationships between all parties engaged in the

business are focused appropriately, the result will be ambiguous and the project is likely to run out of time and costs will escalate.

4.3.2 Client definitions

Walker (1988) describes a variety of different forms of project organisation. He identified 2 types of clients: the first is non-expert in construction and the second possess in-house expertise. Bresnen and Haslam, (1991), have defined the *client* as that organisation responsible for the development of the building, i.e. the *named* organisation on the contract. In some instances, this would correspond to the prospective occupier or owner; in others, it would correspond to those developing the premises on behalf of current or future tenants (e.g. property developers, local authorities).

4.3.3 Client involvement

Much has been written regarding client responsibility in construction projects (see NEDO, 1974; CIOB, 1980; CIRIA, 1987). Some of these studies have suggested that the strategic choice as to how to organize and manage their projects could have a critical impact upon consequent project performance (see Bryant *et al.*, 1969; Friend *et al.*, 1974; Stocks and Male, 1983). Friend *et al.* (1974) have undertaken a study that specifically focused on client attributes. They investigated the relationship between how a client organization manages a project and what impact it will have upon subsequent project performance. This was followed by two studies by the National Economic Development Office (NEDO) in 1978 and 1983. Both reports recognized that client attributes, and their general approach towards project management, can have significant effects upon achievement of project objectives from the point of view of all the parties involved in the project. Also (NEDO) 1983 and Bennett (1985) recognized the benefits stemming from clients' active involvement, and described the client's true organizational situation and how the client as the rest of party with full knowledge of the internal workings and personalities within her/his organisation.

With regard to the client's potential impact on projects, there is strong support for all construction clients, whether experienced or not, to be involved in the building process in order to get what they want. (Ministry of Public Building and Works 1965; Wood Report 1975; NEDO 1976a,b, 1983, 1985; CIOB 1982; CIRIA 1987). However, client

engagement is frequently questionable. The poor performance of the client in projects was highlighted as a contributing factor by the Construction Industry Institute (1990), who also observed that some project managers working for clients lack strong management skills and experience.

A study was carried out by Bresnen and Haslam (1991) to highlight the influence that client attributes may have upon a construction project. Their aim was to chart features of client organisations and, by focusing upon one specific project, to gauge the impact of clients' decisions and practices upon construction project performance. Both client and project attributes were formulated as a set of independent variables and the relationship to performance was assessed. A key finding of this research suggested that if clients are better informed and educated about the implications of various types of delivery system, they can then select the one which best suits their construction projects needs. In many cases this may be true. Clients can learn and find this information and advice of considerable use. But this doesn't mean that all the clients in the industry are the same. There are sizable numbers of regular clients who typically manage a fair-sized selection of projects varying in scale and type, and have taken a standard appropriate to their projects. This contradicts the common view that "every project is different" and should be treated as such. There may be a number of reasons for adoption of such 'standard appraisal'. First, clients operate in an institutional environment in which certain procedures and mechanisms are considered appropriate (Zucker, 1987). Secondly, clients rely on "tried and tested" methods, seeking satisfactory, rather than most favourable solutions to the project management problem (Simon, 1965). Thirdly, the choice may be influenced by the direct calculation of resources and capabilities in relation to needs. Whatever the reasons for this standard behaviour in practice, there is clearly some reluctance on the part of clients to re-orientate their systems to meet the precise requirements of particular projects. If clients continue to implement practices that others consider suboptimal, then it is because they have been able to make these methods work to their satisfaction and also because they still remain to be convinced of the benefits of change (Bresnen and Haslam, 1991).

4.3.4 The significance of client involvement

Further emphasis upon the significance of client involvement in projects is found in several studies conducted in North America. These have stressed the importance of

client involvement during the construction process. The following points highlighted from this research demonstrate how project quality is affected by the contribution of the client in decision-making:

- Where clients have a high impact on project quality, such impact may, in many cases, determine the project's success or failure (American Society of Civil Engineers, 1988).

- Clients who exercise close involvement seem to be the clients who are most satisfied with their project results (Thrush, *et al.* 1987).

- Clients should have a sincere feeling that not only have they very fine projects, but also that they have participated in an efficient, well managed and well coordinated programme of design and construction (Wheeler, 1978).

- The way of successfully dealing with the many constraints that can arise during the construction phase is to keep the client close to the project status and involved in the decision-making process (Dunnan, 1984).

- Client involvement in the design phase improves the technical quality and constructability of construction plans, and it can result in a significant saving in project cost and time by eliminating contact modification during the construction phase (Haplin, and Woodhead, 1980).

- Quality suffers if the client and/ or his/ her staff are not present and capable of influencing construction-related decisions as well as interpreting the design (Tatum, 1985).

- Poor construction is recognized in the construction industry to be partly due to insufficient client involvement in the implementation of a quality-assurance programme (Jackson, 1986).

Bubshait (1994), in an article related to client involvement in relation to public projects in Saudi Arabia, discussed the aspects of client involvement that influence project quality. Bubshait concluded that there is no standard method of managing construction projects. Usually the management method is a function of the skill, experience and

culture of a particular construction organisation. This was further explored by a survey completed by Al-Jarallah, (1983), who observed that in Saudi Arabia, due to the various nationalities of construction professionals, clients used different approaches. Some clients chose to be closely involved in managing their projects, while others preferred a remote involvement. The conclusion of the study by Bubshait indicated that a degree of correlation between client involvement and project quality existed. In the planning phase, tasks that had a high degree of association with project quality were the participation of the client in the preliminary studies, the identification of users' requirements, project review, and the establishment of design criteria. In the design phase, they were the use of technical standards to describe materials quality and construction methods. In the construction phase, they were the participation of the client in reviewing documents submitted by contractors, claim resolution, the monitoring of project cost, and the monitoring of safety and quality.

Kometa *et al.* (1994), confront the client involvement from another perspective by investigating the relative importance of the attributes and sub-attributes of UK client organizations that may influence project consultants' performance. Their results indicate that the most important attributes are financial stability of client, feasibility of the project, past performance of client, project characteristics and client's duties. The study also discovered that client performance is not a single issue: it depends on a number of closely interrelated but very important sub-attributes.

4.3.5 What does 'project success' entail?

Lock (1987) reported that if a project were delivered on time and within budget, the contractor would be well pleased. The customer should also be pleased, but he won't be if the finished result is below his functional or aesthetic requirements. A project is not successful if its late completion results in delayed start-up of a process or production plan, causing lost revenue for the owner. So what are the basic conditions that can be given to a project in order to fulfil the client's wishes?
The value on what is important in a project changes from one phase of the project to the other. Furthermore, the relative importance of time, cost and quality will vary for each phase of a project. For example, Avots (1984) explains that during the early phase of a project, schedule may be of primary importance, while cost could take second place and quality third. Later in the project, cost may become the controlling

interest, with schedule taking a secondary role. After the project has been completed, schedule and cost problems may be easily forgotten and quality becomes the key issue. Each project will, of course vary, because the difference in the primary objectives in each phase of a project will result in different successful outcome criteria.

4.3.6 The impact of stakeholders

The client and contractor are the two most obvious parties that have a stake in any project: it can be said that they are the key project stakeholders. Cleveland (1985) has explained that there are other stakeholders with key interests in the outcomes of the projects. Avots (1984) emphasises that projects must take into consideration outside parties whose actions can change the course of the project or even destroy it. For example, Fishlock and Wilkinson (1986) indicated that the decision whether to build the Sizewell 'B' nuclear power station in the UK was held up for more than 3 years by one of the most complex inquiries ever mounted in the country.

The objectives of the stakeholders involved in a project are unlikely to be harmonious. The most obvious examples of that are the objectives of the client and the contractor. The aim of the client is to minimize the cost of the project, whist that of the contractor is to maximize the profit. Lichtenberg (1983) following a case study of a university hospital project has identified six groups of stakeholders, each with their own objectives. They varied from the Government, who wanted a fairly limited investment, to local politicians and key people, who wanted to build an impressive monument project. Project managers should therefore be aware of all stakeholders and their objectives. In order to ensure maximum satisfaction from the stakeholders, project mangers should have political skills as an attribute to achieve that possibility.

4.3.7 The involvement of consultants

Evidence indicates that construction clients are not totally satisfied with the performance achieved on many of their projects. Frequently they point their finger at contractors and consultants as the cause of failures. So how did the theorists come to this conclusion?

Many studies have been undertaken that investigate how construction clients convey their needs and requirements to their consultants (NEDO 1974; CIRIA 1978; Newman *et al.* 1981; Murray *et al.* 1990), including some studies by the Construction Industry Institute in the US (see, Rowings *et al.* 1987; Laufer 1989; Howell 1990).

It can be seen from the literature that the influence of consultants and contractors on project outcomes has been variously investigated (Banwell, 1964; National Research Council, 1988; Russell and Skibniewski, 1988; Jaselskis and Russell, 1992). Consultants are considered to be among the keys players in the construction industry, and their role in a project depends mostly upon their relation with their client. Kometa *et al.* (1995a), examine the potential risks that some client organisations may create for project consultants. They found that the major client attributes used to measure the risk exposure of consultants were: project feasibility, client's duties, financial stability, past performance, project characteristics and organizational quality. Kometa *et al.* (1996) then proceeded to publish results of a new survey, which indicated that the model correctly predicted project outcomes (in terms of time, cost, quality and fee), in 10 cases out of 29 cases (nearly 35%) and was found to be more conservative in predicting risk exposure.

Kometa *et al.*, (1995b) carried out further research. The aims of the survey were to establish and rank the fundamental needs of clients (i.e. function, safety, economy, running/maintenance cost, flexibility, time and quality) and evaluate the relative importance of these needs. They established and ranked clients' responsibilities in achieving their needs using the success factors identified by Morris and Hough (1986; 1987) and they, also compare clients' responsibilities in construction projects to see if they correlated with project consultants' expectations. Their results showed that the most important needs of clients were: functionality of the building, safety of the building, quality of the building, and completion on time. The most important clients' responsibilities as perceived by the clients themselves are: planning/design, project finance, project implementation, project management and project definition/formulation. The most important clients' responsibilities identified, by project consultants were: project finance, project definition/formulation, planning/ design, and project implementation/management. This illustrates some degree of agreement on clients' responsibilities as perceived by both clients and consultants. It

appeared that the degree of responsibilities that clients accept in the construction process is a function of their experience with the industry.

Client evaluation by construction consulting and contracting firms focuses almost entirely on client financial stability, largely neglecting other project relevant attributes within the client organisation. Again Kometa *et al.*, (1996) review the literature to establish the relevance of client evaluation to consultants, and to evaluate attempts at studying the impact of client performance on realizing successful project outcomes. Their results show that client evaluation is usually limited to financial analysis only. Other equally important client attributes have been identified and suggested as providing a broader basis for construction client evaluation. Finally they stressed that multi-attribute client evaluation could provide a significant step forward to a fuller understanding of all project participants, including the client himself.

4.3.8 Client organisation

Researchers have rarely investigated the consideration of sociodynamic forces operating in the client organization itself prior to developing the project objectives. In actual fact, as indicated by Kometa and Olomolaiye (1997) clients are normally corporations, syndicates, property developers, charitable trusts, or government agencies, with attendant communication problems, especially when dealing with complicated procurement procedures. Such complicated organizational structure needs to be properly understood. Kometa and Olomolaiye (1997) undertook an investigation with the objectives of identifying the factors influencing a client's original decision to build; evaluating the relative importance factors that affect the decision-makers in a construction client's organization; developing an understanding of how these factors operate in influencing the decision to build. Their findings suggested that there are several factors influencing a client's decision to build that eventually impact upon a successful project outcome. The factors operate in the following three main groupings: organisational variables, including directors' preference, corporate ego, status/prestige, location and profit/economic reasons; structural variables, including change of attitude, cultural influence, social expectation, workers' pressure; and externalities, including users' preference, and need for more facilities. If the client and the consultant have a shared perception of the factors of the project objectives, then they will both perform their respective roles effectively and guarantee a successful project outcome.

In the well-known study by Cherns and Bryant (1984) an examination of the relationship between different forms of client involvement and construction performance was undertaken. The first stage of this research was to establish the feasibility of obtaining access to data and to relevant decision-makers within an appropriate selection of building clients. The method used was by approaching potential clients formally and informally. While little information came from formal approaches, the informal ones attracted many people willing to talk to the researchers. Generally the aims were:

- To find out how feasible it is to obtain valid information from building clients about their part in construction management;
- To define the scope and form of a major study of client involvement and to specify the resources needed to mount it;
- To assemble and present some general propositions on impressions and observations gained from the researcher experiences and from those of others.

The studies showed that during the progress of a construction project there is an involvement of various groups within the client organisation whose interests differ and may be in conflict.

There are several concepts that may be derived from Cherns and Bryant research. Firstly, the concept of a construction projects as an engagement of parts of several separate and diverse organisations: (client, consultants, contractors etc.) for the limited and finite purpose of bringing a building into being from inception to completion. The business of managing the whole process is the function of a special kind of organisation formed for this purpose for a limited time. Thus the *project team* is, in fact a temporary multi-organisation. This resultant temporary multi-organisation (TMO) is further enlarged by the appointment of consultants, contractors and sub-contractors with subsequent complexity. The characteristics of the TMO will vary and depend upon a range of variables, for example: the nature of the project, the nature of the client and the form of contract chosen.
Secondly, the client is regarded, not as a unitary concept, but as a complex system of interest groups, some congruent, some competing. These different influences within

the client system are themselves part of the TMO and can critically affect its performance.

The crucial issues in the progress of a project appear to be concerned with the potential of the TMO in handling risk and learning, the influence of the preproject history on the decision to build, the client's first contacts with advisers, and the tendency for the client to loosen his grip on the project as it progresses.

Gray, R. (2001) has established a clear association between project outcomes and the social and management climate in which those projects are applied. Drawing on extensive field research involving project management professionals in major British organisations, project success is shown to decline as the level of personal and environmental threat perceived by the project staff increases. Other organisational characteristics, such as free expression, questioning, participation in definition of goals, innovation, and intrinsic satisfaction from the work itself, are all found to be positively associated with successful project outcomes, while organisational change and conflict are negatively associated with project success. Earlier research by Gardiner and Simmons (1992) discussed the way in which conflict and change can have a considerable impact upon the success or failure of construction projects. Their preliminary investigation lends weight to the hypothesis that the creative management of conflict and change can benefit construction industry clients.

4.3.9 Some features of project success

In the US, Ashley, (1986) carried out a pilot study on construction project success and its repeatability. The results of this study showed that the possibility of achieving a successful construction project is greatly improved by placing more emphasis on the following success factors: construction planning efforts, design planning efforts, project management goal commitment, project team motivation, project manger technical capabilities, scope and work definition and control systems. Furthermore, the results showed that there are six success criteria most frequently used to measure construction project success: budget performance, schedule performance, client satisfaction, functionality, contractor satisfaction and project manager/ team satisfaction. The analysis of the results also illustrated that certain factors are more directly related to individual success criteria and their achievement than others. Table 4.1 page 58, shows the factors with the strongest relationships were:

Success Factor	Success Criteria
Construction planning efforts	Functionality
Project manager technical capabilities	Client satisfaction
Technical uncertainty	Client satisfaction
Project manager administration capabilities	Budget performance
Legal political environment	Follow-on work

Table 4.1 Measurement of construction project success

Ashley *et al.*, (1987) commented that the previous results are important and were confident that they will be able to give clients, designers and contractors good advice into how they can consistently achieve better results on their projects.

In the UK, Morris and Hough (1986) undertook a survey among 8 case study projects, which led to the identification of 80 factors that are important for the success of major projects. Those factors were grouped under the following 10 headings as shown in table 4.2 below:

Project definition	Planning and design	Politics and social factors
Schedule duration	Schedule urgency	Finance
Legal agreements	Contracting	Project management
Human factors		

Table 4.2 Factors affecting project success

Lock (1987) has examined the same issue and addressed the need for management methods and a suitable project structure, in this the following assumptions are made:

Organisation: it is assumed that the project organisation is appropriate to the size and nature of the work, and that all members of organisations are clear on their roles.

Project definition: further assumption is that the project is clearly defined, so that the project manager knows exactly what has to be achieved.

Supportive management: the project manager should get the support and encouragement of his superiors. It should exist both in provision of facilities and in backing-up any requests for action, which demand intervention at senior level, either within or outside the contractor's own organisation.

A reasonable client: the client must act responsibly by providing funds when they are required, by avoiding unnecessary request for changes, by approving designs and authorisations for expenditure when asked without undue delays, and generally by appreciating the problems which face his contractor and acting to co-operate rather than hinder progress.

Competent people: a lot of people are involved in a project. They are coming from different organisations within the project teams, client's own management, contractor's own people, subcontractors and suppliers. Some of these people will be competent. Others might be less so. If project progress is to be assured, then the majority of the people engaged in the construction process are assumed to be capable of performing their duties properly.

A workable schedule: schedules have to be thought through carefully, taking into account all task interdependencies, resource constraints, etc.

Lock adds that many professionals and personel in a supervisory rôle feel alienated by the nature of their work and their failure to see how it fits into the overall company picture. He warns that many layers of management in a large organisation leave those at the lower levels feeling a sense of powerlessness and remoteness from decision-making, and it is difficult for them to equate their own personal needs with those of the organisation. This leads to a loss of involvement and commitment to their work and the objective of the groups to which they belong. Not surprisingly, this is likely to lead to a low level of performance in the organisation.

On the other hand, many scholars, (Hayfield, 1979, 1985; Bennett, 1985; Morris and Hough, 1986; Ashley *et al.*, 1987; Pinto and Slevin, 1988) have identified factors that

determine a successful project performance. In particular, Bennett (1985) covered the wide scope of client involvement in construction projects under five main headings:

1. Project objectives
2. Outline of project organisation
3. Selection of project team
4. Establish method of control over project team
5. Establish the project culture.

While some authors have intensified the focus of their investigation on project failure, others such as Asquith (1980) have investigated the causes of project failure, and Avots (1969) explore the common reasons of project management failure. Learning from the past, especially not to repeat mistakes, is one of the main elements in identifying success factors. Project client, contractors and stakeholders are the target for that, once they get the knowledge of all the related important issues within their responsibilities, and they get the right path to go through and to feed back, it is most likely that this will improve the construction industry process.

4.3.10 Questions to be answered

As shown in this review, researchers have drawn attention to client issues and identified some major influences on project performance. However, there are distinct gaps of knowledge with regard to other client attributes and how they may affect the project outcome. For instance, there is very little information describing how the stability of a client organisation, in terms of human resources can impact upon the outcome of a project. Likewise, to what extent, given that stability is a dominant factor, can client experience contribute towards a positive outcome? Furthermore, to what extent can client competency influence a similar positive outcome? Such fundamental questions will be addressed during this PhD project and, as it will be seen later, these aspects will be included in the client-related variables and will be considered in the investigation.

4.3.11 Building on the case study findings

With reference to a preliminary investigation involving the Tripoli Medical Centre, Libya and Guys hospital, London, it has been discovered that delays in completion and cost overruns are the result of a range of factors. According to the National Audit Office (1998), the reasons for delays in Guys hospital, London UK include:

- Delays in putting the design team in place
- Delays in resolving cost and funding problems
- Failure to freeze the design, and consequently significant design changes
- Delays in designing the engineering services, and producing associated drawings
- Problems with the services installation, and various modification work
- Numerous changes in management and control
- Lack of experience by the client in the use of the management contracting.

For the Tripoli Medical Centre in Libya, the Follow-up Ministry (1998) have observed:

- Design review and redesigning the existing architectural plans to accommodate the approved modifications
- Delays in approving and issuing variation orders
- Delays in approving the selected medical equipment package and its preinstallation
- Delay by the Cabinet in approving the project ceiling amount
- Continuous change in the upper management structure
- Lack of management experience within the client team in dealing with a complex project
- Delays in resolving cost and funding problems.

Despite the differences between the two projects in terms of location, scale and so forth, the problems encountered in each appear to exhibit some interesting similarities. An analysis of the delays and cost overruns on the two projects suggests that there are similar administrative failings associated with large public-sector projects, regardless

of factors such as geographical location and position of relative economic development. The preliminary findings suggest that, hospital projects in any part of the world may face similar difficulties associated with slow decision-making, late approvals and changes to the make-up of management and administrative teams.

Comparing the findings from the two case studies, it is suggested that the following influencing factors are apparent in both projects:

1. The importance of the role of administrative factors in facilitating and speeding the decisions related to the project;
2. The importance of continuity and consistency in the administrative and managerial support to the project, particularly that of the client;
3. The importance of the method and provision of the necessary funding;
4. The importance of complete and adequate design before their commencement, avoiding client-initiated variations;
5. Lack of client experience with projects of this type;
6. Capability of the client to cooperate with the members of the project team to appreciate the procedures of the construction process.

Linking these outcomes with the purpose and the aim of this research, the following client attributes will be targeted: *consistency*, *continuity* and *proficiency*. These attributes will be examined as to their affect upon project outcomes including: *time*, *cost*, *functionality*.

4.4 Factors Affecting Project Success

4.4.1 Introduction

Project success is a topic, which is frequently discussed and yet rarely agreed upon. The concept of project success has remained vaguely defined. It is a concept that has been defined by many people according to their varying professional and academic interests. Regrettably, this leads to disagreements about whether a project is successful or not. Pinto and Slevin (1987) addressed the same point when they stated that project success is a concept, which "has remained ambiguously defined both in the project management literature, and indeed, often within the psyches of project mangers". Project outcomes have traditionally been examined in terms of the tripartite relationship between time, cost and quality. Some writers, for example Briner *et al.*

(1990), Kliem and Ludin (1992), have argued that the triangle is too simple a figure to represent the interacting objectives of most projects, and that the personal objectives and feeling of the people involved must be taken into account.

4.4.2 Perception of project success

The literature dealing with and defining project success can be divided into three categories that emphasise the following aspects:

1. *Project goals.* The most usually cited goals are those concerning time, cost and functionality/ quality/ technical specification (Gaddis, 1959; Avots, 1969; Olsen, 1971; Tuman, 1983; Morris and Hough, 1987; Trauner, 1993; Williams, 1993; CIOB, 1994; Handa and Adas, 1996). Recent research has also indicated other aspects, such as safety and environmental sustainability issues. However, these can be interpreted as subsumed under the project goal of quality, which in turn is interdependent on the other two goals of time and cost.

2. *Stakeholders satisfaction.* An additional element for a successful project concerns the satisfaction of the stakeholders, the most obvious being the client (Barrie, 1980; Bedell, 1983; Baker *et al*, 1983; Ashley *et al.*, 1987 Lock, 1987; Pinto and Slevin, 1988a, 1988b; Sanvido *et al.*, 1992).

3. *Perception and awareness of different stakeholders.* Project stakeholders with different orientation (e.g. management verses scientific) may have different views of what constitutes a successful project outcome (DeCottis and Dyer, 1979; Trauner, 1993).

Several researchers have concluded that measuring project success in solely objective terms is an impossible task (de Wit 1986; Morris 1986; Stuckenbruck 1986). There are many reasons for the complexity of measurement of results. These include: project objectives that change over time, the huge number and amount of project participants and stakeholders and their different objectives, and the subjective nature of many desirable project outcomes (de Wit 1986).

4.4.3 The importance of project success for project entities

The aim of each client is that his/ her project will reach its final stage successfully within the approved budget, on time, with accepted quality and be ready to use for the targeted function. However, we are also familiar with a number of projects that were completed on time and under budget, nevertheless, were later considered to be failures. Conversely, there are many projects that were finished late and far over budget, despite, which were later, hailed as a success. Project mangers can often portray cases of 'successful' projects, which have been poorly received by the end user client, failing to fulfil functional objectives. The impact that time may have upon perception is also significant. There are projects which, when first completed, were originally seen as failures, but have eventually come to be viewed as major successes. Relevant examples include: North Sea Oil projects completed in the 1970s, which suffered from extensive cost and time overruns. There were eventually considered to be successful, as a result of increases in oil prices in 1973 and 1979 making them very profitable. Sykes (1982) commented that many large projects are saved from disaster by fortuitous circumstances. More recently, the London Millennium Dome was recognised as a great technical and landmark achievement, however it was eventually seen as a waste of resources and closed after a year of celebration.

With regard to project management, a project team receive credit for a successful project, which it does not deserve, and on the other hand, the team may be wrongly blamed for a project failure. Similarly a project may be a success despite its poor management performance and vice versa (De Wit, 1988).
Munns and Bjeirmi (1996) indicate that in analysing the sources and contributors to success and failure projects, a distinction should be made between project outcome and project management activity, in which they explain that they are both frequently confused. Their finding illustrates that good project management can contribute towards project success but it is doubtful that in many cases it can prevent project failure.

In practice, many project mangers may be forced, through company policy, to revert to a simple formula in rating a project's level of success or failure. Project outcomes are frequently evaluated in terms of budget, time and level of functional performance, since these aspects are easier to measure and are embedded in project management tradition.

Other project organizations have begun to include the client satisfaction variable in their evaluation of project success. Paolini and Glaser (1977) indicated that client satisfaction is often measured by the number of complaints and supplemental cost overruns during the client take over stage. Other project organizations point to more sophisticated measurement techniques in assessing project success, such as carefully constructed surveys to investigate client satisfaction.

4.4.4 More factors to be considered

It is clear the concept of what makes a project a success or failure is not yet agreed. Presenting this view, Cleland (1986) stressed that it is crucially important to project client and mangers that an ongoing observation capability is in place in order to track project performance. To support this activity, an agreement upon critical success factors and method of evaluation must be established. Pinto and Slevin (1988) attempted to construct more general, and consequently more widely accessible, measures of project success that would be applicable to a variety of organizational projects. Their research includes a definition of a 'project', developed by Tuman (1983), which 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.
>
> (Tuman 1983; p. 57)

Secondly, Pinto and Slevin cited earlier work by Avots (1969), Gaddis (1959), Bedell (1979), DeCotiis and Dyer (1979), Baker, Fisher and Murphy (1983), which in summary, looks upon project success as a matter of paying attention to the outcome criteria of: budget, schedule, performance and client satisfaction. Finally, Pinto and Slevin (1988) focused upon measures of success from the field of research on implementation of organisational systems. In figure 4.1 page 66, key factors in success project implementation are shown as: Technical Validity (TV), Organizational Validity (OV) and Organizational Effectiveness (OE). TV consists of an assessment of whether or not the project works as it is intended to work. OV tests the question of whether or not the project will be used by the clients for whom it is intended. OE is

concerned with determining whether or not it is having a positive impact on the firm making use of it.

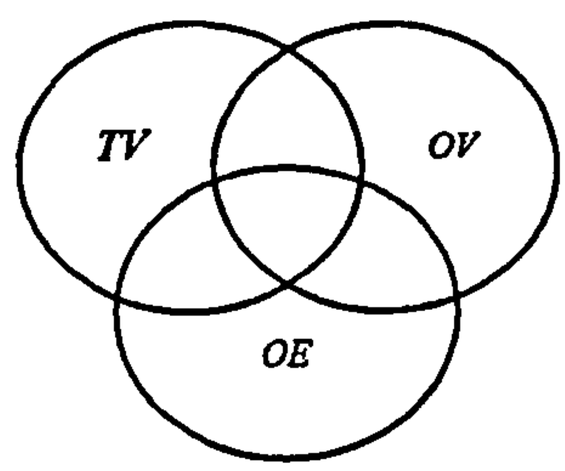

Figure 4.1 Key Factors in Successful Project Implementations
(Source: Pinto and Slevin; 1988 page. 69)

Their findings suggest that the first important point is that two of the three success constructs are equally important both inside and outside the project organization, i.e., they are related to both the project organization and the client. So the project to be undertaken must be 'right' for the project organization; that is within their capacity to produce it. Further and equally important, there must be concern for whether or not the client is making use of the project once it has been delivered to them and then, whether or not use of the project is leading to some improvement in organizational effectiveness. It is also important to note that, since clients are central to project success, we must be careful as to what point we make our assessments of project success or failure since their opinion may be changeable over time.

4.4.5 Client and the relationship with the project

Pinto and Slevin (1998) further address the relationship and the effect between client and the project. Their findings indicated that the project in itself must be technically correct and perform well as intended and secondly, the project team must interface effectively with the client organization to maximize the chance of acceptance. They presented the project success model shown in Figure 4.2 page 67.

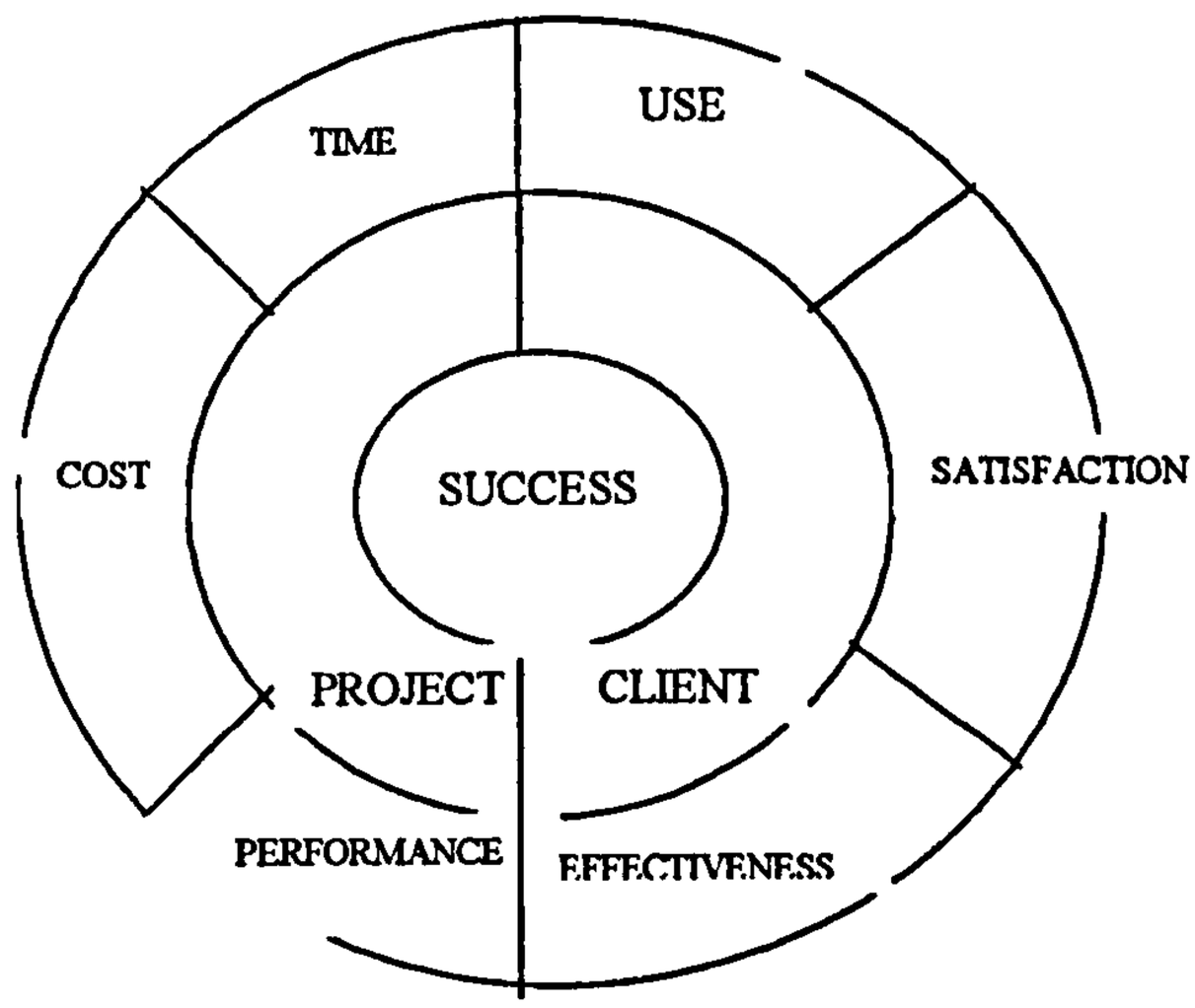

Figure 4.2 Pinto and Slevin's Model of Project Success
(Source: Pinto and Slevin; 1988 page. 69)

The model shows that success is composed of both internal and external factors. Internal organizational factors refer to those variables over which the project manager and his/her team apply daily control during the development and running of the project. The outer ring shows examples of these variables, including the most well known measures of project success: time, cost, and performance. The external organizational factors shown on the other side of the circle refer to the set of variables related to usage of the project, client satisfaction with the performance of the projects, and apparent impact of the project on organizational effectiveness. It is worth mentioning that one of the main characteristics of the framework presented in Figure 4.2 is that a large part of the assessment of success relates to the impact of the project upon its end users. The demonstrated framework shows that much of the criteria of project success are concerned with external organizational variables. Pinto and Slevin stated that:

> This is not to suggest that a project not be evaluate until it has been up and running for several years. Obviously, the further down the road after the initial installation, the greater the likelihood of additional factors in the client's organizational influencing the perceived quality of the initial project.
>
> (Pinto and Slevin 1988; p.70)

Pinto and Slevin recommended following the project during its installation phase and into its normal operational stage before attempting to declare the project either a success or failure. They further indicated that many of the external client factors mentioned, including satisfaction, use and effectiveness require some time to pass before being evaluated. Then the value of the proposed model is that it suggests an alternative to project assessment at too early a stage.

The successful project manager will recognize the problems involved with any metric used to measure success, especially in the early stages of the project's life. On the other hand, the successful project manager will develop a specific and well-defined programme for monitoring project success as the project goes forward in time. This action will provide an early alarm for the identification of possible problem areas.

Various authors have recognized a number of other factors, either from research or experience that are important to project success. Hayfield (1979), for instance, has identified two sets of factors that determine the successful outcome of a project: a set of *macro* factors that relate mostly to the owner, like the definition of the project, the efficient manner of project execution, comprehension of project environment and the selection of project organization. And a second set of *micro* factors that are more oriented to the engineer, or the constructor's area, like: planning project policies, framework of project organization, selection of key personnel, competent dynamic management control and consistent management information systems.

4.4.6 The impact of project objectives upon project success

Furthermore, how can project objectives impact upon the criteria of project success? Project objectives vary by type of project, throughout the project life cycle, and the level of considered impact will depend upon the management hierarchy and the stakeholders' degree of involvement. This process will eventually lead to classification of projects. Sykes (1982) has attempted to complete this task by categorizing projects into two broad groupings: *public-sector* projects, e.g. education and research projects, defence, space; and *commercial projects*, e.g. all private-sector projects and some government projects. He further illustrated that the objectives of the public-sector projects tend to be political, military or social, while commercial projects

have a mainly economic purpose. Obviously, major projects have a mixture of motives, objectives and disciplines involved. However, it is important to decide which one is the dominant factor. Nevertheless, in the absence of a clear understanding of which category a construction project primarily belongs to, the identification and ranking of objectives will not necessarily lead to the determination of success.

4.4.7 Interpretation of success by project team

Lim and Mohamed (1999) explore project success in terms of participant perspective. They consider that progress success can be viewed from two perspectives: macro and micro. The macro perspective considers the question in fundamental terms "has the original concept been achieved?" The micro perspective considers the level of project achievement in smaller component levels. In practice the contracting parties (developer and contractor) are similar in their perspective of success. The preliminary finding of Lim and Mohamed (1999) reinforces the observation that project success is dependent on varying perspectives. It is suggested that the sets of completion criteria and satisfaction criteria are sufficient to determine the macro viewpoint of project success, while the set of completion criteria alone is sufficient to determine the micro viewpoint of project success.

Baccarini (1999) emphasised that the project team must have a clear understanding of their project objectives. He used the logical framework method (LFM) as a foundation for defining project success and identified 4 levels of project objectives: goal, purpose, output and input. He proposes that project success consists of two components: product success and project management success. Product success deals with goal and purpose; project management success deals with output and inputs.

4.4.8 The effectiveness of project management

Therefore, project management may succeed whilst the product may fail, a situation perhaps neglected and misunderstood by project managers. Gradiner and Stewart (2000) examine this aspect by studying the relationship between project budget, cash flow, cost control and time schedules. They considered the theoretical effect that each can have on the Net Present Value (NPV) of a project. NPV is defined as equal to the present value of future returns, discounted at the marginal cost of capital, minus the

present value of the cost of the investment. They further proposed that investment appraisal techniques, such as NPV, can and should be used as an ongoing tool to monitor project health.

Brown and Adams (2000) argue that the problem is not with the function of the project management, but it is related to the methods used to evaluate construction output. They present a new approach to the measurement of the effect of Building Project Management (BPM) in terms of time, cost and quality output derived from UK data. They adopt a theoretical framework to evaluate the effectiveness of building project management in terms meaningful to clients, and operationalise this by developing a model using 15 case studies from the UK. Their evaluation demonstrates that BPM as it is presently implemented in the UK fails to perform as expected in relation to the three predominant success measuring criteria; time, cost and quality. The results presented suggest that if these criteria are considered to be joint products, then BPM does not represent added value for UK construction clients. Finally they argue that understanding the specific influence that the Project Manager presently has upon construction outputs and by understanding why BPM has apparently failed to produce the expected results, will provide a basis for the development of the project management function and added value.

4.4.9 Role of the project manager

With regard to the role of project manager, Shenhar *et al.* (2001) suggested that project managers are the new strategic leaders, who must take on total responsibility for project business results. In supporting this they developed a multidimensional framework for assessing project success, showing how different dimensions mean different things to different stakeholders at different times and for different projects. The analysis identified 4 major separate success dimensions:

1. Project efficiency
2. Impact on the customer.
3. Direct business and organizational success
4. Preparing for the future.

They further commented that the importance of the dimensions varies according to time and the level of technological uncertainty involved in the project.
Shenhar *et al.* (2002) critically reviewed previous studies and identified possible flaws to the methods adopted by researchers. A key criticism involves the approach used in most project management studies, which assumes that all projects are similar. Also the problem is one of subjectiveness, and sometimes, weakly defined success measures, which weakens the validity of some research. Likewise the limited number of managerial variables examined by researchers detracts from the finding of previous research. Although some success factors are common to all projects, the findings from the study identified project-specific lists of factors, indicating as an example, that high-risk projects must be managed differently than low risk projects, and high-scope projects differently than low-scope projects. Furthermore, the first finding strongly suggested that a wide range of variables influences successful project management. Secondly, it facilitates the discovery of several key managerial factors whose value has not been identified in other research. Thirdly, project success factors are indeed dependent upon the specific type of project. Finally the study provided a framework upon which to build a typological theory of projects.

4.4.10 Measuring project success

In reality there are many objectives in a project, which make it complex for project mangers to handle, in that compromise is likely to be required. This is frequently dependent upon subjective opinion. However, the relationship and the interdependencies of the objectives can be simplified by the use of a 'project success framework'. If the framework of a project was determined, then what is the method(s) of measuring success?

As shown by Youker and Burnett (1983) The success of a project and project management may be determined by assessing objectives or by evaluating performance against success criteria as indicated by Ashley *et al.* (1987). De Wit (1988) shows that the measurement of performance forms the basis for determining success. He further looked at the issue of how one specifies the required level of performance for success; how much cost and time overrun is acceptable for a successful project? The problem that might arise here is that the lack of acceptable performance variation criteria obstructs the measurement of success of a single project. In the research sector, this

problem can be overcome by the measurement of comparative performance of a number of projects. De Wit (1988) cited three methods to measure success. His first method (following Might and Fisher, 1985) was used to investigate the role structural factors assumed to affect project success. These factors include: structure of the organisation, the level of authority given to the project manager, and the size of the project. Their findings indicated that there was only a weak relationship between organisational structure and project success, and no connection between project size and success. However, for the level of authority delegated to the project manager, there was a positive connection related to all internal measures of success (in relation to time schedule, meeting budget and technical performance).The study concluded inter alia that:

> Choice and articulation of specific performance criteria should be given considerable care. Since the traditional criteria, cost, schedule and technical performance are not unambiguously related, it is conceivable that the project manager may be managing with one set of expectations while his/her performance is being judged on the basis of another.
>
> (De Wit 1988; p. 168)

Work by Morris and Hough (1986 and 1987) is based on the use of three measures for project success:

1. Project functionality; the expectation of project sponsors in the way the project perform in terms of financial and technical issues.
2. Project management; budget, schedule, technical specification.
3. Contractors' commercial performances; short term, long term.

The evaluation of the Polaris defence project by Sapolsky (1972) considered that success on Government programmes can be defined in terms of satisfaction by those affected. Absence of criticism is then seen as a mark of success. This approach is dependent upon the project goals being viewed as of interest to nearly everyone, or at least not against the interest of many. The factors supporting this situation are: favourable environment, winning skill in bureaucratic politics, the ability to mange technological development.

The summary of these approaches shows that the first method is primarily concerned with the measurement of project management success, the second and third methods cover both the success of the project and its management.

Cooke-Davies (2002) studied critical factors that effect project success. He drew upon new empirical research, which he used to answer 3 questions: What factors lead to project management success? What factors lead to a successful project? What factors lead to a consistently successful project?

The study identified 12 factors, 8 derived from hard data and 4 from softer evidence. The practices that correlated to successful on-time completion are:

1. Adequacy of company wide-education on the concepts of risk management;
2. Maturity of an organization's processes for assigning ownership of risks;
3. Adequacy with which a visible risk register is maintained;
4. Adequacy of an up-to- date risk management plan;
5. Adequacy of documentation of organizational responsibilities on the project;
6. Minimising project duration as far below 3 years as possible.

And those that correlated to on-cost performance were:

1. Allow changes to scope only through a mature change control process;
2. Maintain the integrity of the performance measurement baseline.

The previous 8 factors were critical to project management success; a ninth was critical to project success:

1. The existence of an effective benefits delivery and management process that involves the mutual cooperation of project management and line management functions.

The remaining factors that appear to be critical to consistent corporate success were:

1. Portfolio- and programme management practices that allow the enterprise to resource fully a suite of projects that are thoughtfully and dynamically matched to the corporate strategy and business objectives;
2. A suite of project, programme and portfolio metrics that provide direct 'line of sight' feedback on current project performance, and anticipated future success, so that project, portfolio and corporate decisions can be aligned;
3. An effective means of 'learning from experience' on projects that combine explicit improvement of project management process and practices.

Davir *et al.* (2002) examine the relationship between different aspects of project planning and project success as perceived from various perspectives. Three planning aspects are considered (requirements definition, development of technical specifications, and project management processes and procedures), alongside three main bodies: the end-user, the contractor, and procurement office (the duty of the procurement office is to manage the procurement process and to monitor contractor's performance). The findings suggested that the project was insensitive to the level of implementation of management processes and procedures, which are readily supported by modern computerized tools and project management training. On the other hand, project success was positively correlated with the ability to define requirements and the development of appropriate technical specifications.

4.5 Summary

This Chapter has explained how models have been classified theoretically and presents some descriptive examples. It presents the proposed research model illustrating the relationships between client attributes and project outcomes. These were further explained by giving detailed literature background in relation to the criteria of project success and the factors that might affect project success. What has become apparent is that many factors affect project success. However for the purpose of this research only those relating to the hypothesis have been considered.

CHAPTER FIVE: OPERTIONALIZATION OF THE CONSTRUCTS

5.1 Introduction

Explanatory research investigates the causes or consequences of a phenomenon, based upon the principal that the research question must be understandable. De Vaus (2001) defines dependent variables as the *effect* in the causal model, which means it is dependent on the influence of factors. Independent variables are defined as the presumed *causes* of the dependent variable (s).

5.2 Dependent Variables

In order to deal with the data efficiently, the model's variables were coded V1-V14. The following diagram explains these notations.

Variables name	Code
Consistency- complexity of the Client Organisation	V1
Consistency- actions of the Client Organisation	V2
Consistency- attitudes of the Client Organisation	V3
Continuity of the Client Organisation	V4
Proficiency of the Client Organisation	V5
Experience of the Client Organisation	V6
Consistency- actions of the Client Project Manager	V7
Consistency- attitudes of the Client Project Manager	V8
Continuity of the Client Project Manager	V9
Proficiency of the Client Project Manager	V10
Experience of the Client Project Manager	V11
Time of the project	V12
Cost of the project	V13
Functionality of the project	V14

Variables 12-14 are the dependent variables and these will be introduced first.

5.2.1 Time V12

In any project, time is considered vital to the client and the contractor: it is an investment of resources. In most cases, for the client, it is because that particular project is used to provide a service or to produce goods, and in all circumstances the

client will gain benefits. Similarly for the contactor, who will inevitably use his resources and skills to construct the project to the client's satisfaction? Payne (1980) indicated that financial pressure to complete projects in shorter times is on the increase, especially for industrial and commercial revenue yielding projects.

In construction business this procedure is usually formulated into a contract, where both parties sign an agreement expressing their desire to construct a building within a certain cost ceiling in a defined period of time and with expected quality. The definition of contract duration can be expressed, as it is the period of time agreed in the contract documents for substantial completion of the work. When a construction contract is awarded, clients generally want some assurance that the contractor can fulfil the terms of the contract in the agreed time limit. To demonstrate this, the contractor in many cases required submitting a schedule showing the sequence of activities for performing the work.

Cost, time and quality are mostly used as an indication for measuring project success: the three valuable measures considered by many scholars as the golden triangle. They are important constraints; in addition, the balance between them will differ from one project to another. Turner (1999) indicated that some project managers treat time as the only important task, and focus on that to the disadvantage of the others. Furthermore he indicated the importance of time by:

> Certainly there are projects for which time is of overriding importance, the Olympic Games for instance. The time the athletes will start parading up the stadium is known six years in advance, and if they are late, the whole world will be watching. The organizers cannot ring up the athletes two weeks before they are due to start, and tell them to come two weeks later. They must start on time.
>
> (Turner 1999; p. 8)

Completing construction projects on time is one of the measures of success that will be considered by the parties involved. Bresnen *et al.* (1987) found that ranges of indicators are used to measure project performance. These were categorised as *hard* performances, used to measure the degree of time and cost over/under run, and *soft* indicators, used to measure satisfaction with project outcomes. Project time is considered one of the most significant features. Nkado (1991) indicated that the

attainment of successful project completion initially stipulated within the contract, is the responsibility of a widen group that often exceeds the direct responsibility of the individual parties.

5.2.2 Cost V13

In most construction projects, cost is considered as paramount for both client and contractor. It is a controversial objective where the client is trying to attain a product or service that produces its requirements at the lowest cost. On the other hand, the contractor usually has a goal of maximizing the profit, which frequently means a higher price for the value provided.

Several factors are responsible for cost escalation within the construction process. Lack of understanding and good communication between design team and construction team is one of the problems facing the construction industry. Information is frequently not delivered from the design team at the right time or in the right form for the contactor, which therefore fails to allow the construction of the project to meet time, cost and quality objectives. Gidado (1996) describes the process of information flow between designers and construction managers, and identifies the constraints affecting the process about attaining project savings in cost, time and quality control.

Davenport (1997) indicated that cost and cost certainty are known to be the main concerns of construction clients. For the purpose of comparing differences in construction cost within the construction industries world leaders, Xiao and Proverbs (2002) conducted a survey for comparing contractor performance in Japan, the US and the UK. Their findings indicated that building costs in the UK, when adjusted for exchange rate fluctuations, are significantly higher than those in Japan and the US. Furthermore, cost certainty and client satisfaction are higher in Japan than in the UK, but there is no significant difference between Japan and the US. Their results suggested that differences in cost performance between the three countries are considered to derive from disparities in the relationships between contractors and clients and also in the construction process.

On the other hand, Flanagan *et al.* (1998) indicated that low price is not always the main concern of clients; instead cost certainty is becoming increasingly important.

Soetanto *et al.* (2001) specified that the most important aspects of clients' evaluation criteria for contractors' performance is *cost certainty*. Wright (1997) showed that, in general, the majority of construction projects meet the required quality specification, but rarely are completed within budget and time. In their investigation, Graves and Rowe (1999) stated that two-thirds of public projects investigated exceeded cost estimates. Xiao and Proverbs (2002) indicated that a cost overrun is an indication of poor management.

The literature outlined above also shows that some of the following aspects might affect the project cost:

- competitiveness of tendering,
- reduction in construction time,
- higher buildablity,
- material choice,
- construction methods,
- and effective use of contractors' plant and equipment

5.2.3 Functionality V14

This term is relatively wide in its definitions. In this research, the purpose of functionality is to measure whether or not the project meets its functional requirements in terms of quality and inter-relationship of space and the way in which the building is designed to be useful. It was considered that the parties involved in the project were in a good position to evaluate this.
Satisfaction is a complex word; for the client it is expected to guarantee that the original business strategic target is sustained up to the end within the agreed framework stipulated in the contract. For the contractor, defining satisfaction means keeping his profit as a priority without neglecting customer's satisfaction, so actually the contractor's position is more stressful.

Clients in their selection of contractors consider many factors. Ramsay-Dawber (1995) argues the case for a more broad and standardised approach to the measurement

of the corporate performance of UK contractors. He suggests the use of multiple measures that use quantitative and qualitative non-financial and financial methods, which reflect the stakeholders of the industry, more particularly the client.

Measuring client satisfaction involves issues from different perspectives. The argument arises that the initial client might not be the ultimate client, likewise, rather may be the end user. For the purpose of this research functionality is narrowly defined as whether or not the project meets its functional requirements in terms of quality and inter-relationship of space and the way in which the building is designed to be useful.

5.3 Measuring the dependent variables

The unit of analysis of this fieldwork is the project. Measurement of the dependent variables of the proposed model for two dependent variables (time and cost) were achieved by asking the main contractor or the client's architect for project statistics relating to the duration and cost of their projects. The third of the dependent variables (functionality) was investigated by asking the respondents to opine on the relevant outcomes relating to projects they worked on.

5.3.1 Time V12

Therefore, in this research, *time* (V12) will be measured by looking at the *original duration* (OD) of each project (in weeks), and the *actual duration* (AD) of the same project (in weeks) including the extensions of time given to the contractor. A measure of project time overrun/ underrun (V12) will be obtained by dividing AD by OD. (See figure 5.1 as an example).

Example from Tripoli Medical Centre:

- Original time (OD) was 36 months
- Actual time (AD) was 191 months
- Time index (V12): 191 ÷ 36 = 5.31

Figure 5.1 Time calculations for projects surveyed

5.3.2 Cost V13

During this study, cost (V13) was measured by looking at the *original cost* (OC) of each project and the *actual cost* (*AC*). The project's cost index (V13) would be achieved by dividing actual cost (AC) by original cost (OC). (See figure 5.2 as an example.

Example from Tripoli Medical Centre:

- Original cost (OC): £78 million
- Actual cost (AC): £156 million
- Cost index (V13): 156 ÷ 78 = 2

Figure 5.2 Cost calculations for projects surveyed

5.3.3 Functionality V14

Functionality (V14) was evaluated by asking respondents to rate the functionality of their project. An ordinal ranking scale that employed five integers in uniform descending order (i.e. from 5 to 1) was used to measure each respondent's intuitive perception of their projects functionality, (i.e. from very good to very poor).

5.4 Independent Variables

Many factors have been cited as contributing to levels of project performance. As explained earlier, this thesis attempts to concentrate on what the author considers to be the important influence of client attributes.

Conventionally, the main participants of any construction project are the client, the consultant and the contractor. Smith and Wilkins (1996) and Egan (1998) found that interactions and interrelationships between these participants decide the overall performance of a construction project. On the other hand, Higgin and Jessop (1965) and Mohsini (1989) explained that the performance of these participants is also interdependent. Therefore, in order to achieve success, mutual requirements must exist, whereby each participant requires the other to perform their duties efficiently and in harmony with others. Despite this mutual dependency, Liu and Walker (1998) concluded that the performance of individual participants remains important because overall project performance is a function of the performance of each participant.

It has been recognized that client influence can manifest itself in projects in two main ways. First, there is what we can define as the 'client organization'. As exemplified by the Tripoli and Guys projects, this can be complex and inconsistent to the detriment of the project. It is however, recognized that on some projects the client chooses to be represented by a consultant, and the impact of this organization might not be inconsiderable.

Two sets of variables are therefore proposed, one for each of the client organization (CO) and client project manager (CPM) constituents.

5.4.1 Consistency of the client organization and the client project manager

In this research the term *consistency*[3] is defined as "the constant actions and behaviours of the client or organisation in its or their relations to others in one single transaction". In other words, it is a stable action and steady policy from a client or his/her representatives towards his/her counterparts within an agreed contract.

The consistency construct is therefore seen to be composed of two elements: consistency of the client organisation (COCS) and consistency of the client project manager (CPMCS).

5.4.2 Continuity of the client organisation and the client Project manager

In this research *continuity*[4] is related to the continuous existence and steady position of the client organization and the project manager in a project. In other words, both bodies will remain in their positions from the start of a project up to completion. The purpose of this factor is to check whether the continuity of the client organization and project manager could have any effect in relation to project certainty.

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[3] The definition of *consistency* is given by The New Oxford Dictionary of English as "The achievement of a level of performance which does not vary greatly in quality over time". The Oxford English Dictionary defines it as "The quality, state, or fact being consistent; agreement, harmony, compatibility (with something, of things, or of one thing with another)" or " Remaining in the same state or condition; settled, persistent; durable."

[4] The definition of *continuity* as given in The New Oxford Dictionary of English as "The unbroken and consistent existence or operation of something over a period of time". The Oxford English Dictionary defines it as "The state on quality of being continuous, for immaterial things, actions, processes etc.: the state or quality of being uninterrupted in sequence or succession, or in essence or idea; connectedness, coherence, unbrokenness".

An expected feature of project management is that project managers come and go. The schedule, cost and quality of a project are influenced by the changes resulting from project manager turnover. Craig (1989) studied the adverse effect on projects caused by project manager instability. Minimizing this affect can be achieved by overlapping at milestones, obtaining contacts, making introductions, honouring previous commitments, verifying data bases and cleaning up *non-productive* paper work.

Gold and Woodliffe (2000) studied and compared the strategic development of Spain's two most important retail organization known as El Corte Ingles and Galerias Preciados. Both department stores were established in the1930s, but while the former has gone from strength to strength, Galerias Preciados changed hands several times before going into receivership in 1994, when El Corte Ingles acquired it. During their study, they used a comparative case study approach that focused on outlet growth, financial control and continuity. Their findings concluded that continuity of ownership contributed to El Corte Ingles' success and durability.

5.4.3 Proficiency of the client organization and the client project manager

In this research, the term *proficiency*[5] is related to the client organization's and client project managers' knowledge and skills. The aim is to discover whether this variable has an effect on the outcome of the project in relation to time, cost and functionality.

A variety of definitions regarding individual proficiency can be distinguished in literature. While some authors define it as an ability to do certain tasks, requiring capabilities and skills, some add the concept of work attitudes and experience. Gonczi *et al.* (1990) indicated that proficiency studies review the knowledge, skills and attributes. Boyatzis (1982) saw it differently by referring to the behaviour of individuals. Finn (1993) indicated that it was both. Lassey (1998) concluded that proficiency is always seen as being task related, i.e. related to the performance of a rôle.

In the US, Marquis and Straight (1965) and Rubin and Marquis (1966) indicated that industrial firms under government contracts gathered data on the background and skills of 40 managers of large projects. They indicated that although the project manager is

[5] The definition of term *proficiency* in The New Oxford Dictionary of English is "The competence or skills in doing or using something".

definitely significant to levels of project performance, no systematic research has examined the personal characteristics that most directly affect his/her selection and related success or failure.

Rubin and Seelig (1967) focused on the relationship between a project manger's background characteristics and certain characteristics of the projects they were asked to manage. The impact of this decision process is then examined by relating project manager experience and project characteristics to measure project performance. Their findings indicated that organizations select their oldest and most experienced project managers to direct large, high-priority projects. It could therefore be argued that performance is superior not because of the project manager proficiency, but because of the high priority given to large projects. Contrary to the previous statement, Anderson (1991) argued that the relationship between a project manager's managerial attributes and project success is indirect. That is, the attributes of the project manager in themselves do not directly determine whether or not a project performance is impacted through the effective application of project management principles and recommendations selected by the project manager. Furthermore, he argues that high-quality managerial attributes are an equally important contributor to project success and appropriate with high-quality technical skills.

Bresnen and Haslam (1991) examined similarities and differences in the way in which clients organize and manage their projects and assess the impact of these practices on project performance. Their main conclusions drawn from the data are that client experience has a vital impact upon many of the decisions made, that strategic decisions are often internally driven as different to project-based, that additional work and inadequate briefing still continue to cause problem during construction.

Tarricone (1992) reported that management skills are often learned in a variety of settings and at different stages of the engineer's career. He added that managers can be made in at least 4 ways:

- Undergraduate training;
- Graduate and continuing education classes;
- Employer in-house training programs;
- On-the-job experience.

Lee *et al.* (1995) conducted a survey to assess the decision-making leadership styles of US and European project mangers. Their findings showed that although a skills level based on the number of years as project manager appears to show little difference, the overall decision authority component is influenced by the number of projects managed.

Kog *et al.* (1999) identified key determinants for construction schedule performance from a list of factors related to the client project manager, project team, planning and control efforts. Their findings indicated that there are 5 key determinants:

1. Time devoted by the project manager to a specific project;
2. Frequency of meetings between the project manager and other project personnel;
3. Monetary incentives provided to the design;
4. Implementation of constructability program;
5. Project manager experience on projects with a similar scope.

Edum-Fotwe and McCaffer (2000) presented a study that focuses on the development of construction project managers and how they maintain their professional skills in a changing construction business environment. One of their main findings is the importance of experience in achieving, maintaining and renewing skills and competency in construction project management. Furthermore, they considered that the factor with greatest significance is the ability to employ such experience to address the changing conditions and requirements that the industry environment daily presents.

Project managers are not working alone in their organizational team; several disciplines from different categories are engaged with them to do their job. Conflicts resulting from a clash of ideas and opinions within such organisations are expected. Shannon (1982) studied the rôle of project managers resolving conflict between parties involved in the design-engineering group. Their findings show that the proficiency and consistency of the part of the manager is considered as his/her strength in controlling his/her engineers, which will enable the whole team to act as one body. Their goal being to complete the project as expected by their client.

Bent (1989) described the key to successful execution of projects, as making sure that project managers/engineers fully understand their task and develop certain skills and abilities. The findings indicated that these fall within 3 separate but integrated tasks:

accountability, skills and responsibility. Project manager accountability is towards project funding, client relationship and financial authority. His skills should include: business awareness and expertise, experience in design technology; management skills, leadership qualities and communication capability. The study concluded that project manager and the project engineer must be aware of their own tasks within their overall responsibilities. Kimmons (1990) studied the affect of engineering proficiency on different companies. His findings indicated that the proficiency of the engineering discipline leaders is always a crucial factor in the ultimate success in project execution.

5.5 Measuring the Independent variables

The unit of analysis for this research work is the project. Measurement of the independent variables of the proposed model was achieved by asking informants to respond to various statements and questions about the project they worked on.

Client Organisation

5.5.1 Consistency of Client Organization

Consistency of the client organization (COCS) was measured during this study as a composite of three sub variables (V1, V2 and V3), which related to complexity, actions and attitudes of the client organization respectively. The subvariables were later tested to see whether they could be considered as such. Respondents were asked to rate the extent to which their client organization *complexity*, *attitudes* and *actions* with the other parties involved with them during implementing their tasks within the project. An ordinal ranking scale that employed five integers in uniform descending order, i.e. from 5 to 1 (i. e. from 1 strongly agree to 5 strongly disagree) was used to measure each respondent's perception of their client organization's complexity (V1), attitudes (V2) and actions (V3), (i. e. from 1 strongly agree to 5 strongly disagree). Three statements were prepared, as follows:

- The client organization was highly unified or highly complex, e.g. highly unified would be where there was a single individual as client. A highly complex client would be where there were many organization represented in the client role (V1).

- The client organization was consistent in its *actions* during the construction process (V2).

- The client organization was consistent in its *attitudes* during the construction process (V3).

5.5.2 Continuity of the Client Organization

Continuity of the client organization (COCN) was measured during this study as a single variable (V4), which related to continuity of personnel that made up the client organization. Respondents were asked to rate the extent to which changes in the executives or high-ranking structure of their client organization had impacted upon the project (V4). Similar ordinal ranking scale was used to measure this. One statement was prepared, as follows:

- Changes in the client organization had impacted this project (V4).

5.5.3 Proficiency of the Client Organization

Proficiency of the client organization (COPR) was measured in this study as a composite of two variables (V5 and V6), which related to ability and experience of client organization respectively. Again, these sub-variables were later tested for congruence. Respondents were asked to rate the extent to which their client organization proficiency in terms of making decisions earlier, keeping good communication with the rest of the project's bodies (V5) and the client organization experience in building construction (V6). Again an ordinal ranking scale of 1 to 5, was used. Two statements were prepared, as follows:

- The client organization was proficient e.g. taking decisions early and keeping good communication (V5).

- This client organization is experienced in construction projects (V6).

Client Project Manager CPM

5.5.4 Client Project manager Consistency

Consistency of the client project manager (CPMCS) was measured as a composite of two variables (in attitudes- V7; and in actions-V8). Respondents were asked to rate the extent to which their client project manager *attitudes* (V7) and *actions* (V8) with the other parties involved with them during implementing their tasks within the project. Two statements were prepared, as follows:

- The client project manager was consistent in its *attitude* during the construction process (V7).
- The client project manager was consistent in its *action* during the construction process (V8).

An ordinal ranking scale of 1 to 5 was again used.

5.5.5 Client Project manager Continuity

Continuity of the client project manager (CPMCN) was measured as a single variable (V9). Respondents were asked to rate, on an ordinal 1-5 scale the extent to which changes and the stability of the client project manager had impacted upon the project (V9). One statement was prepared as follow:

- Changes in the client project manger had impacted this project (V9).

5.5.6 Client Project Manager Proficiency

Proficiency of the client project manger (CPMPR) was measured as a composite of two variables (proficiency V10 and experience V11). Respondents were asked to rate client project manager proficiency in terms of making decisions earlier, keeping good communication with the rest of the project's bodies (V10) and experience in building construction (V11). Two statements were prepared, as follows:

- The client project manager was proficient in making decisions early and keeping good communication (V10).
- This client project manager is experienced in construction projects (V11).

Respondents were asked to rate their level of agreement with these statements as before.

5.6 Procurement type as a possible mediator factor

Walker (1994) argued that contract type itself does not significantly affect speed of construction, and that several client-related factors proved more significant: mainly how well clients or their representatives communicate with the project team. In a further study, Walker (1996) indicated that an improvement in construction time performance is associated with high levels of construction management team competence in planning, team building and communications. A year later however, Walker (1997) suggested that traditionally procured projects perform less well than systems that include the manager of the construction process as a consultant (such as construction management or management contracting) early in the project's development. His findings indicated that sound working relationships between the construction management team and the client's agent team helped to reach good construction time performance. The results also showed that sound planning and risk management for project time control strongly affects construction time performance. The study concluded that early involvement of the construction management team into project design assists with time planning and control.

Holt and Proverbs (2001) conducted a survey in England to determine whether lowest price remains the goal with associated objectives by analysing Local Authority (LA) practice. Their findings showed that:

- 50% of LAs considered lowest tender most important;
- 80% of projects were assigned using single-stage tenders with 70% of work let on lump-sum basis;
- 37% of LAs found it easy to comply with EU directives;
- 11% considered lowest tender to provide value for money;
- 50% were positive regarding the Latham and Egan reports;
- 74% were negative about *Constructionline* [6].

[6] Constructionline is a web directory funded by the Department of Trade Industry (DTI), which aims to make it easier to hire construction companies.

Songer *et al.* (1996) conducted a research study in the US and the UK addressing the effects of design-build procurement strategies. Their conclusion was that clients most often select design-build to shorten duration. Clients justified this by arguing that the single-point of responsibility and the contractors' ability to speed up design and construction that exists in the design-build process will reduce the delivery time. The study concluded that such clients evaluate project success in terms of budget variation, schedule variation and conformity to expectations.

Previous scholars appear not to agree on whether Design and Build (DB) projects cost more, less or the same as the traditional Design-Bid-Build (DBB) projects.
In the design and build (DB) the design and construction tasks become the responsibility of one organization, usually a contractor (Janssens, 1991:9; Masterman, 1992:3), in contrast with the traditional procurement arrangement, where two separate teams are involved; the design team and the construction team (Mohsini and Davidson, 1992).

A study by Konchar and Sanvido (1998) showed that construction cost of DB projects is 6% lower than DBB projects. The reasons behind lower costs in DB projects as expressed by some researchers are:

- The design is subject to competition (Laing, 1975);
- Reduction in construction time (Smith, 1994);
- Cost effective design due to better buildablity (Akintoya, 1994; Songer and Molenaar, 1996);
- Cost effective materials and construction methods (Kenworthy, 1992 and Neo, 1997);
- Effective use of contractors' plant and equipment (Neo, 1997).

Other researchers argued that DB projects are subjected to higher costs for the following reasons:

- Higher profit margins for the contractors (Pain and Bennett, 1988 and McManamy *et al.* 1994);

- Additional insurance coverage for the contractor and higher bond rates (Denning, 1992);

- Higher overheads costs for contractors due to their early involvement (McManamy *et al.*1994);

- Higher risks on the part of contractors (Hogg and Morledge, 1995)

- Pricing based on incomplete drawings (Chau *et al.*1996);

- Clients may be appointed additional number of consultants to supervise contractors and their consultants (Anumba and Evbuomwan, 1997).

Several other studies by Rowlinson (1987), Pain and Bennett (1988) and Regan (1995) concluded that DB projects are neither cheaper nor more expensive than DBB projects. Alongside cost saving, Love and Skitmore (1996) indicated that clients choose DB because it can guarantee a maximum price before construction actually starts on site. This fixing of construction cost is probably possible because the single body (contractor) controls the design and the construction budget that gives fewer occasions for changing orders (Songer and Molenaar, 1996).

In the US, Krizan (1997) points to the study of the Construction Industry Institute, which found that DB projects had less cost escalation than traditional, or and construction management projects. Other US studies by Dreger (1993), Songer *et al.* (1996) and Kluenker (1996) found that DB projects have a better chance of being delivered to budget. A finding that has been confirmed by Heery and Thomsen (1992), Akintoya and Fitzgerald (1995), Murray (1995) and Stoker (1995) in the UK. In a survey carried out by Chevin (1993), 50% of clients said that DB is useful when a guaranteed price is vital for the project. Bennett *et al.* (1996) showed that 60% of clients feel that it is crucial to have guaranteed maximum price, which can be achieved if the clients' requirements are detailed. The study also showed that DB projects are more likely to be completed on budget, or within 5% of the budget. Ormerod (1996) indicated that DB gives more cost certainty if the client does not modify the contractor's design after the tender is accepted.

In contrast, in Singapore, Low and Wong (1992) concluded that a survey of contractors' quantity surveyors indicated that there is a tendency for cost overruns in DB.

Pain and Bennett (1988) in their study of 49 Design-and-Build (DB) projects showed that none of the projects experienced serious problems; a small portion experienced some difficulties. Bennett *et al.* (1996) found in another study that the DB projects have greater time and cost certainty, better value for money, and are 50% more likely to finish on time and be delivered on the agreed budget, compared to the Design-bid-Build (DBB) projects.

In the UK, Ndekugri and Turner (1994) indicated that clients have above average satisfaction with DB projects in terms of cost, time and quality performance. Akintoya (1994) and Ndekugri and Turner (1994) showed that contractors felt that overall project time is decreased. Akintoya and Fitzgerald (1995) in their study agreed that there is a reduction in time in DB projects. Bennett *et al.* (1996) indicated that completion on time or earlier could be achieved when minimal clients' requirement were provided. When more detailed clients' requirements are provided, fewer projects are completed on time or earlier. That is because clients' when requirements are more developed, contractors are involved later. In the same study, Bennett *et al.* (1996) illustrated that in DBB projects where clients' requirements are extensively provided in drawings and specifications, only 56% of the projects are completed on time.

5.7 Summary

This Chapter presents the operationalization of the constructs and presents the methods of how to measure the dependent and independent variables. Firstly it shows a theoretical background of each variable and then illustrates the ways of how these variables are measured. The Chapter further gave more explanation in relation to the possibility for the impact of procurement types on the surveyed projects.

CHAPTER 6: DATA COLLECTION, RESULTS AND ANALYSIS

6.1 Data Collection Strategy

In Chapter Four a model was developed illustrating the hypothetical relationships between client-related attributes and project-related attributes. Hypotheses were then generated from predictions about the interaction of the model's variables. The next stage of the research process involved testing the model.

Grover (2001) describes a number of typical steps in survey design. These include (1) the determination of the unit of analysis; (2) the creation of multi-item scales for measurement; (3) the assessment of the measurement system for validity (both construct and content) and reliability; (4) consideration of issues of sampling; (5) the choice of a data-collection instrument; the strategy for analysing the data, typically in the form of tests of association; and (6) determining the external validity of the findings, *i.e.* whether the analysis based upon the sample is capable of generalisation. The issues related to the unit of analysis and the choice of data-collection instrument (steps 1 and 4) is relatively straightforward and will be dealt with according to Grover's approach.

6.1.1 Unit of analysis

Huber and Power (1985) stress the importance of establishing that the unit of analysis is clearly defined and matched by the research instruments and chosen respondent(s). As noted in Chapter one[7], the principle research question is to investigate the main client-related attributes that influence delays, cost overruns and functionality of large and medium public-sector building projects, whilst examining the correlations that exist between the variables. This directs the research towards a unit of analysis based upon the evaluation of related professional parties involved in the construction of a

[7] Chapter 1, section 1.2

project upon their client's organization and his project manager's. In the majority of construction projects a number of different professionals are typically involved during the construction process: for example, main contractor, architect, structural engineer, quantity surveyor and building services engineer. The aim therefore, was to invite a large number of these project practitioners to participate in this study and to provide information that included the means of measuring the model's eleven variables.

A list was collected of 103 public projects that were completed by 2002 in the North East of England. The source was Building magazine issues up to December 2002. Taken into account the cost (projects over quarter of a million pounds) and type of each project (public projects not including housing), the list was then reduced to 48 projects. The identified projects were accessed by calling the clients and checking their willingness to participate in the study. Once permission was obtained, a questionnaire headed by recommendation letter was sent to each participant. 155 project participants from 31 projects were accessed and asked to provide replies to the faxed questionnaire.

6.1.2 Instruments for data collection

All research designs require instruments for gathering data. De Vaus (1996) indicated that survey research is not restricted to any particular data collection instrument. In this case the objective was to obtain information about the duration, cost and functionality of each project and on the other hand getting the evaluation of each professional to their client organization and client project manager.

Each instrument needed to contain questions of fact about each *project* (that is, about time and cost). This was collected in each case from the main contractor. Two forms of questionnaire were prepared. Form 1 that included the factual figures related to time and cost was sent to the main contactor and form 2, which included more qualitative information was sent to other participants (the architect, structural engineer, quantity survey and building service engineer).

In both forms there were a number of questions or statements whose purpose was to elicit attitudinal responses.. The statement was coded in the form of a linear scale, a

device that has been widely used for applying quantitative units of measurement to qualitative constructs (Trochim, 1997). Typically, such scales measure the intensity of respondents' attitudes towards a variety of questions, statements, or propositions and offer techniques for combining results into one overall indicator (Kumar, 1996). Oppenheim (1992) noted that linear scaling is used not only for measuring attitudes and opinions but also concepts, awareness and other subjective variables. There are three common types of scale: the *equal-appearing-interval* (Thurstone) scale, the *cumulative* (Guttman) scale, and the summated rating (Likert) scale (for fuller descriptions of each, see, for example, Kumar, 1996; Oppenheim, 1992; Trochim, 1997). Likert scales are the most widely used, not only because they are less laborious, but also because they have been found to correlate well with their more intricate counterparts (Oppenheim, 1992).

Therefore, each question was coded in the form of a five-point *summated rating scale* commonly known as a Likert scale. Scale ratings ranged from strongly agree to strongly disagree with two categories on either side of the 'neutral' point. The evidence suggests that scales with points or categories in excess of seven do not provide significant information gains (Kelley, 1999). The most commonly used are the five-point and seven-point scales (Sapsford and Jupp, 1996; Bryman and Cramer, 1994; Trochim, 1997) and for the present study a five-point scale was chosen.

6.2 Results

Results of this study are presented in relation to their:

- General description of the data
- Project detail
- Respondent categories
- Procurement types

6.2.1 General description of the data

Thirty-one public projects were surveyed in the North East of England and the details of each project, location, value and duration were listed in table 6.1.

P. No.	Location	Value (Millions)	Duration (Weeks)	P. No.	Location	Value (Millions)	Duration (Weeks)
1	Newcastle	£6.5	74	17	Newcastle	£2.8	48
2	Newcastle	£4.5	59	18	Newcastle	£1.2	33
3	Newcastle	£4.7	101	19	Newcastle	£2.8	23
4	Whitley Bay	£2.5	43	20	Newcastle	£1.3	52
5	Newcastle	£1.6	49	21	Newcastle	£0.9	37
6	Sunderland	£8.4	98	22	Newcastle	£0.4	22
7	Sunderland	£4.4	90	23	Darlington	£1.7	60
8	Newcastle	£3.2	89	24	Blaydon	£1.0	42
9	Newcastle	£7.7	64	25	Gateshead	£0.4	26
10	Durham	£1.2	36	26	Gateshead	£1.2	42
11	Consett	£1.9	30	27	Gateshead	£0.6	26
12	Newcastle	£0.9	30	28	Gateshead	£2.4	60
13	Durham	£1.0	32	29	Gateshead	£0.4	24
14	Gateshead	£2.5	68	30	Gateshead	£0.3	20
15	Whitley Bay	£2.3	33	31	Gateshead	£1.0	36
16	Newcastle	£2.8	67				

Table 6.1 Project details

Respondent category

For each project five categories of respondents were contacted, main contractor (MC), architect (AR), structural engineer (ST), quantity survey (QS) and building service engineer (BSE), and most of the respondents returned a fully completed questionnaire as detailed in table 6.2.

P. No.	MC	AR	ST	QS	BSE	P. No.	MC	AR	ST	QS	BSE
1	X	X	X	X	X	18	X	X	X	X	X
2	X	X	X	X	X	19	X	X		X	X
3	X	X	X	X	X	20	X	X	X	X	X
4	X	X	X	X	X	21	X	X	X	X	X
5	X	X		X		22	X	X	X	X	X
6	X	X	X		X	23	X	X			X
7	X		X		X	24	X	X	X	X	
8	X	X		X		25	X	X	X	X	
9	X		X			26	X	X	X	X	X
10	X	X	X	X		27	X	X	X	X	X
11	X	X	X	X		28	X	X	X	X	
12	X	X	X	X	X	29	X	X	X	X	X
13	X	X	X	X		30	X	X	X	X	
14	X	X	X	X	X	31	X	X	X	X	
15	X	X	X								
16	X	X	X	X	X	Total	31	29	27	26	19
17	X	X	X	X	X	Ratio %	100	94	87	84	61

Table 6.2 Response rate by categories

Types of procurement

Four types of procurement were observed in the surveyed projects; (1) traditional lowest bid (T/L); (2) traditional negotiated, (T/N); (3) design and build lowest (DB/L); and (4) design and build negotiated (DB/N). Table 6.3 illustrates this.

Project number	Procurement Type				Project number	Procurement Type			
	T/L	T/N	DB/L	DB/N		T/L	T/N	DB/L	DB/N
1		X			18	X			
2		X			19	X			
3		X			20	X			
4				X	21	X			
5			X		22	X			
6			X		23				X
7		X			24	X			
8	X				25	X			
9				X	26	X			
10			X		27	X			
11				X	28	X			
12			X		29			X	
13				X	30	X			
14	X				31				X
15			X						
16	X				Projects	15	4	6	6
17	X				Ratio %	49	13	19	19

Table 6.3 Types of procurement

It is important to note that all of the projects were finished by 2002.
Of the 155 sent out, 132 questionnaires form were returned, representing a response rate of 85%, this high ratio was achieved due to fact that the participants were approached through other project participants (normally the client).

6.3 Data analysis

6.3.1 Using Structural Equation Modeling EQS

The data were first subjected to software Structural Equation Modeling (EQS) from Multivariate Software. The EQS programme offers a variety of presentations and a range of tests including multiple regression, confirmatory factor and path analysis. The

model to be tested by EQS, incorporating the variables described above, is shown in Figure 6.1.

All returned data were recorded using Microsoft Excel in the first instance and then imported into the EQS package for manipulation and analysis.

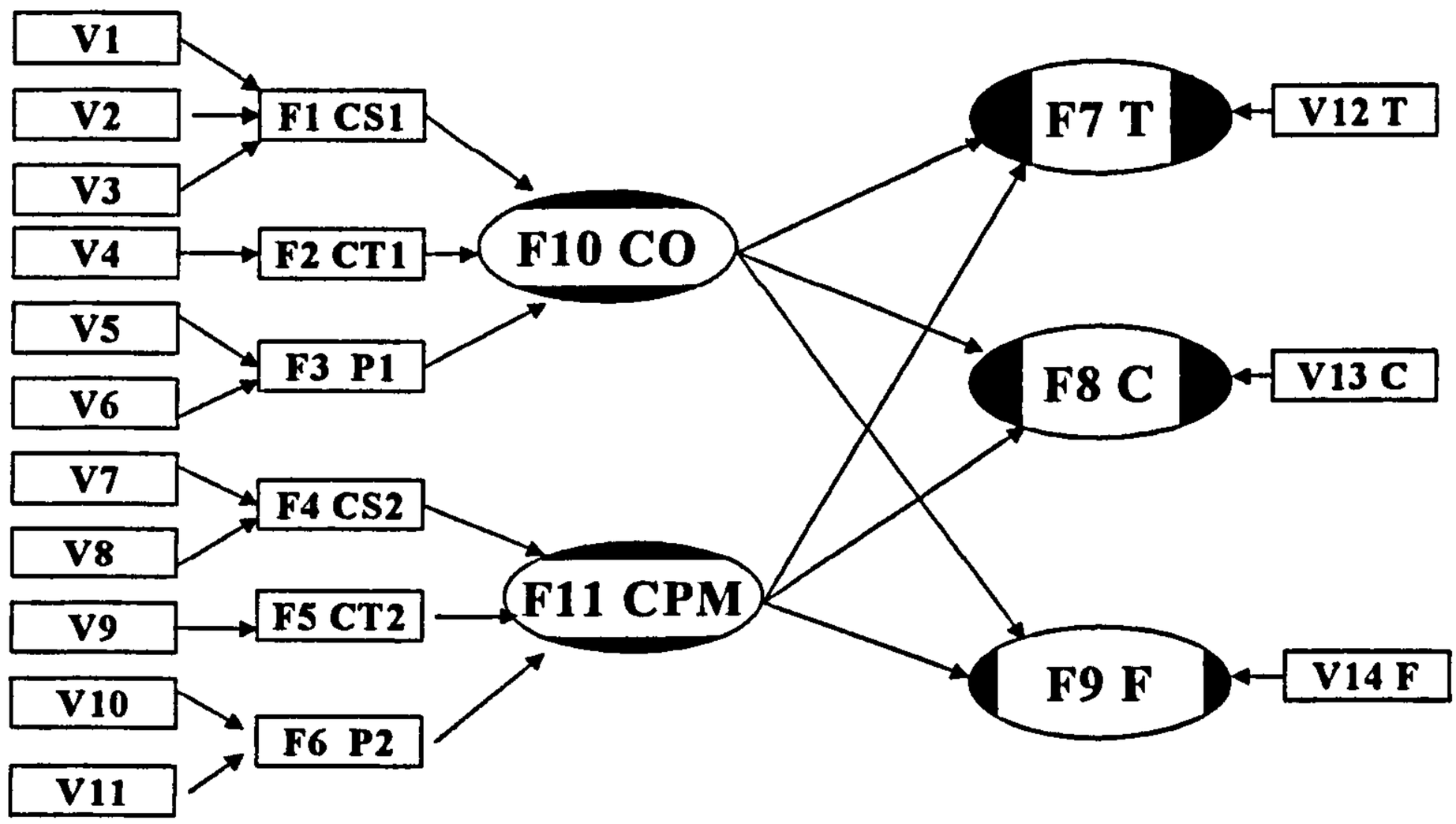

Figure 6.1 A Structural Equation Model with hypothesized relationships

After several attempts with the software, the package did not respond and no feedback could be obtained by any means. It was therefore decided to use more traditional approach to analysis of the data.

6.3.2 Using SPSS software

SPSS (Statistical Package for the Social Sciences) is a commonly used piece of software that performs many statistical tests. All data were recorded using Microsoft Excel in the first instance and then imported into the SPSS package for manipulation and analysis. The main objective was to look for strength of association between model's independent and dependent variables. The most commonly used measure of association is Pearson's test 'r' *product-moment correlation coefficient*, which is

defined as a measure of how well a linear equation describes the relation between two variables X and Y (www.factindex.com/p/pe/pearson).

In performing these tasks, there are two important indices relating to associations. These are the Pearson coefficient 'r' and the significance level 'p', as shown in table 6.4:

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Cost
Client Organization Consistency- Comple	Pearson Correlat	1	-.253	-.377**	.565**	-.221	.142	.353*
	Sig. (2-tailed)	.	.062	.005	.000	.106	.301	.008
	N	55	55	55	55	55	55	55
Client Organization Consistency- Action	Pearson Correlat	-.253	1	.598**	-.129	.513**	.163	-.221
	Sig. (2-tailed)	.062	.	.000	.348	.000	.235	.105
	N	55	55	55	55	55	55	55
Client Organization Consistency- Attitude	Pearson Correlat	-.377**	.598**	1	-.245	.550**	.163	-.301*
	Sig. (2-tailed)	.005	.000	.	.071	.000	.235	.026
	N	55	55	55	55	55	55	55
Client Organization Continuity	Pearson Correlat	.565**	-.129	-.245	1	-.210	.028	.172
	Sig (2-tailed)	.000	.348	.071	.	.125	.838	.208
	N	55	55	55	55	55	55	55
Client Organization Proficiency	Pearson Correlat	-.221	.513**	.550**	-.210	1	.368**	-.021
	Sig. (2-tailed)	.106	.000	.000	.125	.	.006	.878
	N	55	55	55	55	55	55	55
Client Organization Experience	Pearson Correlat	.142	.163	.163	.028	.368**	1	-.010
	Sig. (2-tailed)	.301	.235	.235	.838	.006	.	.944
	N	55	55	55	55	55	55	55
Project Cost	Pearson Correlat	.353**	-.221	-.301*	.172	-.021	-.010	1
	Sig. (2-tailed)	.008	.105	.026	.208	.878	.944	.
	N	55	55	55	55	55	55	55

**.Correlation is significant at the 0.01 level (2-tailed).

*.Correlation is significant at the 0.05 level (2-tailed).

Table 6.4 Sample of correlation results

The sign of the correlation coefficient (+, -) defines the direction of the relationship, either positive or negative. A positive correlation coefficient means that as the value of one variable increases, the value of the other variable increases; as one decreases the other decreases. A negative correlation coefficient indicates that as one variable increases, the other decreases, and vice-versa.

At this point it was considered useful to examine the predictive model (see Chapter 4 section 4.2) and chart the hypothesized correlations between the variables as illustrated in Table 6.5.

Independent Variable			Dependent Variables		
Code	*Description*	*Scaling level*	*Time*	*Cost*	*Functionality*
V1	CO Consistency- complexity	Highly complex organisation	+	+	-
V2	CO Consistency- actions	Highly consistent actions	-	-	+
V3	CO Consistency- attitudes	Highly consistent attitudes	-	-	+
V4	CO Continuity	Highly organisation changes	+	+	-
V5	CO Proficiency	Highly proficient organisation	-	-	+
V6	CO Experience	Highly experienced organisation	-	-	+
V7	CPM Consistency- actions	Highly consistent actions	-	-	+
V8	CPM Consistency- attitudes	Highly consistent attitudes	-	-	+
V9	CPM Continuity	Highly CPM changes	+	+	-
V10	CPM Proficiency	Highly proficient CPM	-	-	+
V11	CPM Experience	Highly experienced CPM	-	-	+
CO: Client Organization		CPM: Client Project Manager			

Table 6.5 Hypotheses predicating the effect of independent variables on dependent variable

6.3.3 Possible Moderator Variables

As described in Chapter Four[8], the importance of procurement basis of the projects was considered as a possible source of influence in the model. To recap, these were as follows:

- Traditional lowest bid T/L
- Traditional negotiated T/N
- Design and build lowest DB/L
- Design and build negotiated DB/N

It was considered at least possible that the procurement type of a project would act as a *moderator* variable in the model (i.e. between client attributes and project outcomes). This will be discussed later.

6.3.4 Alpha test

The Alpha test is frequently used as a preliminary where measurement has been made using rating scales. Alpha (α), known as *Cronbach's alpha* measures how well a set of scaled items appears to measure a single uni-dimensional latent construct. For example, when five rated statements are used to assess the level of *client consistency* a high alpha level (i.e. one that is closer to unity) will suggest that all five statements really *are* measuring the same thing (in this case *client consistency'*). When data have a multidimensional structure, Cronbach's alpha will usually be low. Technically speaking, Cronbach's alpha is not a statistical test - it is a coefficient of reliability (or consistency). Cronbach's alpha can be written as a function of the number of test items and the average inter-correlation among the items. Below the formula for the standardized Cronbach's alpha:

$$\alpha = \frac{N \cdot \bar{r}}{1 + (N-1) \cdot \bar{r}}$$

Here N is equal to the number of items and r-bar is the average inter-item correlation among the items. One can see from this formula that if you increase the number of items, you increase Cronbach's alpha. Additionally, if the average inter-item

[8] Chapter 4, section 4.5

correlation is low, alpha will be low. As the average inter-item correlation increases, Cronbach's alpha increases as well.

This makes sense intuitively - if the inter-item correlations are high, then there is evidence that the items are measuring the same underlying construct. Thus, if there are multi-dimensional data, Cronbach's alpha will generally be low for all items. In this case, run a factor analysis to see which items load highest on which dimensions, and then take the alpha of each subset of items separately.

In the original model some of the independent variables were *combined* for easier working with EQS. The related variables were as fallows:

- Client organization consistency (COCS1), which related to client organization complexity (V1), client organization actions (V2) and client organization attitudes (V3).
- Client organization proficiency (COP1), which related to client organization proficiency (V5) and client organization (V6).
- Client project manager consistency (CPMCS2), which related to client project manager actions (V7) and client project manager attitudes (V8).
- Client organization proficiency (CPMP2), which related to client project manager proficiency (V10) and client project manager experience (V11).

By running alpha tests for these independent variables, the tables below (6.6, 6.7 and 6.8) indicate the following results:

	Scale Mean if item deleted	Scale Variance if item deleted	Alpha if item deleted
V1CO complexity	6.5303	3.6098	0.8053
V2CO actions	6.6591	1.3867	-1.1694
V3CO attitudes	6.4470	1.8216	-0.6880
Alpha = 0.0071			Standardized item alpha = 0.0488

Table 6.6 Alpha test for variables V1, V2, V3 (Client Organization Consistency)

The test shows in table 6.6 that consistency of client organization- complexity variables (V1) is not compatible with the other variables (V2, V3 client organization consistency-action, and client organization-attitude). The results indicated that the

level of Alpha would increase to (0.8053) if V1 was deleted. (Note, that a reliability coefficient of **0.80** or higher is considered as "acceptable" in most Social Science applications). Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient and lower thresholds are sometimes used.

	Scale Mean if item deleted	Scale Variance if item deleted	Alpha if item deleted
V5CO proficiency	3.2803	1.0735	Nil
V6CO experience	3.0303	1.1136	Nil
Alpha = 0.5466			Standardized item alpha = 0.5467

Table 6.7 Alpha test for variables V5 and V6 (Client Organization Proficiency)

The test shows in table 6.7 that Alpha scores 0.5466, which means it is not high reliability.

	Scale Mean if item deleted	Scale Variance if item deleted	Alpha if item deleted
V7CPMAC	3.5985	0.8681	Nil
V8CPMATT	3.4697	0.9533	Nil
Alpha = 0.9115			Standardized item alpha = 0.9120

Table 6.8 Alpha test for variables V7 and V8 (Client Project Manager Consistency)

The test shows in table 6.8 that Alpha scores 0.9115, which means it is a very high reliability.

	Scale Mean if item deleted	Scale Variance if item deleted	Alpha if item deleted
V10CPM proficiency	3.6894	0.8570	Nil
V11CPM experience	3.3106	1.0249	Nil
Alpha = 0.6227			Standardized item alpha = 0.6245

Table 6.9 Alpha test for variables V10and V11 (Client Project Manager Proficiency)

The test shows in table 6.9 that Alpha scores 0.6227, which means it is not high.

The conclusion of conducting Alpha test shows that most of the independent variables are on low reliability except for V1. Therefore, the study would proceed by following the original hypothesis structure, which meant reverting to 11 independent variables.

6.3.5 Results of correlation on all projects

Pearson correlation coefficient 'r' was conducted for all projects (132) regardless of their procurement types. The data were recorded using Microsoft Excel in the first instance and then imported into the SPSS package for manipulation and analysis.

The following table 6.10 shows a summary of analysis results:

Variables	Time		Cost		Functionality	
	CO	CPM	CO	CPM	CO	CPM
V1complexity Consistency			0.255** 0.003			
V2 action Consistency	-0.277** 0.001		-0.263** 0.002		0.227** 0.009	
V3 attitude Consistency	-0.241** 0.005		-0.271** 0.002		0.222* 0.010	
V4 Continuity			0.176* 0.044			
V5 Proficiency			-0.216* 0.013		0.261* 0.002	
V7 action Consistency				-0.282** 0.001		0.264** 0.002
V8 attitude Consistency		-0.184* 0.035		-0.300** 0.000		0.313** 0.000
V10 Proficiency				-0.283** 0.001		0.299** 0.000
V11 Experience						0.321** 0.000

Table 6.10 Summary correlation for all projects

6.3.6 Partial correlation based on procurement types

As explained in Chapter Four (see section 4.5), it was considered likely that the procurement basis of the projects may have been a significant factor in their outcomes. Hence, the second correlation analyses were concluded by dividing projects by their procurement types, which were summarized into (1) traditional lowest bid, T/L (2) traditional negotiated, T/N (3) design and build lowest, DB/L (4) design and build negotiated, DB/N. The summary results were as follows:

Table 6.11 shows results for traditional lowest bid with 68 projects.

Variables	Time		Cost		Functionality	
	CO	CPM	CO	CPM	CO	CPM
V1complexity Consistency			0.270* 0.026			
V2 action Consistency	-0.392** 0.001		-0.248* 0.042			
V3 attitude Consistency	-0.317** 0.008		-0.255* 0.036			
V4 Continuity					-0.313** 0.009	
V8 attitude Consistency		-0.242* 0.047				0.273* 0.024
V10 Proficiency						0.292* 0.016
V11 Experience						0.444** 0.000

Table 6.11 Summary correlation by procurement type T/L

Table 6.12 shows results for traditional negotiated bid with 18 projects.

Variables	Time		Cost		Functionality	
	CO	CPM	CO	CPM	CO	CPM
V3 attitude Consistency			-0.522* 0.026			
V8 attitude Consistency				-0.593** 0.009		
V11 Experience				-0.591** 0.010		

Table 6.12 Summary correlation by procurement type T/N

Table 6.13 shows results for design build lowest bid with 24 projects.

Variables	Time		Cost		Functionality	
	CO	CPM	CO	CPM	CO	CPM
V1 complexity Consistency			0.408* 0.048			
V4 Continuity	0.448* 0.028		0.511* 0.011			
V11 Experience				0.471* 0.020		

Table 6.13 Summary correlation by procurement type DB/L

Table 6.14 shows results for design build negotiated bid with 22 projects.

Variables	Time		Cost		Functionality	
	CO	CPM	CO	CPM	CO	CPM
V6 Experience	0.481* 0.024					
V8 action Consistency						0.465* 0.029
V10 Proficiency						0.447* 0.037

Table 6.14 Summary correlation by procurement type DB/N

6.4 Summary

Chapter Six deals with the data collection, results and analysis. It has presented the data collection strategy, which was based on a survey of completed projects as the main source of data. Response rates were indicated, which provided for appropriate data collection, analysis and critical evaluation of the results. Next the chapter presented some of the results of the survey, including a general description of the data, the identification of the projects' procurement types, and types of respondent. Finally it has presented an analysis of the data using SPSS software.

CHAPTER 7: DISCUSSION

7.1 Introduction

In Chapter Six the data collection process, results and analysis were presented. Chapter Seven will examine and discuss these results in more detail. The discussions are divided into two groups: the first presents the associations between variables for *all projects* regardless of type of procurement; whilst the second is related to the associations according to their *procurement types*.

7.2 Discussion

The following discussion will examine the hypothesized associations shown in table 6.5 in the light of the actual results of the empirical survey. In this discussion there is particular emphasis on associations that were found to be stronger and/ or more significant. As noted above, these discussions are in two parts. First, associations are highlighted for *all projects*, which are shown in table 7.1, and then projects are split according to *procurement type*, which are shown in tables 7.2, 7.3, 7.4 and 7.5. The details of these results are in appendices number (B, C, D, E and F).

The number of data points that are related to each type of discussion is classified as follows:

- 132 data points for all projects (31 projects)
- 68 data points for traditional lowest bid (15 projects)
- 18 data points for traditional negotiated (4 projects)
- 24 data points for design and build lowest bid (6 projects)
- 22 data points for design and build negotiated (6 projects)

7.2.1 Results of all projects

The following table is a reminder of the discussion relating to the hypothesized associations shown originally in table 6.5. Table 7.1 shows the actual association from the empirical survey for *all projects* regardless of their procurement types. Associations have been expressed in terms of the Pearson correlation between variables (r) and the significance observed level (p) of the results. Data were presented by using the SPSS statistical software package.

Independent Variable		**Dependent Variables**		
Code	***Description***	Time V12	***Cost*** ***V13***	***Functionality*** ***V14***
V1	CO Consistency Complexity	Pearson (r) 0.121 Sig. (p) 0.167	0.255** 0.003	0.023 0.792
V2	CO Consistency Actions	-0.277** 0.001	-.0263** 0.002	0.227** 0.009
V3	CO Consistency Attitudes	-0.241** 0.005	-0.271** 0.002	0.222* 0.010
V4	CO Continuity	0.057 0.516	0.176* 0.044	-0.061 0.488
V5	CO Proficiency	-0.155 0.077	-0.216* 0.013	0.261** 0.002
V6	CO Experience	-.002 0.983	-0.012 0.890	0.157 0.002
V7	CPM Consistency Actions	-0.108 0.219	-0.282** 0.001	0.264** 0.002
V8	CPM Consistency Attitudes	-0.184* 0.35	-0.300 0.000	0.313** 0.000
V9	CPM Continuity	0.036 0.682	0.066 0.454	-0.095 0.279
V10	CPM Proficiency	-0.147 0.092	-.0283** 0.001	0.299** 0.000
V11	CPM Experience	0.021 0.808	0.029 0.737	0.321** 0.000

CO: Client Organization
CPM: Client Project Manager
**. Correlation is significant at the 0.01 level (2-tailed)

Table 7.1 Correlation results of all projects

I. Client organisation

Consistency of the client organisation – complexity and cost

There is a moderate positive correlation between consistency of the Client Organisation *complexity* and *cost* of the projects, which indicated that high level of complexity of the client organisation would increase the cost of the project. On the other hand a more unified organisation might assist in keeping costs on budget.

Consistency of the client organisation - actions and time

The results show that there is a moderate negative correlation between Client Organisation (CO) *actions* and *time*, reflecting the fact that a higher level of consistent actions by the client organisation would result in the project being more likely to be on schedule. Consistent actions by the CO are linked to the stability of the organisation especially in the construction sector where the level of stability in most cases is an indication of a reliable organisation. In this sort of organisation contractors are not recipients of daily random decisions from their client organisation, which might affect the progress of their work.

Consistency of the client organisation - actions and cost

The results illustrate that there is a moderate negative correlation between Client Organisation *actions* and *cost*, which suggests that if there is a high level of consistent action by the client organisation, then as a result, the cost of the project would be kept to budget, and that where this is not the case, increased cost might occur.

Consistency of the client organisation - actions and functionality

The results indicate a moderate positive correlation between Client Organisation *actions* and *functionality*, which suggests that if there is a high level of consistent action by the client organisation, then as a result, functionality of the project would be improved.

Consistency of the client organisation - attitudes and time

The results demonstrate that there is a moderate negative correlation between Client Organisation *attitudes* and *time*. This suggests that if there is a high level of consistent

attitudes with the client organisation, then as a result, duration of the project would be kept on schedule.

Consistency of the client organisation - attitudes and cost

There was a moderate negative correlation between Client Organisation *attitudes* and *cost*, which reflects the effect on budget of this factor also.

Consistency of the client organisation - attitudes and functionality

The results show that there is a positive correlation between Client Organisation *attitudes* and *functionality*. As a result a high level of consistent client organisation attitudes would improve the functionality of the project.

Continuity of the client organisation and cost

The results indicate a positive correlation between *continuity* of the client organisation and *cost* of the projects, which suggests that if there is a high level client organisational change then as a result, cost of the project might increase.

Proficiency of the client organisation and cost

The results show a negative correlation between client organisation *proficiency* and *cost*. If there were a high level of proficiency within the client organisation, then as a result, the cost of the project would be maintained within budget.

Proficiency of the client organisation and functionality

The results show a moderate positive correlation between client organisation *proficiency* and *functionality*. If there is a high level of proficiency within the client organisation, then as a result, functionality of the project would be improved. Proficient organisations are expected to take decisions as early as possible when it is related to decision-making actions and manage all contractual matters with open communication with the rest of the construction team.

Discussion

The results of this section appear, therefore, to support the working hypotheses to a certain extent, and concur with the findings of Smith and Wilkins (1996) who found that interactions and interrelationships between the main participants of any construction projects mostly decide the overall performance of a construction project. It is also supported by the findings of Liu and Walker (1998) who concluded that the performance of individual participants remains important because overall project performance is a function of the performance of each participant. Nkado (1991) who indicated that the attainment of successful project completion initially stipulated within the contract, is a wide responsibility that often exceeds the direct responsibility of the individual parties.

II. Client project manager

Consistency of the client project manager – action and cost

The results show that there is a moderate negative correlation between consistency of Client Project Manager (CPM) *actions* and *cost*, implying that if there is a high level of consistent actions by the client's project manager, then as a result the project would be more likely to be kept to budget. In keeping the cost of the project within its original financial resources, it is anticipated by the contractor that client project manager is consistent in his/her actions with the rest of the construction team, especially the contractor.

Consistency of the client project manager – action and functionality

The results give a strong positive correlation between Client Project Manager *actions* and *functionality*, which explained that if there is a high level of consistent actions by the client project manager then as a result the functionality of the project would be improved.

Consistency of the client project manager - attitudes and time

The results demonstrate a negative correlation between Client Project Manager *attitudes* and *time*. If there is a high level of consistency of attitude demonstrated by the client project manager then as a result duration of the project would be managed to be on schedule.

Consistency of the client project manager – attitudes and functionality

The results suggest a moderate positive correlation between Client Project Manager *attitudes* and *functionality*. A high level of consistent attitudes by the client project manager tends to assist functionality of the project.

Proficiency of the client project manager and cost

There was a moderate negative correlation between Client Project Manager *proficiency* and *cost*, implying that higher levels of client project manager proficiency would keep cost within budget.

Proficiency of the client project manager and functionality

There was a strong positive correlation between Client Project Manager *proficiency* and *functionality*. This suggests that the functionality of the project would improve and that proficiency is an important factor in ensuring that the project fulfils the criteria for which it was constructed.

Experience of the client project manager and functionality

The results show that there is a strong positive correlation between the *experience* of the Client Project Manager and *functionality*. The experience of the project manager appears to be a key factor in project functionality.

Discussion

In general, there are slightly higher associations in *client organisation* compared with *client project manager* in terms of their effect on time, cost and functionality. The results show that the quality of client project manager in terms of his/her consistent

actions and *attitudes* appears to have a slightly less effect than client attributes in managing building projects successfully.

One of the questions that might arise here is, how can individuals gain skills and knowledge? Obviously, most of these skills are obtained through the academic institutions. Traditionally, degree programmes for construction and engineering for project mangers reflect technological content. In order to retain their position in the industry, construction project managers often rely on various learning activities that can help them to fulfil their obligations, both in the construction sector and non-construction. Bentil (1996) addressed the need and the importance of training for construction project managers, as it is one of the tools to improve their skills.

Grant *et al.* (1997) established the importance of technical proficiency to project managers. Their study also examined the influence of several personal and situational factors on the apparent importance of technical proficiency. The factors included: project manager experience level, the amount of technical education completed by the project manager, level of technology engaged in the project, the phase of the project, and the standard of the project team. Their results concluded that the apparent importance of technical proficiency did not vary by level of experience, though project managers who acquired more technical education perceived technical proficiency to be more important. However, technical proficiency was supposed to be of more importance during the early phases of the acquisition process.

Furthermore, technical proficiency was perceived to be more important for managers of extremely good teams than it was to managers of reasonably good teams. Edum-Fotwe and McCaffer (2000) presented the outcome of a survey that examined how construction project mangers gained and developed the necessary skills and knowledge for practice. They outlined the generic areas of knowledge construction project managers are usually expected to acquire by various authorising bodies; this is summarized as follows:

1. *Integration*; includes plan development, plan execution and overall change control

2. *Time*; includes activity definition, activity sequencing, activity duration estimating, schedule development and schedule control

3. *Cost*; includes resource planning, cost estimating, cost budgeting and cost control

4. *Procurement*; includes procurement planning, solicitation planning, solicitation, source selection, contract administration and contract close-out

5. *Quality*; includes quality planning, quality assurance and quality control

6. *Communication*; includes communication planning, information distribution, performance reporting and administrative closure

7. *Risk*; includes risk identification, risk quantification, risk response development and risk response control

8. *Scope*; includes initiation, scope planning, scope definition, scope verification and scope change control

9. *Human Resources*; includes organizational planning, staff acquisition and team development

Their findings indicated that professional proficiency in project management is attained by the combination of knowledge acquired during training, and skills developed through experience and the application of the acquired knowledge.

In the space programme, Sayles and Chandler (1971) emphasised the role of the project manger in this complicated project by pointing that his contribution is at two administrative extremes. Firstly, the project manager seeks to establish an organizational structure, which will be relatively self-maintaining. Secondly, he seeks to facilitate the operations of the structure by suitably timed forward or drawn back. But, for the most part, he does not operate the structure; a variety of functional, line, technical and contractors' groups handle operations. They further stress their role by saying that:

> The project manager acts the rôle of a *marginalist*. He widens or narrows limits, adds or subtracts weights where trade-offs are to be made, speeds up or slows down actions, increases the emphasis on some activities and decreases the emphasis on others. He cannot make very many of the decisions himself because of the time factor, and because he is not empowered to do so- that power resides in the line and functional groups in most cases
>
> (Sayles and Chandler 1971; p.209)

7.2.2 Results by procurement types

As described in Chapter Five[9], the importance of procurement type was considered as a possible source of influence in the surveyed projects. The types of procurement that were used in the related projects were as follows:

- Traditional lowest bid T/L
- Traditional negotiated T/N
- Design and build lowest DB/L
- Design and build negotiated DB/N

Therefore, the following discussion will examine the hypothesized association shown in table 6.5 in the light of the actual results of the empirical survey in relation to their procurement types.

Traditional lowest bid procurement, T/L

Within the traditional procurement method, as indicated by Morledge and Sharif (1996), design should be completed before tenders are invited and the main construction contract is let. As a result, with a condition that no changes are established, costs of the construction can be determined with reasonable certainty before construction starts.

In their procurement guide, The Royal Institution of Chartered Surveyors, RICS, (1996) emphasised the role of the client in traditional procurement and they indicated two major points: (1) clients take the responsibility and risk for design team performance whilst the contractor assumes responsibility and financial risks for the building works. Therefore, if there were a delay or failure by the design team to meet contractor's obligations, then the contractor may claim against the client for additional costs and/or time to complete the project. (2) Clients have the ability to influence the development of the design to meet their requirements because they have direct contractual relationships with the design team. When construction starts, they usually have a single contractual relationship with their main contractor and therefore are able to influence the construction process.

[9] Chapter 5, section 5.6

The main disadvantages of the traditional strategy are: (1) open to a level of abuse that might lead to less certainty; (2) overall programme may be longer than other strategies as there is no parallel working; (3) contractor not involved in design or planning (reduce buildability); (4) often results in adversarial relationships developing during a project.

The following discussion will examine the hypothesized associations shown in table 7.2 in the light of the actual results of procurement type *traditional lowest* bid.

Independent Variable		**Dependent Variables**		
Code	***Description***	***Time V12***	***Cost V13***	***Functionality V14***
V1	CO Consistency Complexity	Pearson (r) 0.082 Sig. (p) 0.504	0.270* 0.026	-0.012 0.922
V2	CO Consistency Actions	-0.392** 0.001	-0.248* 0.042	0.237 0.052
V3	CO Consistency Attitudes	-0.317** 0.008	-0.255* 0.036	0.237 0.051
V4	CO Continuity	0.025 0.841	0.100 0.419	-0.313** 0.009
V5	CO Proficiency	-0.201 0.099	-0.213 0.081	0.173 0.159
V6	CO Experience	0.019 0.880	0.016 0.895	0.187 0.126
V7	CPM Consistency Actions	-0.205 0.094	-0.184 0.133	0.227 0.062
V8	CPM Consistency Attitudes	-0.242* 0.047	-0.181 0.140	0.273* 0.024
V9	CPM Continuity	0.005 0.968	0.098 0.425	-0.152 0.215
V10	CPM Proficiency	-.0100 0.415	-0.221 0.070	0.292* 0.016
V11	CPM Experience	0.058 0.640	0.075 0.545	0.444** 0.000

CO: Client Organization
CPM: Client Project Manager
**. Correlation is significant at the 0.01 level (2-tailed)

Table 7.2 Correlation results by procurement type T/L

I. Client organisation

Consistency of the client organisation - complexity and cost

There is a moderate positive correlation between consistency of the Client Organisation *complexity* and *cost* of the projects, where high level of complexity of the client organisation would increase the cost of the project. On the other hand a more unified organisation might serve to keep costs on budget.

Consistency of the client organisation - actions and time

The results explain that there is a moderate negative correlation between consistency of the Client Organisation *actions* and *time* of the projects, where a high level of consistent actions of the client organisation would tend to result in the project being nearer schedule.

Consistency of the client organisation - actions and cost

There is a negative correlation between consistency of the Client Organisation *actions* and *cost* of the projects, where high level of consistent actions of the client organisation would tend to result in the cost of the projects being on budget.

Consistency of the client organisation - attitudes and time

The results show that there is a moderate negative correlation between CO consistency *attitudes* and *time* of the projects, reflecting the fact that a higher level of consistent attitudes of the client organisation would result in the project being more likely on schedule.

Consistency of the client organisation - attitudes and cost

The results illustrate that there is a negative correlation between CO consistency *attitudes* and *cost* of the projects, which suggests that if there is a high level of consistent attitudes within the client organisation, then as a result, the cost of the project would be kept to budget.

Continuity of the client organisation and functionality

The results indicate a moderate negative correlation between *continuity* of the client organisation and *functionality* of the projects, which suggests that if there is a higher level of the client organisation changes then as a result, functionality of the project might decrease.

II. Client project manager

Consistency of the client project manager - attitudes and time

The results show that there is a negative correlation between *consistency* of the Client Project Manager *attitudes* and *time* of the projects, implying that if there is a high level of consistent attitudes of the client project manager then as a result the project would be better kept on schedule.

Consistency of the client project manager - attitudes and functionality

There is a positive correlation between consistency of the CPM *attitudes* and *functionality* of the projects, which explains why a higher level of consistent attitudes of the client project manager would manage to improve project functionality.

Proficiency of the client project manager and functionality

The results demonstrate a positive correlation between *proficiency* of the client project manager and *functionality* of the projects. If there is a high level of proficiency played by the client project manager, then as a result, functionality of the project might improve.

Experience of the client project manager and functionality

The results suggest a strong positive correlation between CPM *experience* and *functionality* of the projects. Higher levels of client project manager experience tend to improve project functionality.

Discussion

Within this procurement type (traditional tender lowest bid) the client organisation and client project manager are seen to play an important role. Results indicate that a more

unified organisation might assist to keep costs on budget, as would be expected where only a few decision-making staff were involved. For a complex organisation the case is completely different.

Lowest bid procurement is intended to keep duration and cost within the approved schedule and budget, but this is conditional upon the client not making any changes to the scope of the project. Furthermore, continuity of client organisation might assist in improving functionality of its project, where a different outcome might appear if a large number of changes in the organisation occur. This finding supported the results of Gold and Woodliffe (2000) who concluded that the continuity of client contributes to a successful project.

For the client project manager, the results show that his/her consistent attitude manage to reduce project duration and improve functionality; further, that proficiency and experience of the client project manager have a great impact on functionality. This finding supports the outcome of Kimmons (1990) who studied the effect of engineering proficiency on different companies. His findings indicate that the proficiency of the engineering discipline leaders is a crucial factor in the ultimate success of project execution.

Comparing results from *traditional procurement* with the finding from *all projects*, it appears that client organisation and client project manager *actions* and *attitudes* in relation to *time* of the projects are most likely having the same correlation figures in both (moderate negative correlation).

As for *cost*, in *traditional lowest* situations, bid less correlation was found between client organisation actions and attitudes than for *all projects*. It may be the case that the actions and attitudes of the client organisation are not directly affecting the parties involved on site. Where *complexity* of the client organisation appears only in *traditional* projects, in which this could be explained that the size of the surveyed projects is less than in *all projects*. Client project manager appears not to affect cost in traditional compared to all projects, where consistent *actions* and high level of *experience* CPM would keep cost on budget, these could be an indication that the role of CPM in all projects are more essential than in traditional.
Functionality of the project is subjected to the affect of CO and CPM in all projects rather than traditional, which explained that the procurement type might cause this, one

exception to this in traditional, where *continuity* of CO has moderate negative correlation on functionality, which suggested that high level of changes in CO might decrease functionality. The role of CPM appears to be less in effecting project outcomes in traditional than all projects.

Traditional negotiated bid procurement, T/N

Under traditional and negotiated procurement, both client and contractor in advance are more likely to have agreed the time and cost of their project together. The expectation would be that increasing duration and cost would be kept to a minimum (conditional upon the fact that client/ or his agents would not make any changes after construction starts).

The following discussion will examine the hypothesized association shown in table 7.3 in the light of the actual results of procurement type *traditional negotiated* bid.

Independent Variable		**Dependent Variables**		
Code	***Description***	***Time V12***	***Cost V13***	***Functionality V14***
V1	CO Consistency Complexity	Pearson (r) 0.442 Sig. (p) 0.066	0.409 0.092	0.068 0.787
V2	CO Consistency Actions	-0.249 0.318	-0.213 0.396	-0.141 0.576
V3	CO Consistency Attitudes	0.082 0.748	-0.522* 0.026	-0.120 0.635
V4	CO Continuity	-0.066 0.796	-0.098 0.698	0.257 0.304
V5	CO Proficiency	0.062 0.806	0.209 0.405	-0.159 0.528
V6	CO Experience	-0.032 0.899	-0.259 0.300	-0.251 0.316
V7	CPM Consistency Actions	0.064 0.801	-0.370 0.131	-0.238 0.342
V8	CPM Consistency Attitudes	0.042 0.869	-0.593** 0.009	-0.203 0.419
V9	CPM Continuity	0.128 0.613	-0.035 0.890	-0.028 0.911
V10	CPM Proficiency	-0.187 0.459	0.058 0.820	-0.042 0.869
V11	CPM Experience	-0.400 0.100	-0.591** 0.010	-0.075 0.769

CO: Client Organization CPM: Client Project Manager
**. Correlation is significant at the 0.01 level (2-tailed)

Table 7.3 Correlation results by procurement type T/N

I. Client organisation

Consistency of client organisation – attitudes and cost

The results show a negative correlation between consistency of the client organisation *attitudes* and *cost* of the projects, which reflects the effect of this factor on budget.

II. Client project manager

Consistency of client project manager – attitudes and cost

The results demonstrate that there is a moderate negative correlation between consistency of the Client Project Manager *attitudes* and *cost* of the projects, which suggests that if there is a high level of consistent attitudes by the client project manager then as a result the cost of the project would be kept to budget.

Experience of client project manager and cost

The results give a moderate negative correlation between Client Project Manager *experience* and *cost* of the projects, reflecting that a higher level of client project manager experience would assist to keep cost within budget.

Discussion

The results from this type of procurement indicated that the influence of client organisation and client project manager is limited to only three associations. Client organisation attitudes have a slight affect upon cost of projects, where client project manager attitudes and experience have a moderate connection in managing project cost to its budget limit.

Comparing results from *traditional negotiated* with the finding from *all projects*, the following appears:

- As for *time* and *functionality* of the projects, there are no connections between CO and CPM in *traditional negotiated.*

- For *cost* of the projects, the influence of the client organisation is far less in *traditional negotiated* than *all projects*, where there is only a negative correlation between consistency of CO *attitudes* and *cost*. These suggest that the effect of CO on traditional negotiated is more unlikely to occur, and that might be explained by the fact that in this procurement strategy it was assumed that most of the project details were already agreed upon between clients and contractors.

- The *attitudes* and *experience* of the client project manager in traditional negotiated situations appear to affect cost. It appears that within this sort of procurement type, attitudes and experience of the CPM have a great impact on reducing or/-keeping cost to budget.

Design and build lowest bid DB/L

Under a design and build strategy, a single contractor assumes the risk and responsibility for designing and building the project, in return for a fixed price lump sum. As a consequence of design risks being transferred to contractor, the client loses some control over the project.

The following discussion will examine the hypothesized association shown in table 7.4 page 123, in the light of the actual results of procurement type *design and build lowest* bid.

I. Client organisation

Consistency of client organisation complexity and cost

The results illustrate a positive correlation between consistency of the Client Organisation *complexity* and *cost* of the projects. If there is a high level of complexity within the client organisation, then as a result, cost of the project might be increased.

Independent Variable		Dependent Variables		
Code	*Description*	*Time V12*	*Cost V13*	*Functionality V14*
V1	CO Consistency Complexity	Pearson (r) 0.345 Sig. (p) 0.098	0.408* 0.048	0.141 0.512
V2	CO Consistency Actions	0.020 0.927	-0.071 0.742	0.118 0.583
V3	CO Consistency Attitudes	0.112 0.602	0.013 0.951	0.095 0.659
V4	CO Continuity	0.448* 0.028	0.511* 0.011	0.175 0.415
V5	CO Proficiency	0.048 0.823	0.051 0.812	0.198 0.353
V6	CO Experience	0.081 0.705	0.137 0.522	0.356 0.088
V7	CPM Consistency Actions	0.054 0.803	0.029 0.894	0.180 0.401
V8	CPM Consistency Attitudes	0.053 0.804	0.022 0.920	0.217 0.307
V9	CPM Continuity	0.302 0.152	0.316 0.132	0.005 0.981
V10	CPM Proficiency	-0.029 0.894	0.015 0.946	-0.067 0.757
V11	CPM Experience	0.374 0.072	0.471* 0.020	0.385 0.063

CO: Client Organization
CPM: Client Project Manager
**. Correlation is significant at the 0.01 level (2-tailed)

Table 7.4 Correlation results by procurement type DB/L

Continuity of client organisation and time

The results indicate a positive correlation between *continuity* of the Client Organisation and *time* of the projects. This suggests that if there is a high level change within the client organisation then as a result, duration of the project might increase.

Continuity of client organisation and cost

The results show that there is a positive correlation between *continuity* of the Client Organisation and *cost* of the projects, which serves to explain that where a high level of change within the client organisation exists then as a result cost of the project might increase.

II. Client Project Manager

Experience of Client Project Manager and cost

The results demonstrate that there is a positive correlation between the *experience* of the Client Project Manager and *cost* of the projects, reflecting that a high level of client project manager experience might contribute to an increase in the cost of the projects (*contradicting the hypothesis*).

Discussion

The results from *design and build lowest procurement* projects (DBL) indicated that the influence of client organisation and client project manager is limited to only four associations; this could be clarified by the assumption of the effect of procurement type, which limited the influence of client to least. Client organisation *complexity* has a slight effect upon the cost of projects, which could be envisaged in that a complex organisation is a problem in itself where different objectives of stakeholders might contradict during the progress of construction.

The first contradiction in results of this study came from the association between the *experience* of client project manager and the *cost* where a high level of experienced client project manager would manage to increase the cost of the project. In design and build procurement, designing and building the project is the responsibility of the contractor, therefore, the client has less influence on the project, but for this case it could be argued that the experienced client project manager may have intervened to improve and raise up the standard of the project, resulting in increased costs.

Comparing results from *design and build lowest* with the findings from *all projects* it appears that the influence of the continuity of client organisation upon duration and cost of the projects are more crucial in *DBL* than *all* projects. The results also indicate that a higher level of change within the client organisation results in increased project duration and costs. Furthermore, complexity of client organisation has impacted more upon the cost of the project in *DBL* than *all* projects, reflecting that complexity of the client organisation is a vital factor in DBL, even though design and building is the responsibility of the contractor and a single client has less and less influence over the

project. For a complex organisation this might not be the case, where different concerns appear to emerge within that organisation.

Functionality of the project is not affected by any means from the client organisation and client project manager in *DBL* than *all* projects, reflecting that in design and build procurement strategy, the functionality of the project is not a big concern from both client and contractor. It could be argued that in DB most of the technical and financial matters are already agreed upon between clients and contractors, and it is the contractors responsibility to ensure that functionality is achieved through contract documentation. In *all* projects, it is not the case that functionality is a critical issue, most of the client organisation and client project manager related variables are connected to affect the functionality of their projects.

A 1992 guideline document by Treasury Central Unit on Procurement (Smit, 1995) noted that D&B had advantages in terms of cost and time certainty, and a single point for project responsibility and damages recovery. Miles (1996) indicated that D&B removes the 'check and balance' between the design professional and constructor. Banwell (1964) recommended greater cooperation between the design and construction processes. According to CIOB (1988) D&B appears to achieve this recommendation by reporting that some D&B contractors removed departmental barriers by creating multi-disciplinary teams in order to become more client focused.

Design and build negotiated bid DB/N

The following discussion will examine the hypothesized association shown in 7.5 page 125, in the light of the actual results of procurement type *design and build negotiated* bid.

I. Client organisation

Experience of client organisation and time

The results show a positive correlation between the *experience* of the Client Organisation and *time* of the project, where high level of experienced client organisation increased duration of the project (*this is against the hypothesis*).

Independent Variable		Dependent Variables		
Code	*Description*	*Time V12*	*Cost V13*	*Functionality V14*
V1	CO Consistency Complexity	Pearson (r) 0.336 Sig. (P) 0.126	-0.070 0.757	0.229 0.306
V2	CO Consistency Actions	-0.209 0.350	-0.339 0.123	0.179 0.425
V3	CO Consistency Attitudes	-0.319 0.147	-0.304 0.168	0.135 0.549
V4	CO Continuity	-0.005 0.982	0.149 0.509	0.165 0.464
V5	CO Proficiency	-0.088 0.696	0.021 0.926	0.152 0.500
V6	CO Experience	0.481* 0.024	-0.104 0.646	-0.028 0.902
V7	CPM Consistency Actions	0.091 0.688	-0.256 0.250	0.259 0.245
V8	CPM Consistency Attitudes	0.048 0.831	-0.132 0.560	0.465* 0.029
V9	CPM Continuity	-0.067 0.768	0.136 0.545	0.048 0.831
V10	CPM Proficiency	0.202 0.368	0.098 0.665	0.447* 0.037
V11	CPM Experience	0.349 0.112	-0.151 0.502	0.164 0.466

CO: Client Organization
CPM: Client Project Manager
**. Correlation is significant at the 0.01 level (2-tailed)

Table 7.5 Correlation results by procurement type DB/N

II. Client project manager

Consistency of Client Project Manager – attitudes and functionality

The results illustrate a positive correlation between the consistency of the Client Project Manager *attitudes* and *functionality* of the projects, which suggests that the functionality of the project might be improved by the existing of a higher level of consistent attitudes of the client project manager.

Proficiency of Client Project Manager and functionality

The results indicate a positive correlation between the Client Project Manager *proficiency* and *functionality* of the projects, which reflects that a high level of proficiency by the client project manager assists to improve the project functionality.

Discussion

The results relating to design and build negotiated procurement type indicated that the influence of client organisation and client project manager is limited to only three associations.

Contradictory results came from the association between experience of the client organisation and duration of the project, where it appears that high level of experience within the client organisation would increase the duration of the project.

Client project managers show that his/her attitudes and experience have a positive correlation upon functionality where it is found that a high level of consistent attitudes and proficiency within client project managers would manage to improve project functionality.

Comparing results from *design and build negotiate with* the findings from *all projects*. It appears in *DBN* that the influence of the *experience* of client organisation upon duration of the projects is in contradiction with hypothesis and with *all projects*. The effect of client project manager in DBN is less clear, where only two associations appears to be related to the impact of the CPM attitudes and proficiency upon functionality reflecting that attitudes and proficiency of the client project manager assist to improve project functionality. In all projects, functionality is an important factor in evaluating client organisation and client project manager.

Songer *et al.* (1996) conducted a research study in the US and the UK addressing the area of selecting design-build procurement strategies. Their conclusions indicated that clients most often select design-build to shorten duration. Clients justified this by arguing that the single-point of responsibility and the contractors' ability to speed up design and construction that exists in the design-build process will reduce the delivery time. The study concluded that clients evaluate project success in terms of budget variation, schedule variation and conformity to expectations.

Despite these findings, design and build procurement (dependent upon the particular adopted) is subject to these disadvantages: (1) difficult for the client to prepare adequate brief; (2) bids difficult to compare; (3) client driven changes can be expensive; (4) design liability limited by standard contract; (5) less real competition; (6) client needs to commit himself before design is complete; (7) no design overview unless consultants appointed. On the other hand, D&B is accused of not being appropriate for complex or prestige projects (Smit, 1995). For example, Masterman, (1994) indicated that problems exist in valuing variations, allowing sufficient client control over the design, and there often remains for the inexperienced client a necessity to appoint external advisors.

The most frequently expressed concern over using D&B procurement (see for example Ashworth, 1996) is that designs produced by contractors may be attuned to their individual organization and its constraints, more than to the client's needs. Furthermore, New Builder (1993) reported that by adopting D&B, projects lose their purity of design through unnecessary cost cutting methods by contractors. Comparing results between Traditional and Design Build procurement, Moore and Moore (1997) suggested that traditional construction projects are forced to organise on the basis of a contingency strategy due to the high level of uncertainty in such projects. On this basis, it is arguable that a D&B contractor is less affected by that contingency, and may therefore have the opportunity to organise themselves in terms of non-traditional management structure.

7.2.3 Points raised in the second focus group

As described in Chapter 3[10] the purpose of the focus group meeting results would assist to fulfil two functions: first, as an attempt to further validate and refine the model that had previously been populated with survey data; secondly, to assist the contribution of the research work to knowledge, both in practice and in academic terms.

Therefore, the following discussion will cover the main finding shown in table 6.15.

[10] Chapter 3, section 3.3.5

The importance of the research study

As described in Chapter One, the research project aims to investigate, explore and evaluate the dominant client-related factors that influence the various components of project success. Furthermore, to develop a model that reflects the outcomes of empirical study by highlighting the major client-related factors and their association with aspects of project success (namely: time, cost and functionality). These were observed by the one member of the focus group as stated "these are difficult issues"[11]. These comments reflect the uniqueness of the research in which it looks to difficult issues.

Responses and sample quality

The design concept of the research project has been established to combine both qualitative and quantitative approaches. The observations and data collected from the two case studies were undertaken in order to obtain qualitative data, while a structured survey was arranged for the main study to obtain quantitative data. Several meetings with Local Authority staff were held in order to explain the research strategy and the way that they will be involved. Finally questionnaires were prepared and sent to different respondents within the North East councils. This approach meant that better and clearer responses were gained. This led one of the focus group to comment that there was "... Clearer understanding because not just postal questionnaire"[12]. Furthermore, the group noted that there was a good sample of respondents[13]

Effect of procurement types DB and Traditional on Functionality and actions

As described in Chapter Four[14], the importance of the procurement basis of the projects was considered as a possible source of influence in the model. These issues were further discussed in the focus group. One of the members indicated that "in traditional selected tender, the consistency of client actions and attitudes really does have a big impact"[15]. Another commented that "... D+ B takes away that kind of client influence"[16]. One of members expressed his interest to know "... whether D+B

[11] P.3 line 14-15. Appendix H.
[12] P.3 line 30-31. Appendix H.
[13] P.6 line 15-18. Appendix H.
[14] Chapter 4, section 4.5
[15] P.9 line 7-12 and line 17-18
[16] P.10 line 35

projects give inferior functionality than Traditional"[17]. Although this was not an issue within the research scope, it was an interesting point that could be further investigated in future studies. The strong negative correlation between consistent actions of client organisation and time was observed by the focus group[18]. One comment was that "it all makes sense, totally"[19].

Public sector client

One of the issues that was raised is the clients have different levels of expectation, where for example a developer might not want the same sort of functionality as another type of client, but for public projects the picture is a more consistent one, in that they have the same sort of idea of what they want from their projects, because they are more aware of what is needed by the end user than a normal client. This was indicated by a focus group member "Public sector clients are likely to have a better appreciation of what the end user want"[20].

Explanation of how Positive (+ve) and Negative (–ve) correlations works

The SPSS software package used to analyse the data. One of the focus group wondered "how (+ve) and (–ve) correlations expressed in the data"[21]. The sign of the correlation coefficient (+, -) defines the direction of the relationship, either positive or negative. A positive correlation coefficient means that as the value of one variable increases, the value of the other variable increases; as one decreases the other decreases. A negative correlation coefficient indicates that as one variable increases, the other decreases, and vice-versa. An example of how this correlations works was given[22].

Project manager

Many have written in relation to the role of the project manager and it was noted by the group members that "Project Manager (PM) could means a number of things"[23]. This was clarified to mean in this research the Client Project Manager.

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[17] P.4 line 18-21 and 27-30.
[18] P.7 line 4-6
[19] P.7 line15
[20] P.5 line 3-4 and P.11 line 17-20
[21] P.5 line 27-28
[22] P.5 line 29-36
[23] P.6 line 10

Clients' changes

In Chapter 4 section 4.3 and 4.4 a detail descriptive review were presented regarding the effect of client involvement and how excessive variations could led to time and cost overruns. One of the focus group noted that "there may be a vested interest [sc. on the part of the contractor] in how much the client is changing his mind and attitude"[24], this because it raises the possibility of contractual claims. It was noted also by the group that in D+B procurement "clients can't change its mind... the gate is shut on them to an extent"[25].

Continuity of the client

This was one of the independent variables that were used to evaluate how client organisation and client project manager affected project outcomes. In this focus group, it was also noted that "because of the sample type (Local Authority) the factor *continuity* was not likely to be is effective as was in Tripoli Medical Centre and Guys Hospital, because both projects are central government and all committees were changed, but with local government they do it as a job, you are not likely to get so many changes in the team"[26], so it is understandable why continuity does not show up as a big factor in this research.

Project type

One of the questions raised by a member of focus group was "whether data was analysed by project type"[27] for example whether university building is prone to cost or time overruns. It would have been interesting to investigate this if the sample had been big enough from each type, but actually data were analysed: all projects, and by procurement type.

Variations between proficiency and experience

It was noted by one focus group member that "the experience of client organisation and client project manager didn't seem to have any effect on time and cost"[28]. It was

[24] P.7 line 19-20
[25] P.7 line 17
[26] P. 8 line 1-7
[27] P. 8 line 8-9
[28] P. 8 line 13-15

argued that the results show less effect of that factor because the sample type (i.e. all local authorities). Individually there may have been differences in experience. As an operating organisation it is less likely for that factor to show up and it is understandable why there is no such strong correlation.

Indication of procurement preference

Another focus group member raised the question "do they (LA) fall into any specific categories, in terms of what type of project they were"[29]. Which means do certain local authorities prefer DB to other procurement type? The answer was that they were spread equally throughout the study, and to enable such investigation would require a bigger sample.

Sophistication of the client

In relation to the ways clients are selecting their procurement type, a member raised the issue of the relationship between the sophistication of the client and the procurement method. "Those clients that are relatively uncomfortable in terms of the construction process would go for traditional procurement or perhaps Design & Build, and the more sophistication you get, the more you move towards Construction Management procurement type"[30]. All clients were local authorities and it was imagined that they are operating in construction for some time, and therefore wouldn't be more or less sophisticated. They might have different opinions to do with the risk of different procurement methods. Although the research sample is sufficient in terms of the depth of information, required for that sort of information a bigger sample would assist to evaluate why all local authorities did things differently. It was explained that this issue was not really within the scope of the research, but it was interesting for further work.

Best Value legislation

It was noted that Best Value legislation came in recently and a lot of local authorities were pushed into partnering. However the group decided that because the research survey was taken from 1999-2002 and that all project were completed projects, so the legislation would not have had an impact at this stage. What may be interesting for

[29] P. 8 line 26 - 27
[30] P. 8 line 29-33

future research is for the survey to be redone to see if Best Value legislation had had any impact on the procurement type and on the client influence as well[31].

Knowledge gap

On of the speakers asked "How did your results compare with those of others"[32]. The focus team acknowledged that there was a knowledge gap because it was explained that what others had done didn't get into the detail of this research. Others commented that the relationships were very interesting, "you do get surprises"[33]. To sum up, one speaker said "The findings...(include)... many things that haven't being found. They are novel"[34]. The members of the focus group acknowledged that the model would go a considerable way towards enabling clients to improve their decision-making.

7.3 Summary

Chapter seven deals with the discussion of study results. It has highlighted two groups for discussion. Firstly there has been a discussion relating to all projects. Secondly there has been a discussion according to the type of procurement used in each of the projects.

In the first discussion, it appears that in *all projects* both client organisation and client project manager are among the crucial elements in leading the project outcomes to reach its targets. Consistent actions and attitudes of client organisation are linked to result in keeping duration to its schedule, cost to its budget and improving project functionality. Furthermore, the functionality of the projects might be improved by the existence of high level of proficiency within client organisations. For the client project manager, actions, attitudes, proficiency and experience are less likely to impact upon duration of the project, but are vital to assist in reducing cost and improve functionality of the projects.

In the second discussion, it appears that the types of the procurement used in the projects surveyed give the findings another dimension. Under *traditional*

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[31] P. 9 line 19-34
[32] P. 10 line 21
[33] P. 11 line 28
[34] P. 11 line 30

procurement, the effects of the client organization are likely to have a higher impact than the client project manager, which reflects the fact that rôle of the client organisation in this procurement system is central and greater than any other sort of procurement type. Most of the major actions and decisions are taken by the client organisation and the responsibility of the client project manager is to adopt the client's requirements and execute them on site. In *design and build procurement*, the impact of the client organisation and his/her project manager is less observed. This result is in concurrence with other research findings (Smit, 1995; Miles, 1996 and Songe et al. 1996), which indicated that D&B had advantages in terms of cost and time certainty, and a single point for project responsibility.

CHAPTER 8: CONCLUSION AND RECOMMENDATIONS

8.1 Introduction

Chapter Eight re-examines the aims and objectives of the current research, and discusses the research findings in relation to the client organisation and client project manager attributes had affected project outcomes in terms of time, cost and functionality of some public projects in the North East of England. There follows some speculation about how the findings of this research might have impacted on the organisation of Tripoli Medical Centre project. Finally the Chapter presents some limitations of the research and recommendations for taking it further.

8.2 Re-Examination of Aims and Objectives

The aim of the study (re-stated from Chapter 1) was to investigate and evaluate dominant client-related factors that influence the various components of project success. However, the aim has been achieved firstly by studying and evaluating two case studies in Libya and the UK, secondly by reviewing the literature and presenting theoretical framework of client- related attributes, thirdly by developing a model that reflects the outcomes of the empirical study and highlights the major client-related factors and their association with project success.

The objectives of the study are re-stated here for convenience of discussion in this chapter. They were:

1. The definition and evaluation of the dominant client-related factors that influence project success.

2. The development of a model that reflects the outcomes of the empirical study and highlights the major client-related factors and their correlation to project certainty.

3. Advice to enable clients to improve project-related decision-making in terms of project briefing and funding.

The extent to which these objectives have been achieved will now be examined, taking the objectives one at a time.

Objective 1: A theoretical framework for tracing client attributes in building construction has been established in the study through an extensive literature review. The impact of client attributes in building construction is a vital issue. Most of the published papers emphasized how client involvement could affect project outcomes. Few researchers studied the influence of the client attributes in the construction process. In addition, the criteria for measuring project success remains ambiguous, which adds to the complexity of the research. The focus upon the client as the main central factor in this research is the result of both shortcomings and findings of previous work. What has become apparent is that the effect of client organisation and client project manager attributes are important for the successful completion of building projects.

Objective 2: Following the findings from the two case studies and literature review, a model was developed to enable the isolation of key variables. On the client attributes side (independent variables) two main factors were identified: *client organization* (CO) and *client project manager* (CPM). Both independent variables were evaluated in terms of *consistency*, *continuity* and *proficiency*. On the other side (as dependent variables) project outcomes were measured by *time*, *cost* and *functionality*.

Objective 3: The findings indicated that among the factors that contribute to project success- in terms of time and budgetary control, and project functionality- are a number of attributes of the client and his/her project manager. Of particular importance is a unified organisation, with consistency in its actions and attitudes to the project. Excessive changes have the opposite effect. Client and project manager proficiency and experience were also observed as significant. This is further explained in the following section.

8.3 Research findings

The aim of the research was to remedy a gap in the knowledge about investigating the dominant client-related attributes that influence delays, cost overruns and functionality

of large and medium public-sector building projects. This need was addressed by developing a model of dominant client attributes that affected project outcomes. The model's basic propositions were that client attributes fall along four dimensions: consistency, continuity, proficiency and experience.

Gardiner and Simmons (1992) focused on the relationships between the separate components of organizations and they defined them. Using Gardiner and Simmons' approach, two main entities were identified: the *client organization* (CO) and the *client project manager* (CPM). These two discernable entities were each considered in terms of their *consistency*, *continuity* and *proficiency*. On the other side of the model, project outcomes were measured in terms of these dependent variables, namely *time*, *cost* and *functionality*.

There are many parties concerned in any construction project: clients, architects, quantity surveyors, consultants, contractors, subcontractors and suppliers. In building construction, when dealing with the evaluation of how projects perform most of the attention is centred on the contractor, subcontractors and suppliers, leaving clients or their representatives free from scrutiny.

A review of the current state of knowledge (as discussed in Chapter 3) has discovered some published work that has begun to highlight how client involvement could affect project outcomes. These studies are somewhat limited in their scope. Indeed, the criteria for measuring project success are still ambiguous. The selection of the client as the main focus of this research came as a result of this lack of evidence. The research presents a new approach in which client attributes are specifically scrutinized.

The preliminary investigation of the research involved two large-scale case studies of completed health projects in Tripoli Medical Centre, Libya and Guys hospital in London, UK. Both projects were subject to time and cost overruns, and had major administration changes in terms of their client organisations. This is described in Chapter Two.

A review of the literature between 1971 and 2002 produced 16 studies from 12 different countries. An analysis of these studies was undertaken with a view to

categorising the causes of delays they identified. In the 16 studies respondents cited 53 different factors that contribute to delays and these were grouped into four primary categories (*administrative, financial, technical* reasons and *unforeseen* events) and three secondary categories that represent more complex combinations of the four primary ones. The detailed study on the causation of construction delays can also be seen in Chapter Two.

The studies by the National Economic Development Office (NEDO) in 1978 and 1983, recognized that client attributes, and the client's approach to project management, can have significant effects upon achievement of project objectives from the point of view of all the parties involved in the project

At the time of writing, there is a notable example of a project that experienced such difficulties. The Construction of the Scottish Parliament building started in January 1999 and it was anticipated to be complete by July 2001 with a budget £40 million. It is now expected that the project will be handed over in November 2004 and with a final account of £400 million. Investigating these radical changes in time, cost and building quality, a report by the Rt Hon Lord Fraser of Carmyllie on his Inquiry into the Holyrood Building Project (Scottish Parliament) was published in 15th September 2004. The reasons behind the time, cost and quality variances included: cabinet changes; amendment of the brief; an inexperienced project sponsor; client initiated variations; and poor communications between project team and Ministers. These fall within the factors illustrated in the present research study. It is important to stress that clients should consider more carefully their impact on building construction projects, and that clients should learn from past projects.

The study results indicate that the client and his/her project manager are among the essential factors in driving project outcomes. Unified organisation, consistent actions and attitudes of client organisation are connected to keeping to schedule, and within budget and improving project functionality. In addition, a high level of proficient client organisation might assist in improving project functionality. For the client's project manager, actions, attitudes, proficiency and experience are less likely to effect duration of the project, but are critical in reducing cost and improving projects functionality.

It also appears that the procurement types used within the surveyed projects had an influence on the outcomes. Under the traditional procurement route, the involvement of the client organization is likely to have a higher impact than that of the client project manager. The role of the client organisation in this procurement type is vital. Most of the actions and decisions are taken by the client organisation and it is the responsibility of the client project manager to implement client's requirements on site. In design and build procurement, the impact of the client organisation and his/her project manager is less acute. Interestingly, a further criticism of the management of the Scottish Parliament was in the choice of procurement method (Sudjic, D. 2004).

The findings of this study show that clients have a major influence in the successful constructing of public buildings. More consideration has to be taken by clients as to their actions and attitudes when the time comes to deal with the rest of their counterparts during the process of building construction; furthermore, they have to be aware that any changes in their organisation might affect project outcomes. The selection of procurement type is another important issue to keep in mind. Finally, clients should choose their project manager carefully given that consistent actions, attitudes, proficiency and well experience of the project manager are key elements in attaining the successful completion of projects.

These issues were further supported by the findings from the evaluation of the second focus group meeting (as previously discussed in Chapter Seven). Their comments emphasised the importance of this research as it tackled difficult issues and helped to fill a knowledge gap. It has investigated new factors of the client organisation and client project manager attributes namely *consistency*, *continuity* and *proficiency* that might affect project outcomes in terms of *time*, *cost* and *functionality*. Furthermore, the focus group findings indicated that questionnaire responses and sample quality were clear and understandable. They supported the research finding that the procurement type could act as a mediator factor, and that the consistency of the client organisation does have an impact on project outcomes. They further recognized that some factors (*experience* and *proficiency*) did not have such a great effect on the results due to the type of the surveyed samples, which are from local authority projects

This study was initiated by the author's experience in the construction of the Tripoli Medical Centre. At the end of this study, it is worth reflecting on the past. In 1982 when TMC started, it is interesting to imagine what might have happened if the key players had knowledge of some of the findings of this study. The frame and the content of the picture might have been very different; unified, consistent actions and attitudes, a continuous and homogenous client body, highly proficient and well experienced organisation with a high quality, proficient and experienced project manager. This scenario would certainly have given the TMC a better chance of timely completion, reducing cost to budget and improving functionality.

8.4 Theoretical contribution to knowledge

This study has provided an original contribution towards more understanding of how attributes of client organisation and client project manager namely *consistency*, *continuity* and *proficiency* could affect project outcomes in terms of *time*, *cost* and *functionality*. In addition, this study has made an attempt to tackle a difficult issue in terms of the way to measures client consistency (related to complexity, actions and attitudes). The two case studies, the main study and the evolution of the research model for the present research that were designed to take place within public projects in the North East of England, are comprehensibly related, and therefore the aims and objectives of the research project have been attained. It is believed that this study's findings and the model that emerged would assist clients' decision-making. From an academic point of view, the study has produced insights into further and new client attributes that had not been hitherto identified in an area that has not attracted previous researchers. This were supported by the comments of one of the focus group member who said "The present study helps to fill a knowledge gap and their findings are novel"[35]

In addition, the relationships between client organisation, client project manager and project outcomes has provided further insights and grounding for the theorists and researchers in the construction industry to address in more depth.

[35] P. 10 line 21 and P. 11 line 30

8.5 Practical contribution

It should be noted that this study has presented a constructive contribution in enabling clients to improve their decision-making. The uniqueness of the research lies in the understanding of the client organisation and client project manager from the point of view of their *consistency*, *continuity* and *proficiency*. This should enable other member of the construction team (as well as the client himself) to identify the crucial elements of these attributes and make the necessary arrangement to act upon them in the due course. It is considered that the theoretical framework and the research model will provide guidance and facilitate policy-making to address deficiencies that trace back to client attributes. This will assist in developing more appropriate ways of improving client involvement within construction projects.

8.6 Limitations of the study

There were limitations present in the research. Some of these were by design; others became evident as work progressed.

Sample size and study location

The study was limited to a sample of public projects in the North East of England, and the unit of analysis for the research was individual medium–to-large sized construction projects that involved a public-sector (or quasi-public sector) client. In view of the nature of the model and the number of variables, data were sought from around thirty one projects: in order to maximize the response rate all project participants were contacted prior to questionnaires being dispatched.

8.5 Recommendations for further research

The boundary of the current research has been set within the context of a ssmall sample of public construction projects in the North East of England. However, it is hoped that based upon the findings from this study, the current client-related attributes that emerged from this study can be useful in future work. Ideally it would be preferable that major studies would be undertaken in different countries with diverse

economies, possibly including less developed countries, newly developed countries and advanced industrial countries.

It is clear that the relationships studied were complex and multi-dimensional. Three main independent variables were examined: *consistency*, *continuity* and *proficiency*, but further investigations may seek to expose others. Work can proceed on two possible fronts: improving the general model, or investigating its parts in more depth. The interactions within the client organisation were a difficult concept to work with. Furthermore, the relationships and the impact of client organisation upon client project manager is really important for understanding the changing dynamics of some construction projects. Exploring these intra-relations between these types of bodies in a building project would make it an attractive prospect.

Client attributes have a crucial impact on construction projects. By addressing them, this study has made an attempt to contribute to an under-researched area, and outlines the basis of some possible areas for further research as illustrated above.

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APPENDICES

Appendix A: Construction and Health provision in Libya

Construction Industry in Libya

In Libya the construction industry has played a prominent role in economic development, as one would expect in a country largely devoid of infrastructure before the mid-1960s. The construction industry got its start as a result of foreign oil company investment during the 1960s, but since 1969 it has grown in accordance with the government construction projects called for in the successive five-year plans.

In 1975 the government began to reorganize the construction industry to make it more efficient. At that time, there were about 2,000 contractors, many of them small proprietorships or partnerships. The minister of housing was given the authority to merge contracting firms into a smaller number of larger firms capable of carrying out large construction projects. Firms with capital in excess of LD30, 000 (£35, 000) were converted into corporations, and the majority shares were sold to the public or the government. Previously, the government had set up several state-owned construction companies to build factories and to carry out civil engineering projects. Among there were the National Industrial Contracting Company, the General Corporation for the Construction and Maintenance of Roads, and the General Corporation for Civil Works.

The level of construction activities was driven by increasing demand. The many government-sponsored construction projects of the 1970s created a booming industry, so much so that by the end of the decade Libya had become the world's leading per capita consumer of cement. This was a significant economic achievement, particularly because the 1978 housing law effectively had eliminated private residential construction. By 1986 construction supplied about 11 percent of GDP, second only to public services in the nonpetroleum sector.

This growth has however has been curtailed by some setbacks. The construction industry was damaged more than any other sector by the severe cutback in the number of foreign workers in Libya in the mid-1980s. Between mid-1983 and mid-1984, the number of construction workers dropped from 371,000 to 197,000, mainly because of the departure of foreign workers. The cutbacks in development spending, together with the foreign worker evacuation, led to a decline in overall construction. As an illustration, in 1995 the cement industry, which had been expanded during the building boom, was capable of producing 6 million tons a year, but domestic demand had decreased to only 4.5 million tons. Despite these difficulties the construction industry remains, in 2003 among the main employees in Libya.

Health Provision in Libya

The health service in Libya, which can be described as follows:

- Health care is provided free for Libyan citizens.
- Spending on health sector is about 16% of general spending.
- Primary health care is established for every neighbourhood with more than 1000 inhabitants.
- A broad analysis of expenditure in the health provision is;
    1. Salaries 22%
    2. Buildings and Administration 67%
    3. Drugs 11%

- Most of the Health sector is run by the public sector.

The relative scale of expenditure on health relative to GDP is considered in the table A.1, which compare countries in the Middle East region.
The relative position of Libyan investment in health provision as indicated shows that;

- Libya is ranked seventh in the Middle East and northern Africa region from the point of GDP per capita.

- Libya is ranked tenth in the region as total expenditure on health per capita.
- Libya is ranked twentieth in the region compared the total expenditure as percentage from the total GDP.

The Libyan economy is largely dependant upon the income derived from oil exports. The volatility of this market internationally creates economic conditions that are not conducive to stable investment strategic. In the past 20 years the construction of health projects has passed through several stages, from days of quick expansion to a time where a lack of resources forced the state to reconsider even necessary maintenance to hospitals. The impact of this market volatility in terms of increased hospital provision is shown by consideration of government 5-years plan.

Country	GDP per capita (US $) 2001
Emirates	26,643
Qatar	25,599
Bahrain	16,066
Kuwait	15,884
Saudi A.	12,877
Oman	11,474
Libya	8,272
Syria	7,887
Tunisia	7,183
Iran	6,673
Lebanon	5,528
Jordan	4,348
Egypt	3,901
Yemen	2,146
Sudan	1,112

Country	Total expenditure on health per capita (US $2001)
Qatar	650
Emirates	643
Bahrain	345
Saudi A.	280
Oman	353
Iran	181
Lebanon	141
Tunisia	101
Libya	80
Jordan	76
Iraq	72
Morocco	23
Egypt	22
Yemen	7
Sudan	3

Country	Total health expenditure as % of GDP, 2001
Lebanon	12.2
Jordan	9.5
Djibouti	7.0
Tunisia	6.4
Iran	6.3
Saudi A.	4.6
Yemen	4.5
Pakistan	3.9
Emirates	3.5
Sudan	3.5
Syria	3.4
Qater	3.1
Oman	3.0
Libya	2.9
Somalia	2.6

Table A.1 Comparable tables in relation to health expenditure

(Source: World Health Organisation, 2001)

The Libyan economy is largely dependant upon the income derived from oil exports. The volatility of this market internationally creates economic conditions that are not conducive to stable investment strategic. In the past 20 years the construction of health

projects has passed through several stages, from days of quick expansion to a time where a lack of resources forced the state to reconsider even necessary maintenance to hospitals. The impact of this market volatility in terms of increased hospital provision is shown by consideration of government 5-years plan.

In the five-year plan 1976-1980, there was a state interest to build 26 new general and specialized hospitals, 35 rural hospitals, and to develop 15 existing hospitals. The total additional capacity of these developments was 12050 beds, which if added to the existing number of beds at December 1977, which were 12959, brings a new total of 25009.

Due to a decrease in oil prices and the global economic crisis in 1980, GDP in Libya decreased sharply. In response, the government decided to implement tough economic measures. The main outcome of this policy was the cancellation of some construction projects, and the postponing of some others. This has negatively affected the progress of the new health projects in the country. As a sequence the total number of beds by the end of 1998 was 18645, 6364 less than the number expected by the end of 1980. The types and distribution of these hospitals is shown below in table A.2.

Type of hospital	No.
Specialized Hospital	23
Central Hospital	17
General Hospital	19
Rural Hospital	24
Polyclinic	20
Local Clinic	163
Preliminary Health Care	932
Total No of beds	18645

Table A.2 Distribution of Hospitals in Libya

(Source: Ministry of Health Libya, 1985)

The rate of change in health care resources from 1995 to 1999 including staff and building is shown in table A.3 below, whilst the infrastructure has increased, staffing has decreased. The reasons behind that were due to:

- Government decision not to extend foreign staff contracts due to financial problems;
- Government policy that requires recruitment of local staff specially nurses.

Description	1995	1996	1997	1998	1999
No of hospitals	77	79	83	83	83
No of beds	16807	18007	18645	18645	18645
Handicapped hospitals	53	53	53	53	53
No of beds	5195	5195	7633	7633	6793
Private hospitals	8	12	14	16	26
No of beds	300	502	561	620	747
No of medical staff	56763	56763	36137	37380	38639
No of non medical staff	18362	18362	22319	26276	26479
Total no of employees	75125	75125	58456	63656	65118

Table A.3 Number of health care buildings and the employees from 1995-1999
(Source: Ministry of Health Libya, 2000)

This failure to meet targets has resulted in an under performing health services in 2003 as reflected in the annual report of the Libyan Information Centre.

1. There is a need of upgrade and develop the existing Health Services.
2. Evaluating the positives and the negatives of distributing health services on the regional level.

3. The need of revising the recent policy of drugs and medical supply.
4. The need of revising the recent spending policy in the health sector.
5. Analyzing proposals on how to drawback some costs on free health care.
6. The relation between the public sector and the private sector

Appendix B: SPSS reports (1) Correlations for all projects

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Duration
Client Organization Consistency- Complexity	Pearson Correlation	1	-.256**	-.372**	.353**	-.254**	.009	.121
	Sig. (2-tailed)	.	.003	.000	.000	.003	.919	.167
	N	132	132	132	132	132	132	132
Client Organization Consistency- Action	Pearson Correlation	-.256**	1	.679**	-.318**	.523**	.216*	-.277**
	Sig. (2-tailed)	.003	.	.000	.000	.000	.013	.001
	N	132	132	132	132	132	132	132
Client Organization Consistency- Attitude	Pearson Correlation	-.372**	.679**	1	-.339**	.537**	.304**	-.241**
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.005
	N	132	132	132	132	132	132	132
Client Organization Continuity	Pearson Correlation	.353**	-.318**	-.339**	1	-.248**	-.051	.057
	Sig. (2-tailed)	.000	.000	.000	.	.004	.564	.516
	N	132	132	132	132	132	132	132
Client Organization Proficiency	Pearson Correlation	-.254**	.523**	.537**	-.248**	1	.376**	-.155
	Sig. (2-tailed)	.003	.000	.000	.004	.	.000	.077
	N	132	132	132	132	132	132	132
Client Organization Experience	Pearson Correlation	.009	.216*	.304**	-.051	.376**	1	-.002
	Sig. (2-tailed)	.919	.013	.000	.564	.000	.	.983
	N	132	132	132	132	132	132	132
Project Duration	Pearson Correlation	.121	-.277**	-.241**	.057	-.155	-.002	1
	Sig. (2-tailed)	.167	.001	.005	.516	.077	.983	.
	N	132	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation for All Projects
Table B.1 Correlations between CO and Duration

Correlations

		Client Organization Consistency- Complexity	Client Organization Consistency- Action	Client Organization Consistency- Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Cost
Client Organization Consistency- Complexity	Pearson Correlation	1	-.256**	-.372**	.353**	-.254**	.009	.255**
	Sig. (2-tailed)	.	.003	.000	.000	.003	.919	.003
	N	132	132	132	132	132	132	132
Client Organization Consistency- Action	Pearson Correlation	-.256**	1	.679**	-.318**	.523**	.216*	-.263**
	Sig. (2-tailed)	.003	.	.000	.000	.000	.013	.002
	N	132	132	132	132	132	132	132
Client Organization Consistency- Attitude	Pearson Correlation	-.372**	.679**	1	-.339**	.537**	.304**	-.271**
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.002
	N	132	132	132	132	132	132	132
Client Organization Continuity	Pearson Correlation	.353**	-.318**	-.339**	1	-.248**	-.051	.176*
	Sig. (2-tailed)	.000	.000	.000	.	.004	.564	.044
	N	132	132	132	132	132	132	132
Client Organization Proficiency	Pearson Correlation	-.254**	.523**	.537**	-.248**	1	.376**	-.216*
	Sig. (2-tailed)	.003	.000	.000	.004	.	.000	.013
	N	132	132	132	132	132	132	132
Client Organization Experience	Pearson Correlation	.009	.216*	.304**	-.051	.376**	1	-.012
	Sig. (2-tailed)	.919	.013	.000	.564	.000	.	.890
	N	132	132	132	132	132	132	132
Project Cost	Pearson Correlation	.255**	-.263**	-.271**	.176*	-.216*	-.012	1
	Sig. (2-tailed)	.003	.002	.002	.044	.013	.890	.
	N	132	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation for All Projects

Table B.2 Correlations between CO and Cost

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Functionality
Client Organization Consistency- Complexity	Pearson Correlation	1	-.256**	-.372**	.353**	-.254**	.009	.023
	Sig. (2-tailed)	.	.003	.000	.000	.003	.919	.792
	N	132	132	132	132	132	132	132
Client Organization Consistency- Action	Pearson Correlation	-.256**	1	.679**	-.318**	.523**	.216*	.227**
	Sig. (2-tailed)	.003	.	.000	.000	.000	.013	.009
	N	132	132	132	132	132	132	132
Client Organization Consistency- Attitude	Pearson Correlation	-.372**	.679**	1	-.339**	.537**	.304**	.222*
	Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.010
	N	132	132	132	132	132	132	132
Client Organization Continuity	Pearson Correlation	.353**	-.318**	-.339**	1	-.248**	-.051	-.061
	Sig. (2-tailed)	.000	.000	.000	.	.004	.564	.488
	N	132	132	132	132	132	132	132
Client Organization Proficiency	Pearson Correlation	-.254**	.523**	.537**	-.248**	1	.376**	.261**
	Sig. (2-tailed)	.003	.000	.000	.004	.	.000	.002
	N	132	132	132	132	132	132	132
Client Organization Experience	Pearson Correlation	.009	.216*	.304**	-.051	.376**	1	.157
	Sig. (2-tailed)	.919	.013	.000	.564	.000	.	.073
	N	132	132	132	132	132	132	132
Project Functionality	Pearson Correlation	.023	.227**	.222*	-.061	.261**	.157	1
	Sig. (2-tailed)	.792	.009	.010	.488	.002	.073	.
	N	132	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation for All Projects

Table B.3 Correlations between CO and Functionality

Correlations

		Client Project Manager Consistency- Action	Client Project Manager Consistency- Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Duration
Client Project Manager Consistency- Action	Pearson Correlation	1	.838**	-.257**	.600**	.467**	-.108
	Sig. (2-tailed)	.	.000	.003	.000	.000	.219
	N	132	132	132	132	132	132
Client Project Manager Consistency- Attitude	Pearson Correlation	.838**	1	-.243**	.635**	.527**	-.184*
	Sig. (2-tailed)	.000	.	.005	.000	.000	.035
	N	132	132	132	132	132	132
Client Project Manager Continuity	Pearson Correlation	-.257**	-.243**	1	-.126	-.125	.036
	Sig. (2-tailed)	.003	.005	.	.151	.155	.682
	N	132	132	132	132	132	132
Client Project Manager Proficiency	Pearson Correlation	.600**	.635**	-.126	1	.454**	-.147
	Sig. (2-tailed)	.000	.000	.151	.	.000	.092
	N	132	132	132	132	132	132
Client Project Manager Experience	Pearson Correlation	.467**	.527**	-.125	.454**	1	.021
	Sig. (2-tailed)	.000	.000	.155	.000	.	.808
	N	132	132	132	132	132	132
Project Duration	Pearson Correlation	-.108	-.184*	.036	-.147	.021	1
	Sig. (2-tailed)	.219	.035	.682	.092	.808	.
	N	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Correlation for All Projects

Table B.4 Correlations between CPM and Duration

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Cost
Client Project Manager Consistency- Action	Pearson Correlation	1	.838**	-.257**	.600**	.467**	-.282**
	Sig. (2-tailed)	.	.000	.003	.000	.000	.001
	N	132	132	132	132	132	132
Client Project Manager Consistency- Attitude	Pearson Correlation	.838**	1	-.243**	.635**	.527**	-.300**
	Sig. (2-tailed)	.000	.	.005	.000	.000	.000
	N	132	132	132	132	132	132
Client Project Manager Continuity	Pearson Correlation	-.257**	-.243**	1	-.126	-.125	.066
	Sig. (2-tailed)	.003	.005	.	.151	.155	.454
	N	132	132	132	132	132	132
Client Project Manager Proficiency	Pearson Correlation	.600**	.635**	-.126	1	.454**	-.283**
	Sig. (2-tailed)	.000	.000	.151	.	.000	.001
	N	132	132	132	132	132	132
Client Project Manager Experience	Pearson Correlation	.467**	.527**	-.125	.454**	1	-.029
	Sig. (2-tailed)	.000	.000	.155	.000	.	.737
	N	132	132	132	132	132	132
Project Cost	Pearson Correlation	-.282**	-.300**	.066	-.283**	-.029	1
	Sig. (2-tailed)	.001	.000	.454	.001	.737	.
	N	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation for All Projects

Table B.5 Correlations between CPM and Cost

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Functionality
Client Project Manager Consistency- Action	Pearson Correlation	1	.838**	-.257**	.600**	.467**	.264**
	Sig. (2-tailed)	.	.000	.003	.000	.000	.002
	N	132	132	132	132	132	132
Client Project Manager Consistency- Attitude	Pearson Correlation	.838**	1	-.243**	.635**	.527**	.313**
	Sig. (2-tailed)	.000	.	.005	.000	.000	.000
	N	132	132	132	132	132	132
Client Project Manager Continuity	Pearson Correlation	-.257**	-.243**	1	-.126	-.125	-.095
	Sig. (2-tailed)	.003	.005	.	.151	.155	.279
	N	132	132	132	132	132	132
Client Project Manager Proficiency	Pearson Correlation	.600**	.635**	-.126	1	.454**	.299**
	Sig. (2-tailed)	.000	.000	.151	.	.000	.000
	N	132	132	132	132	132	132
Client Project Manager Experience	Pearson Correlation	.467**	.527**	-.125	.454**	1	.321**
	Sig. (2-tailed)	.000	.000	.155	.000	.	.000
	N	132	132	132	132	132	132
Project Functionality	Pearson Correlation	.264**	.313**	-.095	.299**	.321**	1
	Sig. (2-tailed)	.002	.000	.279	.000	.000	.
	N	132	132	132	132	132	132

**. Correlation is significant at the 0.01 level (2-tailed).

Correlation for All Projects

Table B.6 Correlations between CPM and Functionality

Appendix C: SPSS reports (2) Correlations for Traditional Lowest Bid (T/L) Procurement Type

Correlations

		Client Organization Consistency- Complexity	Client Organization Consistency- Action	Client Organization Consistency- Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Duration
Client Organization Consistency- Complexity	Pearson Correlation	1	-.233	-.271*	.266*	-.230	.147	.082
	Sig. (2-tailed)	.	.056	.026	.028	.059	.233	.504
	N	68	68	68	68	68	68	68
Client Organization Consistency- Action	Pearson Correlation	-.233	1	.712**	-.349**	.551**	.048	-.392**
	Sig. (2-tailed)	.056	.	.000	.004	.000	.699	.001
	N	68	68	68	68	68	68	68
Client Organization Consistency- Attitude	Pearson Correlation	-.271*	.712**	1	-.353**	.503**	.258*	-.317**
	Sig. (2-tailed)	.026	.000	.	.003	.000	.033	.008
	N	68	68	68	68	68	68	68
Client Organization Continuity	Pearson Correlation	.266*	-.349**	-.353**	1	-.213	.010	.025
	Sig. (2-tailed)	.028	.004	.003	.	.081	.938	.841
	N	68	68	68	68	68	68	68
Client Organization Proficiency	Pearson Correlation	-.230	.551**	.503**	-.213	1	.424**	-.201
	Sig. (2-tailed)	.059	.000	.000	.081	.	.000	.099
	N	68	68	68	68	68	68	68
Client Organization Experience	Pearson Correlation	.147	.048	.258*	.010	.424**	1	-.019
	Sig. (2-tailed)	.233	.699	.033	.938	.000	.	.880
	N	68	68	68	68	68	68	68
Project Duration	Pearson Correlation	.082	-.392**	-.317**	.025	-.201	-.019	1
	Sig. (2-tailed)	.504	.001	.008	.841	.099	.880	.
	N	68	68	68	68	68	68	68

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

I. Correlation for Procurement Type T/L

Table C.1 Correlations between CO and Duration

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Cost
Client Organization Consistency- Complexity	Pearson Correlation	1	-.233	-.271*	.266*	-.230	.147	.270*
	Sig. (2-tailed)	.	.056	.026	.028	.059	.233	.026
	N	68	68	68	68	68	68	68
Client Organization Consistency- Action	Pearson Correlation	-.233	1	.712**	-.349**	.551**	.048	-.248*
	Sig. (2-tailed)	.056	.	.000	.004	.000	.699	.042
	N	68	68	68	68	68	68	68
Client Organization Consistency- Attitude	Pearson Correlation	-.271*	.712**	1	-.353**	.503**	.258*	-.255*
	Sig. (2-tailed)	.026	.000	.	.003	.000	.033	.036
	N	68	68	68	68	68	68	68
Client Organization Continuity	Pearson Correlation	.266*	-.349**	-.353**	1	-.213	.010	.100
	Sig. (2-tailed)	.028	.004	.003	.	.081	.938	.419
	N	68	68	68	68	68	68	68
Client Organization Proficiency	Pearson Correlation	-.230	.551**	.503**	-.213	1	.424**	-.213
	Sig. (2-tailed)	.059	.000	.000	.081	.	.000	.081
	N	68	68	68	68	68	68	68
Client Organization Experience	Pearson Correlation	.147	.048	.258*	.010	.424**	1	-.016
	Sig. (2-tailed)	.233	.699	.033	.938	.000	.	.895
	N	68	68	68	68	68	68	68
Project Cost	Pearson Correlation	.270*	-.248*	-.255*	.100	-.213	-.016	1
	Sig. (2-tailed)	.026	.042	.036	.419	.081	.895	.
	N	68	68	68	68	68	68	68

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

I. Correlation for Procurement Type T/L

Table C.2 Correlations between CO and Cost

Correlations

		Client Organization Consistency- Complexity	Client Organization Consistency- Action	Client Organization Consistency- Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Functionality
Client Organization Consistency- Complexity	Pearson Correlation	1	-.233	-.271*	.266*	-.230	.147	-.012
	Sig. (2-tailed)	.	.056	.026	.028	.059	.233	.922
	N	68	68	68	68	68	68	68
Client Organization Consistency- Action	Pearson Correlation	-.233	1	.712**	-.349**	.551**	.048	.237
	Sig. (2-tailed)	.056	.	.000	.004	.000	.699	.052
	N	68	68	68	68	68	68	68
Client Organization Consistency- Attitude	Pearson Correlation	-.271*	.712**	1	-.353**	.503**	.258*	.237
	Sig. (2-tailed)	.026	.000	.	.003	.000	.033	.051
	N	68	68	68	68	68	68	68
Client Organization Continuity	Pearson Correlation	.266*	-.349**	-.353**	1	-.213	.010	-.313**
	Sig. (2-tailed)	.028	.004	.003	.	.081	.938	.009
	N	68	68	68	68	68	68	68
Client Organization Proficiency	Pearson Correlation	-.230	.551**	.503**	-.213	1	.424**	.173
	Sig. (2-tailed)	.059	.000	.000	.081	.	.000	.159
	N	68	68	68	68	68	68	68
Client Organization Experience	Pearson Correlation	.147	.048	.258*	.010	.424**	1	.187
	Sig. (2-tailed)	.233	.699	.033	.938	.000	.	.126
	N	68	68	68	68	68	68	68
Project Functionality	Pearson Correlation	-.012	.237	.237	-.313**	.173	.187	1
	Sig. (2-tailed)	.922	.052	.051	.009	.159	.126	.
	N	68	68	68	68	68	68	68

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

I. Correlation for Procurement Type T/L

Table C.3 Correlations between CO and Functionality

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Duration
Client Project Manager Consistency- Action	Pearson Correlation	1	.907**	-.232	.568**	.527**	-.205
	Sig. (2-tailed)	.	.000	.057	.000	.000	.094
	N	68	68	68	68	68	68
Client Project Manager Consistency- Attitude	Pearson Correlation	.907**	1	-.248*	.585**	.507**	-.242*
	Sig. (2-tailed)	.000	.	.041	.000	.000	.047
	N	68	68	68	68	68	68
Client Project Manager Continuity	Pearson Correlation	-.232	-.248*	1	-.079	-.122	.005
	Sig. (2-tailed)	.057	.041	.	.520	.322	.968
	N	68	68	68	68	68	68
Client Project Manager Proficiency	Pearson Correlation	.568**	.585**	-.079	1	.467**	-.100
	Sig. (2-tailed)	.000	.000	.520	.	.000	.415
	N	68	68	68	68	68	68
Client Project Manager Experience	Pearson Correlation	.527**	.507**	-.122	.467**	1	.058
	Sig. (2-tailed)	.000	.000	.322	.000	.	.640
	N	68	68	68	68	68	68
Project Duration	Pearson Correlation	-.205	-.242*	.005	-.100	.058	1
	Sig. (2-tailed)	.094	.047	.968	.415	.640	.
	N	68	68	68	68	68	68

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

I. Correlation for Procurement Type T/L

Table C.4 Correlations between CPM and Duration

Correlations

		Client Project Manager Consistency- Action	Client Project Manager Consistency- Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Cost
Client Project Manager Consistency- Action	Pearson Correlation	1	.907**	-.232	.568**	.527**	-.184
	Sig. (2-tailed)	.	.000	.057	.000	.000	.133
	N	68	68	68	68	68	68
Client Project Manager Consistency- Attitude	Pearson Correlation	.907**	1	-.248*	.585**	.507**	-.181
	Sig. (2-tailed)	.000	.	.041	.000	.000	.140
	N	68	68	68	68	68	68
Client Project Manager Continuity	Pearson Correlation	-.232	-.248*	1	-.079	-.122	.098
	Sig. (2-tailed)	.057	.041	.	.520	.322	.425
	N	68	68	68	68	68	68
Client Project Manager Proficiency	Pearson Correlation	.568**	.585**	-.079	1	.467**	-.221
	Sig. (2-tailed)	.000	.000	.520	.	.000	.070
	N	68	68	68	68	68	68
Client Project Manager Experience	Pearson Correlation	.527**	.507**	-.122	.467**	1	.075
	Sig. (2-tailed)	.000	.000	.322	.000	.	.545
	N	68	68	68	68	68	68
Project Cost	Pearson Correlation	-.184	-.181	.098	-.221	.075	1
	Sig. (2-tailed)	.133	.140	.425	.070	.545	.
	N	68	68	68	68	68	68

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

I. Correlation for Procurement Type T/L

Table C.5 Correlations between CPM and Cost

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Functionality
Client Project Manager Consistency- Action	Pearson Correlation	1	.907**	-.232	.568**	.527**	.227
	Sig. (2-tailed)	.	.000	.057	.000	.000	.062
	N	68	68	68	68	68	68
Client Project Manager Consistency- Attitude	Pearson Correlation	.907**	1	-.248*	.585**	.507**	.273*
	Sig. (2-tailed)	.000	.	.041	.000	.000	.024
	N	68	68	68	68	68	68
Client Project Manager Continuity	Pearson Correlation	-.232	-.248*	1	-.079	-.122	-.152
	Sig. (2-tailed)	.057	.041	.	.520	.322	.215
	N	68	68	68	68	68	68
Client Project Manager Proficiency	Pearson Correlation	.568**	.585**	-.079	1	.467**	.292*
	Sig. (2-tailed)	.000	.000	.520	.	.000	.016
	N	68	68	68	68	68	68
Client Project Manager Experience	Pearson Correlation	.527**	.507**	-.122	.467**	1	.444**
	Sig. (2-tailed)	.000	.000	.322	.000	.	.000
	N	68	68	68	68	68	68
Project Functionality	Pearson Correlation	.227	.273*	-.152	.292*	.444**	1
	Sig. (2-tailed)	.062	.024	.215	.016	.000	.
	N	68	68	68	68	68	68

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

I. Correlation for Procurement Type T/L

Table C.6 Correlations between CPM and Functionality

Appendix D: SPSS reports (3) Correlations for Traditional Negotiated Bid (T/N) Procurement Type

Correlations

		Client Organization Consistency- Complexity	Client Organization Consistency- Action	Client Organization Consistency- Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Duration
Client Organization Consistency- Complexity	Pearson Correlation	1	-.149	-.633**	.185	-.457	-.200	-.442
	Sig. (2-tailed)	.	.556	.005	.461	.056	.426	.066
	N	18	18	18	18	18	18	18
Client Organization Consistency- Action	Pearson Correlation	-.149	1	.598**	-.509*	.276	.620**	-.249
	Sig. (2-tailed)	.556	.	.009	.031	.268	.006	.318
	N	18	18	18	18	18	18	18
Client Organization Consistency- Attitude	Pearson Correlation	-.633**	.598**	1	-.260	.364	.663**	.082
	Sig. (2-tailed)	.005	.009	.	.298	.138	.003	.748
	N	18	18	18	18	18	18	18
Client Organization Continuity	Pearson Correlation	.185	-.509*	-.260	1	-.336	-.397	-.066
	Sig. (2-tailed)	.461	.031	.298	.	.172	.102	.796
	N	18	18	18	18	18	18	18
Client Organization Proficiency	Pearson Correlation	-.457	.276	.364	-.336	1	-.025	.062
	Sig. (2-tailed)	.056	.268	.138	.172	.	.920	.806
	N	18	18	18	18	18	18	18
Client Organization Experience	Pearson Correlation	-.200	.620**	.663**	-.397	-.025	1	-.032
	Sig. (2-tailed)	.426	.006	.003	.102	.920	.	.899
	N	18	18	18	18	18	18	18
Project Duration	Pearson Correlation	-.442	-.249	.082	-.066	.062	-.032	1
	Sig. (2-tailed)	.066	.318	.748	.796	.806	.899	.
	N	18	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for Procurement Type T/N

Table D.1 Correlations between CO and Duration

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Cost
Client Organization Consistency- Complexity	Pearson Correlation	1	-.149	-.633**	.185	-.457	-.200	.409
	Sig. (2-tailed)	.	.556	.005	.461	.056	.426	.092
	N	18	18	18	18	18	18	18
Client Organization Consistency- Action	Pearson Correlation	-.149	1	.598**	-.509*	.276	.620**	-.213
	Sig. (2-tailed)	.556	.	.009	.031	.268	.006	.396
	N	18	18	18	18	18	18	18
Client Organization Consistency- Attitude	Pearson Correlation	-.633**	.598**	1	-.260	.364	.663**	-.522*
	Sig. (2-tailed)	.005	.009	.	.298	.138	.003	.026
	N	18	18	18	18	18	18	18
Client Organization Continuity	Pearson Correlation	.185	-.509*	-.260	1	-.336	-.397	-.098
	Sig. (2-tailed)	.461	.031	.298	.	.172	.102	.698
	N	18	18	18	18	18	18	18
Client Organization Proficiency	Pearson Correlation	-.457	.276	.364	-.336	1	-.025	.209
	Sig. (2-tailed)	.056	.268	.138	.172	.	.920	.405
	N	18	18	18	18	18	18	18
Client Organization Experience	Pearson Correlation	-.200	.620**	.663**	-.397	-.025	1	-.259
	Sig. (2-tailed)	.426	.006	.003	.102	.920	.	.300
	N	18	18	18	18	18	18	18
Project Cost	Pearson Correlation	.409	-.213	-.522*	-.098	.209	-.259	1
	Sig. (2-tailed)	.092	.396	.026	.698	.405	.300	.
	N	18	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for Procurement Type T/N

Table D.2 Correlations between CO and Cost

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Functionality
Client Organization Consistency- Complexity	Pearson Correlation	1	-.149	-.633**	.185	-.457	-.200	.068
	Sig. (2-tailed)	.	.556	.005	.461	.056	.426	.787
	N	18	18	18	18	18	18	18
Client Organization Consistency- Action	Pearson Correlation	-.149	1	.598**	-.509*	.276	.620**	-.141
	Sig. (2-tailed)	.556	.	.009	.031	.268	.006	.576
	N	18	18	18	18	18	18	18
Client Organization Consistency- Attitude	Pearson Correlation	-.633**	.598**	1	-.260	.364	.663**	-.120
	Sig. (2-tailed)	.005	.009	.	.298	.138	.003	.635
	N	18	18	18	18	18	18	18
Client Organization Continuity	Pearson Correlation	.185	-.509*	-.260	1	-.336	-.397	.257
	Sig. (2-tailed)	.461	.031	.298	.	.172	.102	.304
	N	18	18	18	18	18	18	18
Client Organization Proficiency	Pearson Correlation	-.457	.276	.364	-.336	1	-.025	-.159
	Sig. (2-tailed)	.056	.268	.138	.172	.	.920	.528
	N	18	18	18	18	18	18	18
Client Organization Experience	Pearson Correlation	-.200	.620**	.663**	-.397	-.025	1	-.251
	Sig. (2-tailed)	.426	.006	.003	.102	.920	.	.316
	N	18	18	18	18	18	18	18
Project Functionality	Pearson Correlation	.068	-.141	-.120	.257	-.159	-.251	1
	Sig. (2-tailed)	.787	.576	.635	.304	.528	.316	.
	N	18	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for Procurement Type T/N

Table D.3 Correlations between CO and Functionality

Correlations

		Client Project Manager Consistency- Action	Client Project Manager Consistency- Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Duration
Client Project Manager Consistency- Action	Pearson Correlation	1	.820**	-.271	.469*	.586*	.064
	Sig. (2-tailed)	.	.000	.277	.049	.011	.801
	N	18	18	18	18	18	18
Client Project Manager Consistency- Attitude	Pearson Correlation	.820**	1	-.103	.320	.606**	.042
	Sig. (2-tailed)	.000	.	.684	.196	.008	.869
	N	18	18	18	18	18	18
Client Project Manager Continuity	Pearson Correlation	-.271	-.103	1	-.444	-.294	.128
	Sig. (2-tailed)	.277	.684	.	.065	.236	.613
	N	18	18	18	18	18	18
Client Project Manager Proficiency	Pearson Correlation	.469*	.320	-.444	1	.433	-.187
	Sig. (2-tailed)	.049	.196	.065	.	.073	.459
	N	18	18	18	18	18	18
Client Project Manager Experience	Pearson Correlation	.586*	.606**	-.294	.433	1	-.400
	Sig. (2-tailed)	.011	.008	.236	.073	.	.100
	N	18	18	18	18	18	18
Project Duration	Pearson Correlation	.064	.042	.128	-.187	-.400	1
	Sig. (2-tailed)	.801	.869	.613	.459	.100	.
	N	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for Procurement Type T/N

Table D.4 Correlations between CPM and Duration

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Cost
Client Project Manager Consistency- Action	Pearson Correlation	1	.820**	-.271	.469*	.586*	-.370
	Sig. (2-tailed)	.	.000	.277	.049	.011	.131
	N	18	18	18	18	18	18
Client Project Manager Consistency- Attitude	Pearson Correlation	.820**	1	-.103	.320	.606**	-.593**
	Sig. (2-tailed)	.000	.	.684	.196	.008	.009
	N	18	18	18	18	18	18
Client Project Manager Continuity	Pearson Correlation	-.271	-.103	1	-.444	-.294	-.035
	Sig. (2-tailed)	.277	.684	.	.065	.236	.890
	N	18	18	18	18	18	18
Client Project Manager Proficiency	Pearson Correlation	.469*	.320	-.444	1	.433	.058
	Sig. (2-tailed)	.049	.196	.065	.	.073	.820
	N	18	18	18	18	18	18
Client Project Manager Experience	Pearson Correlation	.586*	.606**	-.294	.433	1	-.591**
	Sig. (2-tailed)	.011	.008	.236	.073	.	.010
	N	18	18	18	18	18	18
Project Cost	Pearson Correlation	-.370	-.593**	-.035	.058	-.591**	1
	Sig. (2-tailed)	.131	.009	.890	.820	.010	.
	N	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for Procurement Type T/N

Table D.5 Correlations between CPM and Cost

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Functionality
Client Project Manager Consistency- Action	Pearson Correlation	1	.820**	-.271	.469*	.586*	-.238
	Sig. (2-tailed)	.	.000	.277	.049	.011	.342
	N	18	18	18	18	18	18
Client Project Manager Consistency- Attitude	Pearson Correlation	.820**	1	-.103	.320	.606**	-.203
	Sig. (2-tailed)	.000	.	.684	.196	.008	.419
	N	18	18	18	18	18	18
Client Project Manager Continuity	Pearson Correlation	-.271	-.103	1	-.444	-.294	-.028
	Sig. (2-tailed)	.277	.684	.	.065	.236	.911
	N	18	18	18	18	18	18
Client Project Manager Proficiency	Pearson Correlation	.469*	.320	-.444	1	.433	-.042
	Sig. (2-tailed)	.049	.196	.065	.	.073	.869
	N	18	18	18	18	18	18
Client Project Manager Experience	Pearson Correlation	.586*	.606**	-.294	.433	1	-.075
	Sig. (2-tailed)	.011	.008	.236	.073	.	.769
	N	18	18	18	18	18	18
Project Functionality	Pearson Correlation	-.238	-.203	-.028	-.042	-.075	1
	Sig. (2-tailed)	.342	.419	.911	.869	.769	.
	N	18	18	18	18	18	18

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

II. Correlation for Procurement Type T/N

Table D.6 Correlations between CPM and Functionality

Appendix E: SPSS reports (4) Correlations for Design Build Lowest bid (DBL) Procurement Type

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Duration
Client Organization Consistency- Complexity	Pearson Correlation	1	-.241	-.358	.615**	-.262	-.157	.345
	Sig. (2-tailed)	.	.257	.086	.001	.216	.464	.098
	N	24	24	24	24	24	24	24
Client Organization Consistency- Action	Pearson Correlation	-.241	1	.426*	-.126	.312	.221	.020
	Sig. (2-tailed)	.257	.	.038	.558	.138	.300	.927
	N	24	24	24	24	24	24	24
Client Organization Consistency- Attitude	Pearson Correlation	-.358	.426*	1	-.396	.666**	.326	.112
	Sig. (2-tailed)	.086	.038	.	.056	.000	.120	.602
	N	24	24	24	24	24	24	24
Client Organization Continuity	Pearson Correlation	.615**	-.126	-.396	1	-.330	.067	.448*
	Sig. (2-tailed)	.001	.558	.056	.	.115	.754	.028
	N	24	24	24	24	24	24	24
Client Organization Proficiency	Pearson Correlation	-.262	.312	.666**	-.330	1	.122	.048
	Sig. (2-tailed)	.216	.138	.000	.115	.	.569	.823
	N	24	24	24	24	24	24	24
Client Organization Experience	Pearson Correlation	-.157	.221	.326	.067	.122	1	.081
	Sig. (2-tailed)	.464	.300	.120	.754	.569	.	.705
	N	24	24	24	24	24	24	24
Project Duration	Pearson Correlation	.345	.020	.112	.448*	.048	.081	1
	Sig. (2-tailed)	.098	.927	.602	.028	.823	.705	.
	N	24	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

III. Correlation for Procurement Type DBL

Table E.1 Correlations between CO and Duration

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Cost
Client Organization Consistency- Complexity	Pearson Correlation	1	-.241	-.358	.615**	-.262	-.157	.408*
	Sig. (2-tailed)	.	.257	.086	.001	.216	.464	.048
	N	24	24	24	24	24	24	24
Client Organization Consistency- Action	Pearson Correlation	-.241	1	.426*	-.126	.312	.221	-.071
	Sig. (2-tailed)	.257	.	.038	.558	.138	.300	.742
	N	24	24	24	24	24	24	24
Client Organization Consistency- Attitude	Pearson Correlation	-.358	.426*	1	-.396	.666**	.326	.013
	Sig. (2-tailed)	.086	.038	.	.056	.000	.120	.951
	N	24	24	24	24	24	24	24
Client Organization Continuity	Pearson Correlation	.615**	-.126	-.396	1	-.330	.067	.511*
	Sig. (2-tailed)	.001	.558	.056	.	.115	.754	.011
	N	24	24	24	24	24	24	24
Client Organization Proficiency	Pearson Correlation	-.262	.312	.666**	-.330	1	.122	.051
	Sig. (2-tailed)	.216	.138	.000	.115	.	.569	.812
	N	24	24	24	24	24	24	24
Client Organization Experience	Pearson Correlation	-.157	.221	.326	.067	.122	1	.137
	Sig. (2-tailed)	.464	.300	.120	.754	.569	.	.522
	N	24	24	24	24	24	24	24
Project Cost	Pearson Correlation	.408*	-.071	.013	.511*	.051	.137	1
	Sig. (2-tailed)	.048	.742	.951	.011	.812	.522	.
	N	24	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

III. Correlation for Procurement Type DBL

Table E.2 Correlations between CO and Cost

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Functionality
Client Organization Consistency- Complexity	Pearson Correlation	1	-.241	-.358	.615**	-.262	-.157	.141
	Sig. (2-tailed)	.	.257	.086	.001	.216	.464	.512
	N	24	24	24	24	24	24	24
Client Organization Consistency- Action	Pearson Correlation	-.241	1	.426*	-.126	.312	.221	.118
	Sig. (2-tailed)	.257	.	.038	.558	.138	.300	.583
	N	24	24	24	24	24	24	24
Client Organization Consistency- Attitude	Pearson Correlation	-.358	.426*	1	-.396	.666**	.326	.095
	Sig. (2-tailed)	.086	.038	.	.056	.000	.120	.659
	N	24	24	24	24	24	24	24
Client Organization Continuity	Pearson Correlation	.615**	-.126	-.396	1	-.330	.067	.175
	Sig. (2-tailed)	.001	.558	.056	.	.115	.754	.415
	N	24	24	24	24	24	24	24
Client Organization Proficiency	Pearson Correlation	-.262	.312	.666**	-.330	1	.122	.198
	Sig. (2-tailed)	.216	.138	.000	.115	.	.569	.353
	N	24	24	24	24	24	24	24
Client Organization Experience	Pearson Correlation	-.157	.221	.326	.067	.122	1	.356
	Sig. (2-tailed)	.464	.300	.120	.754	.569	.	.088
	N	24	24	24	24	24	24	24
Project Functionality	Pearson Correlation	.141	.118	.095	.175	.198	.356	1
	Sig. (2-tailed)	.512	.583	.659	.415	.353	.088	.
	N	24	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

III. Correlation for Procurement Type DBL

Table E.3 Correlations between CO and Functionality

Correlations

		Client Project Manager Consistency- Action	Client Project Manager Consistency- Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Duration
Client Project Manager Consistency- Action	Pearson Correlation	1	.837**	-.343	.667**	.381	.054
	Sig. (2-tailed)	.	.000	.101	.000	.066	.803
	N	24	24	24	24	24	24
Client Project Manager Consistency- Attitude	Pearson Correlation	.837**	1	-.448*	.687**	.444*	.053
	Sig. (2-tailed)	.000	.	.028	.000	.030	.804
	N	24	24	24	24	24	24
Client Project Manager Continuity	Pearson Correlation	-.343	-.448*	1	-.246	-.052	.302
	Sig. (2-tailed)	.101	.028	.	.246	.808	.152
	N	24	24	24	24	24	24
Client Project Manager Proficiency	Pearson Correlation	.667**	.687**	-.246	1	.360	-.029
	Sig. (2-tailed)	.000	.000	.246	.	.084	.894
	N	24	24	24	24	24	24
Client Project Manager Experience	Pearson Correlation	.381	.444*	-.052	.360	1	.374
	Sig. (2-tailed)	.066	.030	.808	.084	.	.072
	N	24	24	24	24	24	24
Project Duration	Pearson Correlation	.054	.053	.302	-.029	.374	1
	Sig. (2-tailed)	.803	.804	.152	.894	.072	.
	N	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

III. Correlation for Procurement Type DBL

Table E.4 Correlations between CPM and Duration

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Cost
Client Project Manager Consistency- Action	Pearson Correlation	1	.837**	-.343	.667**	.381	.029
	Sig. (2-tailed)	.	.000	.101	.000	.066	.894
	N	24	24	24	24	24	24
Client Project Manager Consistency- Attitude	Pearson Correlation	.837**	1	-.448*	.687**	.444*	.022
	Sig. (2-tailed)	.000	.	.028	.000	.030	.920
	N	24	24	24	24	24	24
Client Project Manager Continuity	Pearson Correlation	-.343	-.448*	1	-.246	-.052	.316
	Sig. (2-tailed)	.101	.028	.	.246	.808	.132
	N	24	24	24	24	24	24
Client Project Manager Proficiency	Pearson Correlation	.667**	.687**	-.246	1	.360	.015
	Sig. (2-tailed)	.000	.000	.246	.	.084	.946
	N	24	24	24	24	24	24
Client Project Manager Experience	Pearson Correlation	.381	.444*	-.052	.360	1	.471*
	Sig. (2-tailed)	.066	.030	.808	.084	.	.020
	N	24	24	24	24	24	24
Project Cost	Pearson Correlation	.029	.022	.316	.015	.471*	1
	Sig. (2-tailed)	.894	.920	.132	.946	.020	.
	N	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

III.Correlation for Procurement Type DBL

Table E.5 Correlations between CPM and Cost

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Functionality
Client Project Manager Consistency- Action	Pearson Correlation	1	.837**	-.343	.667**	.381	.180
	Sig. (2-tailed)	.	.000	.101	.000	.066	.401
	N	24	24	24	24	24	24
Client Project Manager Consistency- Attitude	Pearson Correlation	.837**	1	-.448*	.687**	.444*	.217
	Sig. (2-tailed)	.000	.	.028	.000	.030	.307
	N	24	24	24	24	24	24
Client Project Manager Continuity	Pearson Correlation	-.343	-.448*	1	-.246	-.052	.005
	Sig. (2-tailed)	.101	.028	.	.246	.808	.981
	N	24	24	24	24	24	24
Client Project Manager Proficiency	Pearson Correlation	.667**	.687**	-.246	1	.360	-.067
	Sig. (2-tailed)	.000	.000	.246	.	.084	.757
	N	24	24	24	24	24	24
Client Project Manager Experience	Pearson Correlation	.381	.444*	-.052	.360	1	.385
	Sig. (2-tailed)	.066	.030	.808	.084	.	.063
	N	24	24	24	24	24	24
Project Functionality	Pearson Correlation	.180	.217	.005	-.067	.385	1
	Sig. (2-tailed)	.401	.307	.981	.757	.063	.
	N	24	24	24	24	24	24

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

III. Correlation for Procurement Type DBL

Table E.6 Correlations between CPM and Functionality

Appendix F: SPSS reports (5) Correlations for Design Build Negotiated bid (DBN) Procurement Type

Correlations

		Client Organization Consistency-Complexity	Client Organization Consistency-Action	Client Organization Consistency-Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Duration
Client Organization Consistency- Complexity	Pearson Correlation	1	-.377	-.492*	.504*	-.052	-.037	.336
	Sig. (2-tailed)	.	.083	.020	.017	.817	.871	.126
	N	22	22	22	22	22	22	22
Client Organization Consistency- Action	Pearson Correlation	-.377	1	.844**	-.272	.643**	.468*	-.209
	Sig. (2-tailed)	.083	.	.000	.221	.001	.028	.350
	N	22	22	22	22	22	22	22
Client Organization Consistency- Attitude	Pearson Correlation	-.492*	.844**	1	-.411	.451*	.222	-.319
	Sig. (2-tailed)	.020	.000	.	.057	.035	.321	.147
	N	22	22	22	22	22	22	22
Client Organization Continuity	Pearson Correlation	.504*	-.272	-.411	1	-.203	-.092	-.005
	Sig. (2-tailed)	.017	.221	.057	.	.364	.683	.982
	N	22	22	22	22	22	22	22
Client Organization Proficiency	Pearson Correlation	-.052	.643**	.451*	-.203	1	.604**	-.088
	Sig. (2-tailed)	.817	.001	.035	.364	.	.003	.696
	N	22	22	22	22	22	22	22
Client Organization Experience	Pearson Correlation	-.037	.468*	.222	-.092	.604**	1	.481*
	Sig. (2-tailed)	.871	.028	.321	.683	.003	.	.024
	N	22	22	22	22	22	22	22
Project Duration	Pearson Correlation	.336	-.209	-.319	-.005	-.088	.481*	1
	Sig. (2-tailed)	.126	.350	.147	.982	.696	.024	.
	N	22	22	22	22	22	22	22

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

IV. Correlation for Procurement Type DBN

Table F.1 Correlations between CO and Duration

Correlations

		Client Organization Consistency- Complexity	Client Organization Consistency- Action	Client Organization Consistency- Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Cost
Client Organization Consistency- Complexity	Pearson Correlation	1	-.377	-.492*	.504*	-.052	-.037	-.070
	Sig. (2-tailed)	.	.083	.020	.017	.817	.871	.757
	N	22	22	22	22	22	22	22
Client Organization Consistency- Action	Pearson Correlation	-.377	1	.844**	-.272	.643**	.468*	-.339
	Sig. (2-tailed)	.083	.	.000	.221	.001	.028	.123
	N	22	22	22	22	22	22	22
Client Organization Consistency- Attitude	Pearson Correlation	-.492*	.844**	1	-.411	.451*	.222	-.304
	Sig. (2-tailed)	.020	.000	.	.057	.035	.321	.168
	N	22	22	22	22	22	22	22
Client Organization Continuity	Pearson Correlation	.504*	-.272	-.411	1	-.203	-.092	.149
	Sig. (2-tailed)	.017	.221	.057	.	.364	.683	.509
	N	22	22	22	22	22	22	22
Client Organization Proficiency	Pearson Correlation	-.052	.643**	.451*	-.203	1	.604**	.021
	Sig. (2-tailed)	.817	.001	.035	.364	.	.003	.926
	N	22	22	22	22	22	22	22
Client Organization Experience	Pearson Correlation	-.037	.468*	.222	-.092	.604**	1	-.104
	Sig. (2-tailed)	.871	.028	.321	.683	.003	.	.646
	N	22	22	22	22	22	22	22
Project Cost	Pearson Correlation	-.070	-.339	-.304	.149	.021	-.104	1
	Sig. (2-tailed)	.757	.123	.168	.509	.926	.646	.
	N	22	22	22	22	22	22	22

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

IV. Correlations for Procurement Type DBN

Table F.2 Correlations between CO and Cost

Correlations

		Client Organization Consistency- Complexity	Client Organization Consistency- Action	Client Organization Consistency- Attitude	Client Organization Continuity	Client Organization Proficiency	Client Organization Experience	Project Functionality
Client Organization Consistency- Complexity	Pearson Correlation	1	-.377	-.492*	.504*	-.052	-.037	.229
	Sig. (2-tailed)	.	.083	.020	.017	.817	.871	.306
	N	22	22	22	22	22	22	22
Client Organization Consistency- Action	Pearson Correlation	-.377	1	.844**	-.272	.643**	.468*	.179
	Sig. (2-tailed)	.083	.	.000	.221	.001	.028	.425
	N	22	22	22	22	22	22	22
Client Organization Consistency- Attitude	Pearson Correlation	-.492*	.844**	1	-.411	.451*	.222	.135
	Sig. (2-tailed)	.020	.000	.	.057	.035	.321	.549
	N	22	22	22	22	22	22	22
Client Organization Continuity	Pearson Correlation	.504*	-.272	-.411	1	-.203	-.092	.165
	Sig. (2-tailed)	.017	.221	.057	.	.364	.683	.464
	N	22	22	22	22	22	22	22
Client Organization Proficiency	Pearson Correlation	-.052	.643**	.451*	-.203	1	.604**	.152
	Sig. (2-tailed)	.817	.001	.035	.364	.	.003	.500
	N	22	22	22	22	22	22	22
Client Organization Experience	Pearson Correlation	-.037	.468*	.222	-.092	.604**	1	-.028
	Sig. (2-tailed)	.871	.028	.321	.683	.003	.	.902
	N	22	22	22	22	22	22	22
Project Functionality	Pearson Correlation	.229	.179	.135	.165	.152	-.028	1
	Sig. (2-tailed)	.306	.425	.549	.464	.500	.902	.
	N	22	22	22	22	22	22	22

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

IV. Correlation for Procurement Type DBN

Table F.3 Correlations between CO and Functionality

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Duration
Client Project Manager Consistency- Action	Pearson Correlation	1	.585**	-.199	.498*	.377	.091
	Sig. (2-tailed)	.	.004	.374	.018	.083	.688
	N	22	22	22	22	22	22
Client Project Manager Consistency- Attitude	Pearson Correlation	.585**	1	-.136	.718**	.688**	.048
	Sig. (2-tailed)	.004	.	.548	.000	.000	.831
	N	22	22	22	22	22	22
Client Project Manager Continuity	Pearson Correlation	-.199	-.136	1	.105	-.153	-.067
	Sig. (2-tailed)	.374	.548	.	.642	.497	.768
	N	22	22	22	22	22	22
Client Project Manager Proficiency	Pearson Correlation	.498*	.718**	.105	1	.646**	.202
	Sig. (2-tailed)	.018	.000	.642	.	.001	.368
	N	22	22	22	22	22	22
Client Project Manager Experience	Pearson Correlation	.377	.688**	-.153	.646**	1	.349
	Sig. (2-tailed)	.083	.000	.497	.001	.	.112
	N	22	22	22	22	22	22
Project Duration	Pearson Correlation	.091	.048	-.067	.202	.349	1
	Sig. (2-tailed)	.688	.831	.768	.368	.112	.
	N	22	22	22	22	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

IV. Correlation for Procurement Type DBN

Table F.4 Correlations between CPM and Duration

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Cost
Client Project Manager Consistency- Action	Pearson Correlation	1	.585**	-.199	.498*	.377	-.256
	Sig. (2-tailed)	.	.004	.374	.018	.083	.250
	N	22	22	22	22	22	22
Client Project Manager Consistency- Attitude	Pearson Correlation	.585**	1	-.136	.718**	.688**	-.132
	Sig. (2-tailed)	.004	.	.548	.000	.000	.560
	N	22	22	22	22	22	22
Client Project Manager Continuity	Pearson Correlation	-.199	-.136	1	.105	-.153	.136
	Sig. (2-tailed)	.374	.548	.	.642	.497	.545
	N	22	22	22	22	22	22
Client Project Manager Proficiency	Pearson Correlation	.498*	.718**	.105	1	.646**	.098
	Sig. (2-tailed)	.018	.000	.642	.	.001	.665
	N	22	22	22	22	22	22
Client Project Manager Experience	Pearson Correlation	.377	.688**	-.153	.646**	1	-.151
	Sig. (2-tailed)	.083	.000	.497	.001	.	.502
	N	22	22	22	22	22	22
Project Cost	Pearson Correlation	-.256	-.132	.136	.098	-.151	1
	Sig. (2-tailed)	.250	.560	.545	.665	.502	.
	N	22	22	22	22	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

IV. Correlation for Procurement Type DBN

Table F.5 Correlations between CPM and Cost

Correlations

		Client Project Manager Consistency-Action	Client Project Manager Consistency-Attitude	Client Project Manager Continuity	Client Project Manager Proficiency	Client Project Manager Experience	Project Functionality
Client Project Manager Consistency- Action	Pearson Correlation	1	.585**	-.199	.498*	.377	.259
	Sig. (2-tailed)	.	.004	.374	.018	.083	.245
	N	22	22	22	22	22	22
Client Project Manager Consistency- Attitude	Pearson Correlation	.585**	1	-.136	.718**	.688**	.465*
	Sig. (2-tailed)	.004	.	.548	.000	.000	.029
	N	22	22	22	22	22	22
Client Project Manager Continuity	Pearson Correlation	-.199	-.136	1	.105	-.153	.048
	Sig. (2-tailed)	.374	.548	.	.642	.497	.831
	N	22	22	22	22	22	22
Client Project Manager Proficiency	Pearson Correlation	.498*	.718**	.105	1	.646**	.447*
	Sig. (2-tailed)	.018	.000	.642	.	.001	.037
	N	22	22	22	22	22	22
Client Project Manager Experience	Pearson Correlation	.377	.688**	-.153	.646**	1	.164
	Sig. (2-tailed)	.083	.000	.497	.001	.	.466
	N	22	22	22	22	22	22
Project Functionality	Pearson Correlation	.259	.465*	.048	.447*	.164	1
	Sig. (2-tailed)	.245	.029	.831	.037	.466	.
	N	22	22	22	22	22	22

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

IV. Correlation for Procurement Type DBN

Table F.6 Correlations between CPM and Functionality

Appendix G: Transcript of Focus Group meeting on 01.05.2002

Dave: Aggiag will introduce himself and the research in a couple of minutes, but we don't have anticipated this will take beyond seven. He project managed the arrival of some food, which of past performance (because I've eaten some Libyan food before) it is absolutely excellent. And would be breaking for that, but he'll tell you about the timetable. OK. I'll shut up now and pass over to Aggiag.

Aggiag: Aah

Dave: OH, the introduction, sorry, do you think that we should go around the table and just introduce our selves? Dave Greenwood, University of Northumbria.

Speaker 1. I'm a performance coach. Run my own company that help clients to seek out best value and help contractors deliver improve value .... in between.

Speaker 2. NHS, Royal Victoria infirmary Trust health service; engineer by inclination, project manger by education, and lots of other things as well.

Speaker 3. Newcastle upon Tyne Hospitals, I used to work with -----Hopefully project manger by education, my particular experience is dealing with client and like a 'bridge' between the builders and designers and the end users of the buildings.

Allan Osborne, University of Northumbria.

Mohamed Aggiag, PhD researcher student, University of Northumbria.

Speaker 4. Managing director of company operation in the North east of England.

Speaker 5. From ....in Gosforth. Trained as a quantity survey, moved out of quantity surveying; became chief architect with North Tyneside, and moved into private practice again.

Speaker 6. Partner in ...architects and also teach part-time University of Newcastle.

Dave: Great, we may be expecting couples of other guys from Laing's, they phoned me this morning to say that.... personally scooting up and down to Manchester to meet Ray O'Rourke to talk about what plans he has for them in the future of Laing's. I said cool it; don't worry too much about getting here on time or at all or feeling wistful about it. Over to you Aggiag.

Aggiag: Thank you for coming, really I'm delighted that you are here with me supporting my research. I would like also to thank my supervisor Dr Dave and Allan for their support. Really the focus group meeting today will I hope we will concentrate on the two items, which might help me in the near future which is: the *project success* and the *client attribute*. My self, I will just talk few minutes or two minutes maximum about myself. I'm graduated from faculty of engineering, architecture department in 1980. And then appointed in 1982 as resident engineer in Tripoli Medical Centre, which is supposed to be the biggest project in Libya in the health sector. It's around

1500 beds; the total cost of the project is nearly £240 million. At that time, four ministries of client in the construction project as the ministry of health. There was many changes in the organization and management of the client, 6 of them at the Health sector, 2 at the Housing, which ... the ministry of Housing is the state consultant, 10 as the chair of the committees, which is the supervision committees, and 37 as the whole changing in the management of the supervision team. This hospital was planned to be finished in 1984, but fortunately and unfortunately (at the same time) was finished late 1996. The original contract amount for the civil work only is £78 million, and the final account before I coming here was settled to £156 million. So there is, why I'm choosing this subject really? I spend around 18 years in the hospital construction especially Tripoli Medical Centre. So as you can see from my introduction we got client-related problem it is always the really the client, specially in my country it is the client whose going to be blamed. There is a lot of client decision-making, changes in client composition and the structure as well, changes in the client consultant, all that had a great affect of the progress of the project. The other thing, which interested me as well, was the causes of delays and cost overruns in the public or complex projects. So my goals and my aims of the research are improving client decision-making specially (maybe) in developing countries, the role of the administrative factors, which you can see it is always one of the major causes of the delays, there is complete and adequate plans, which is really needed in order to fulfil the project objectives, method and provision of funding, which is also is one of main points, and finally maybe the client continuity and consistency is major point as well in the whole life of any construction project. Finally I hope within our meeting, really I'm trying to achieve from this meeting the following: any criteria for a successful project; what is that? Client attributes in complex project? And may be if there is any relation between them, which will support my thesis. Thank you.

Dave: yes I would like just to make some clarification. Aggiag's PhD is not *about* Tripoli Medical Centre, I think that was launched into this, and we started by Guys hospital. It was remarkable, you know, there is one in Tripoli, and there is one in central London. And if you start looking at Audit commission report on Guys, a lot of this things are actually matching up and across, which is what led us to wonder whether its there are some common problems with, let's say, hospitals to start with, and then we found a little bit of research, which perhaps chat with later. I don't want to influence your answers by telling you about it. Which looked to some client attributes and whether the project as a result of these various attributes were successful or not. So that sort of sparked our interest, to think that maybe there are certain things about clients that could, could be better, or could be different, and that has quite an impact on the outcome of the project. So the *outcome of the project* is the first thing that we've got to define there are obviously some very simplistic ones such as time cost and quality and this sort of thing. We wondered whether you could, maybe chew over what a successful project is, if we're maybe missing anything. And then move on to talking about client attributes, really from many sides of the table (I won't say both sides because we got experience all over the place on that). So anybody want to kick-off on 'successful projects'!!!

Speaker 2: yes, I suppose my interpretation to a successful project is really based on... the issue this eternal triangle of time, cost, quality they all affect the issue in some form... from inception to completion, its common obviously that the values in the team change and that has a huge impact on time, and I suspect the perception of

quality; changes of decisions - probably didn't change the quality at all, but perception of quality, this sounds to me like a huge dimension.

Speaker1: In terms of a successful project I would say ultimately 'can the building user use it as they intended; because all these jobs get built, eventually, and then they will last sixty or seventy years, so one of the things that have been traditionally done is to focus on the *capital* bit, you know, the construction period, but in relative terms. The whole life is so much more important than that. The total ration is something like 1:200. A building might last two hundred years, and it takes a year to construct, so my view is that we're all focussed a little bit too tightly on this little bit of front as opposed to the whole life of the building. And the quality of the building is the function of the. Sorry, the quality of the work done inside the building, is a function of the quality of building...

Speaker 6: if you're going to use the *user* as a measure of a successful project, how it fulfils the needs of the user, you going to have to have an idea of who the user *is*, which in a hospital, in my experience is pretty tricky business. Is the user the doctor, the nurse, and the administrator, the estates manager? Or the patient who's the actual user? And actually the problem is that frequently the ... almost inevitably, their wishes are not compatible. A nurse wants to walk the shortest distance, the patient wants the maximum privacy, and therefore those are immediately irreconcilable...

Speaker 1: how do you cope with a left-handed surgeon?

Speaker 6: Exactly! The other thing that I was thinking about was that a successful project, from point view of is I was a contractor, was one when I signed a contract of £78 million and I was getting £156million. I would consider that to be pretty successful.

Speaker 4: But of course in resolving that claim you got 12 year over-run cost to deal with.

Dave: yes, I thought the financial increase was quite light considering that.

Speaker 4: Is this not about the defining of the initial brief? Often, where the problem occurs, is because, you know, you can have predictability of time, cost and quality, but as, almost as you suggested, that you aren't actually satisfying the brief; whether that's from a client or customer. I think we sometimes get mixed up with what that really means and who the end user is? But all too often I think that brief changes, and certainly if you have a 12 year over-run and medical science moves on massively and the starting point where you have operation or carrying-out operations is probably different 12 years later.

Speaker 2: I think the idea of brief is, you're right, its key. I think of you get the group of people talking value management ... and use that as a tool.

Speaker 3: you are right... you're right about the value management. And picking up on the point that you (NP) and go right back to the very beginning... who is the client? What you are trying to do? The difficulty of measuring a multi-headed client...
You could say you could go back to the very reason for the building in the first place; get back to the business case, or whatever you call it. Maybe the successful project is

the one that gives you a building that achieves *those* business and service objectives, for that 50 or 60 years. Perhaps there's another dimension of success, that's much more intangible, to increase the organization's capacity to manage projects well thereafter, or whether it demoralises them or makes them bureaucratic or whatever. It is about the long term, and you only get the long term right if you understand it at the beginning - exactly what you want.

Speaker 1: of course it could be an incentive, I guess, if are looking at contractors in the historical traditional route where margins are, sort of, minimal at tender stage but in the knowledge that there will be inevitable client changes, if you like, imposed on the contractor and extensions of time and maybe that's where the profit is made on the project, and does that became an inherent part of the reasons for the delays and extension because you have this procurement method, which is at odds with delivering a project at the end of day.

Speaker 2: you got another issue about it, ... the consultant (designer), the appointment of the consultant did he informs the client or whatever, the time that they.. their attendance time has been squeezed more and more in our country - I don't know whether it has happened in Libya, you're limited (as a consultant designer) to how much you, you're on a fee bid. And you think 'yes that's fine, I will accept the best offer'. In the health service and in other public bodies you more or less you have to accept the best bid, unless you have got a good reason why not? Because it's public money and is supposed to be handled with due probity.

Speaker 5: It's difficult to prove otherwise... I mean, I think, between yourself and James you have already touched immediately on to your client attributes, and one is construction is not different to other industry; you get what you pay for. And if you pay less you get less. But I think in terms of the *end user* so often multi-end user whether it is a hospital or a retail centre. But that isn't an excuse for not being able to control them as a client, so I think immediately then, an attribute of a client is to have a control system, at least for the end users. I mean often the top of the tree is very broad with all the end users, the bottom is very broad with all your suppliers and manufacturers; you need really to do the *hour-glass*, so your decision-making comes down there and then it goes out that way. But, that was an aside for me. A successful project is the one that, taking your point just a little bit further David about that at the end of the day the project is functional and it serves the purpose its actually ... given what the client expected at the beginning of the job that I think the construction industry constantly fails on is that yes you may well get a project at the end turned out fine, very rarely is it *more* than client expected, but I think the predictability aspect of construction has been tackled at all, I think it needs too. There is always going be risk in there, and I think if you get a client who's prepared to listen to people who will advise them on this risk - and then you need the contractor and consultants to be prepared to advise- whereas too many of them say to a client what the client wants to hear, and that doesn't work out either. Striving to get the predictability I think is also quite difficult, for the client, you have to say, well, *where are* your priorities, get more time, get that brief, which is essential I think and the client says, well, I haven't got time to do that, then you say right, I'm going to tell you what the dangers are in this. Don't raise expectation, try and make it more predictable.

Speaker 4: If you prepare the risk register for the client and you said to that client you haven't got time to prepare the brief, the entry cost of the tenders for this project will

be say £100 million, but the exit cost will be £300 million, because you haven't that's the risk on that risk register, because you haven't applied yourself to that brief... or take six months to manage this process and apply yourself to it and the entry price of the contractors may be £200 million, but the exit cost may be £210 million, a limited difference and that's probably about just refining what it is you want and then giving the designers time to respond to that as well. Its that, sort of, almost that up-front lean production bit where you invest in the side other than the construction bit. Which is just a very short period of time, [clients tend to] compress everything else, get the thing on site, it is not really designed, massive number of change orders and thus changes in the cost.

Speaker 5: it can be difficult with the client getting them actually to analyse how important their time in the programme is. Because they're all the same - we wanted it for this, we want it for that. That's probably a great example [referring to TMC] - if one more year, I reckon, had been allowed to actually plan it thoroughly, I bet it would've been finished years earlier than it was. I mean, I think that everyone accept that often a difficult argument to get across to a client when you're dealing that size of development, you really can't afford not to plan it.

Speaker 2: Its interesting, ------you hit on the issues I tried ---hit the politics and ----- Not unlike here. Everybody wanted something to show for the political endeavours for their period.

Speaker 5: It's always the same isn't it: people want things for reasons other than a good job...

Speaker 2: 'it's an election next week', 'we need some kind of a result';

Speaker 5: Or, 'my jobs on the line.'

Speaker 6: yes, and I think that cement mixers and people digging holes always looks like something's happening so it feels quite nice when you get into that. You're quite right clients rush into that is the problem... Dave, who's the American academic who talked about improving the construction process, the idea was to look to the left hand side of the programme. In other words, you look at the design stage and try to improve the design stage, you've got to look to the left hand side of the programme yet again to the client stage, to the briefing stage, so you are constantly looking further and further upstream, and part of that *looking upstream* is exactly what Neil says, it is not a matter of setting out the physical attributes of what they're doing, its about setting out the financial implications of taking up... everyone's interested of where the wards are in relation to the operating theatre and the entrance foyer and things like that, is too quickly into the physical discussion about it, there should be much more discussion, I think, about the business case and the implications, and not the business case for the actual hospital, the business case for the way you are going to run the project. I think you have to see that as a tangible, so that it is, you know, discussed and as much time spent looking at the appraisal of programmes rather than looking at drawings of the actual hospital.

That's really ... it's an investment of time. The difficulty is of course, that, certainly in the commercial sector, and I think it works the same way in the public sector, from the point [in time] that you identify the need to the point of delivering the need is actually

negative cost. The more you can compress that soon you can bring something online, the better. But as Ian said this can involve getting on and giving *the illusion* of working more quickly.

Speaker 1: for me, a client attribute would be client who is interested is in *value* not necessarily the *cost,* a client who is prepared to get... to organise a contractor to come on much much earlier, so that they have value, as opposed to worrying about that extra cost. I'm aware, having spent so many years as a contractor, that the value that, as a contractor you can add to the project from day one starting at site is nil, or very little, you can do a little bit of value engineering on this or cost engineering, [PW: de-specing] and the value that clients are prepared to pay for his expertise, i.e. just building the project is 1% or 2%, because that's what contractors' margins are. So the earlier you can get the contractor in, they can get involved when the real value-adding decisions are being made, where clients are prepared to pay much higher margins for that type of expertise - I mean look at what they pay estates people and architects, its more than 1%, the further you go back in the value chain looking at the returns those organizations are making...I mean the guy right at the very front, the solicitor, people who do land deals, the developers, are getting 25% that's what the client values.

Speaker 4: If you could just mange the waste in project, you can give more profit, more fees to everybody and you have still a better project, and I think that's the bit where you need everybody involved up front, so that the procurement methods that are applied on the traditional basis are just never going to ... [To Aggiag] What was the original period of the overall programme that over-ran by 12 years?

Aggiag: Four years only.

Dave: It didn't start in '82 did it, that's when you started in 1982 did you?

Aggiag: It started in 1982 yes,

Dave: oh yes, you started 1982 the site was already started.

Speaker 1: There is also huge keen-ness to see change, driven by the government very aggressively now, under Egan, Achieving Excellence in Local Government, that1999 report Modernizing Construction, the National Audit office, that actually comes out and says 'don't buy cheapest', 'buy against Best Value'... one of the difficulties I'm seeing is, particularly in local authority type of organizations is a huge resistance to that change.

Speaker 2: I tell you they change direction that they are used to, ----------.

Speaker 1: and I come across people of local authority who have been working for local authorities for 30 years, and all they know is compulsory competitive tendering, and being audited, on buying the cheapest, and having to handle all the grief that goes with that, they are now been encouraged to buy by *best value*, which involves partnering, so part of resistance of this change is inherent in those organizations.

Speaker 5: I don't think it's just big organizations where this is inherent. There is something in everybody that says 'I want something for nothing, and that's what brings us back to adjudication on price. You find somebody that will say 'well what you will

give me for that? Can you give little bit more? Can you just manage that? Can you give me little bit less? You still don't get the same for less.

Speaker 2: This notion of best value, I think we could go round the table and get a different notion of that....the consensus her is that here is that certainly, the sooner you get together and discuss, as you said, at the briefing stage, the better.

Speaker 6: Why isn't the lowest price is best value anyway? I mean, Neil talked about how if you could eliminate the waste there would be more money for everyone, but why doesn't that incentive naturally exist, if you can get waste of your system, your price will be lower and you will make more money. So it is a natural economic force, that squeezes waste out of the system and isn't competitive tendering the purest market, the better market, the best market. Ones where, if you bring the right number of buyers and sellers together, you are bound to arrive at the best price and people will innovate and find ways of making the best hospital and delivering that on time and making the most money out of it. I don't understand why those normal rules don't seem to apply in construction.

Speaker 5: I don't know why those normal rules comes to ----------

Speaker 1: I think by concentrating on cost all the time you're always running round like a headless chicken. Rarely in my 10 year of construction did I take time out to work 'on the business', as opposed to 'in the business'.

Speaker 6: That's, that's just a lack of investment. Isn't it?

Speaker 1: absolutely

Speaker 4: And isn't that driven by a lack of profitability. I mean if you look at the margins.

Speaker 6: you are all going back to a lack of efficiency, you know, that's the problem, isn't it? If you are more efficient, you can squeeze more profit out, you could invest more and then become more efficient. We just never seen to break that circle in the construction industry. I'm just worried about getting away from criteria of successful projects.

Dave: yes, yes.

Speaker 6: Perhaps it is part of that the basic set up doesn't seem to work.

Speaker 3: Which was Neil's point earlier on, wasn't it, the structures, the methods that the client has available seem to mitigate against having a successful job.

Speaker 6: everyone it seems to agree that getting contractor on board earlier is better, and certainly in my experience and on the rare occasions where I'm involved in that, is that it *is true*. It's amazing how much - actually it's not amazing it's obvious - how much value that contractors can add if they are involved right in the outset. And somebody discovers [for example] that if you actually move the building, say 4 metres, that you avoid all that bad ground ... and it would all be fine, but if that's such a great idea, self-evidently such great idea, then why do people not do it. And part of the

problem is that it is very difficult to set up a transaction that allows you to do that in a way that ... so there was the example, Faulkner Browns [an architectural practice] did the pool in Manchester and involved Laings, simply as a consultant, and at the end of the day Laings ... coincidentally, or otherwise, Laings got he job, but there was a clean break, in that at one time they were consultant in terms of construction matters, and then they were the people actually building the job.

Speaker 4: But that's what we're doing with BAA as sort of partnering contractors for fit out...

Speaker 6: exactly you don't necessary build the thing at the end of the day..

Speaker 4: well, there are three partners, one of the three might build, but if we're best placed to actually sit there and go through the design or the buildability or the feasibility, you might well do that and we equalise the cost between the contractors, so we all want about the same level of net profit at the end of the day, you know costs are fairly well subcontracted into the same pool and we can actually build it at the same cost, if we are actually open and honest about our allocation of costs into different pockets. What we do, is we say right, OK, if you save us this amount for the pre-construction design, sit in the office with the partnering architect, cost consultant (although they have been moved out at the moment) and we sit in there and work out how the project is going, if we throw in five people and the architect throws in one, then we get five sixths of the cost of the design.

Speaker 1: Brilliant case in hand, which really is exactly what you are talking today - NHS Procure 21. They have now selected their 5 partners and they will tell you who they are if you are interested, and those five partners are now on board and when a Trust says they want (because they started in the West and West Midlands first, but it will be the whole of the rest of the country soon). So when it comes yours, you be able to chose from one of these five contractors, you can chose whoever you want to chose, it can be pretty straightforward, you have to get them to price or hand them a cost model, there is predetermined overhead and profit for them. So all you have to do as the client of RVI is to chose one of these five contractors and they will come along for your projects.

Speaker 3: So you have been selecting them as a base of framework and you pick them because you specific need.

Speaker 1: Yes, that's right. So that's Procure 21 - launched yesterday in Leeds.

Speaker 6: So, how do we know what extra pounds we pay?

(End of side A, Tape-1)

Speaker 4: Cheapest price wins, that's the way its been in the past, it only looks at price at tender stage, it doesn't look at out-turn cost, or the experience of litigation and whatever that might lead to, but it's a way that in terms of prudence, everybody can say, yes that's right to make that decision at that time, whatever the outcome is at the other end. And I think that's the bit that maybe we have to work out a way of moving away from, and working out a way that's comfortable for everybody to say well, we need to work out who will be best fitted to? If you have you know, five contractors

whatever, who are best, will they? If you said to them, you will get a share of thousand million pounds worth of work, and its going to be shared equally, you don't have to bid you just have to bid best, and it has to equate to the outcome cost, with that be better solution?

Speaker 1: I think that government have taken a pretty enlightened view on this. In 1999 they were spending some 7.5 billions on the construction and building, their election pledge was to within three years was to spend 19 billions a year on construction...
National Audit Office carried out a survey a couple of years ago showed that 70 to 80% of all this was delivered over budget and 70% was delivered late, so I think my response to you, Peter, is that it can't get much worst, there is a leap of faith here that people have to work together and surely they can do better than 70% late and 70% over the budget.

Speaker 6: Well you don't know that. That's the problem do you, you don't know if you'd done it the other way it wouldn't have been worse. You said its not so much that it couldn't get worse, there are things that have been, historically worse, if you look back and that I think that is the difficulty, that its actually hard to be objective about, you know, how well these things are going to work.

Dave: I'm touching almost what Peter said, as an academic, its quite difficult to come up with any theory that supports that, but there *are* some very long-lived theories that support the opposite, that the lowest tender or the lowest price for doing something, is not only the best decision for the client to make, but also its the best for the industry, because it drives out inefficiency, whereas by not doing that, and I don't really believe this Ian, I'm saying, this is, this is, supply and demand theory.. Isn't it?

Speaker 1: I remember sharing a platform with you, Peter, five or six years ago, the other guy was a chap called Colin Price, and his attitude was, 'were going to get 6 contractors who know that they can built that job, we know the differences historically is between out-turn cost and tender cost, it is 8%, so we're going to buy the cheapest contract, because we know that six contractors can build it anyway, add 8% to that cheap price, and we know the out-turn cost is. Why do we need partnering? That was his position.

Speaker 2: My experience basically is that in one of the major projects, the outfall project that was down the coast [that Northumbria Water did] that was based on partnering. They've embraced partnering over recent years.

Speaker 6: He's [Colin Price] up in the same organization.

Speaker 5: One of the problems with partnering at the minute is that too many claims of partnering, too many people to willing to say that they have taken part in partnering, they may have to varying degrees,- but there is also far too strong a pressure from the government to find results in partnering, and you can manufacture figures, and I think that is a danger in itself when you invent a form a procurement, but I mean, surprisingly to me, its actually central government who have had the balls to push a vision down the line towards partnering and say who's going to take this on. The industries are about to take it, not because they wanted to, but because the governments' telling them they have to. But the crux of it all, about an awful lot of the

ills in the industry is what Neil said, and that is if you can find a tangible method of selecting on quality, we get rid of an awful lot of this. And you'll find after a while - it will take yes, but it wouldn't be that long at all over terms - that your best quality *does* become your lowest price, but until we do that *lowest price* won't necessarily be best quality, because you miss everything else: consultants provide a service, if you are only going provide for so much then you are going to get so much; and we let the ills come out and of course the contract and the contractor's quite happy because he makes his higher margin on the claims, the solicitors have a wonderful time, who in its cruder sense can be call parasites on our industry, because they don't add to it, unless you are in land development, but otherwise they *take* out of our industry, and I think you *can*, and it is not that difficult to a find quality assessment, but you can't do it by traditional methods and you have to look at people, and you have to try and find out their attitudes and whether they work this way, you basically you have to look at the whites of their eyes and not the screen presentation which is going on behind, and if you find a client who's prepared to pay the price for the job and not have always that desire to get that little bit more for less, then it is actually quite straight forward, because everything has a price, the manufacture, the shipping cost, the supply, bringing along the profits.. If you want to know somebody profit is, get their account books, ask them to open up all of their books for the last five years, and you can find out what that construction company's profit margin is. Whether it is reasonable. What their overheads are? You don't actually need to go down the tendering line, and that really I think is the crux of partnering, whether you call it partnering or something else, it can be done, and it can be done to the benefit of the job. And also overall you actually get a better job, on the face of it that might not be as cheap as if you tender it, but again you come back to your final tender [price], and as you said there was too many people, dissatisfied with what we are all producing in the industry.

Speaker 2: it supports what you are saying about trust isn't it?

Speaker 5: Yes and No, because I have this thing about trust. People have come to me and said 'partnering - its about trust', and really to a degree that's bollocks [rubbish]. If you go to a board of directors as a project manager as you said, this is the best way for us to develop our procurement strategy, and the MD says 'what's it based on?' in you say 'trust'; he's going to says-'Cheerio'. What it is, is a belief that you can trust the people you select and you have to build it up.

Speaker 2: we're talking about an open book approach. Not just gradually...

Speaker 5: Open book probably does away with [the need for] Trust, because it is open book, but I do think once you built up a trust, the improvement and performance on the construction contract is phenomenal, it really is, you have... it's that. The key to everything is the right selection is making a quality decision based upon selecting quality to deliver your job, and it has been intangible, it has almost been a concept, but it is not 'you can put it down and we can work it out'.

Speaker 3: Ian did you think that to come back to the client decision-making that's where you need a very mature client, the client who'll do what you described as opposed to local authority clients who come cross and that's where the client need to know what their own values are...

Speaker 5: long term values, yes.

Speaker 3: and until you sort it that out, you can't get to this stage... its going to the left of the bar chart again, isn't it?

Speaker 5: yes, you have to start with the clients don't you? I mean, nothing's going to end up as a better job until you have that client prepared to accept what needs to be done to get a better job, and if it is a little bit more time then fine, if it is, it's not so much a leap of faith, but it is certainly a change in attitude which is probably the most difficult thing...

Speaker 2: do you think some clients are more focused on what their objectives are? If we can define that? And I think the health service generally can be a little bit woolly about that because it's patient and it seems to be moving all the time; with a local authority it's possibly the same, but if you go to Sainsburys and someone like that, they know how many peas they want to sell next week and how many potatoes, and what kind of people they want in there, and where are they going in ten years time. And I think the health service and other public bodies are not as focused as that.

Speaker 3: I think perhaps that we're [the Health Service] our own worst enemies in that, thinking of the successful project and some of our less successful ones, some of our less successful ones have perhaps been like this: that somebody 'on high' might say 'that department *will* open on that day and it *will* be like that' and 'it can't be bigger than 500m2' and off we go. And we did a project like that to move an accident and emergency department to reconfigure the services completely and the political (with a small and big 'p') dogma ... when it had to be done, what it had to cost, And to this day people still have difficulties working in there... We did another job very recently, where we took a big more time at the beginning in terms of determining what we thought was required. It took much longer, we have a couple of false starts, but we decided what it was that was really wanted. The worthies in the organization and the people who had to work there were all teed-in along the same lines. Now that particular building contract went a little bit over spend, but it was delivered spot on [regarding time] and in fact it exceeded the end-users' expectations. They walked in there and said ' oh, this is more than we expected'.

Speaker 4: So what we talking on here is just simply planning, giving yourself time to plan the activities, whether its defining the brief, doing the pre-construction activities, and to price the value - engineering value management what ever you want to call it - the detail of the design; planning the process through and giving yourself time to look at it, investigate 'are we going the right route?' you know, and reinstall it back in the process, 'yes we are, we can move on now'.

Speaker 3: I think it *is* planning.

Speaker 2: I will introduce one of the other arguments, how certain is the contractor involved in the discussions, was it a two stage, or was it...

Speaker 3: interestingly in both of them, contractor came on board (to save time in the process) with a provisional tender; there was no difference in either one.

Speaker 4: So may be you get the belief that somebody's going to go down on traditionally procured project, down the traditional route which is - find all the

variations, claim against it and maybe come up with a claim at the end to produce the profit, and with the other one the contractor maybe believe that if they work together then they can make their profit out of working efficiently and finishing on time. You know in the same sort of circumstances with broadly the same, probably, tender for each of them...

Speaker 3: Yes there's an element of that. The thing that's also relevant to the decision-making process is communications, if those are a wrong; if the client's communications are out of order then the contract hasn't got a chance.

Speaker 4: do you think anything to do with transactions that it take place at a personal level, and I'm wondering if you get to a size of the project where it becomes impossible. But on a fairly small project you transact very quickly - 'I'm going to tell you what I want you to do', and at the meeting you can say 'Neil, have you done it?' and I will say 'yes', because I'm not going to come to the meeting and say that I haven't done it. And if you can get that sort of ... those transactions going and even on a big project if you can set teams up, who would be, you know, the inter-relationship would be the key thing - 'I'm not going to let you down'; 'you work for somebody else, but we work for the project, and we are going to make this bit of it happen'. Because I have seen parts of projects where you've got sections which work very well and others which don't work well at all, yet it is on the same scheme and same ultimate client the same end users, but different section foremen, different relationships with an architectural technician, and [one is where] somebody has built up a team and then the other one is just a group of individuals who are working independently, rather than....

Speaker 6: Once I did some work with Jonathan Lucas, who is a management consultant, looking at this problem, particularly with architects, and how people work together. And one of the problems that kept coming back to us is the ability to see the bigger picture; and traditionally the way it worked was that the leader of the group on a big project would attend the meetings - the leader of the structural engineer group, the leader of the M&E group, the leader of the architecture group- and then they go back and brief their teams and so much was lost in that process. They were actually *quite good* fulfilling the brief they were *given* as an internal team, but the brief they were given was not very good. So they were actually doing it very well, but they were doing the wrong thing and that was an inability to see the big picture. So, you know, I mean (*participants interference*)... all organizations, Marks & Spencer, whatever. Time spent in communication is very rarely time wasted, you know, the more time you spend talking to people the better.

Speaker 3: Absolutely.

Speaker 6: There is also personal responsibility, I think, one of my many concerns about partnering is that it actually becomes a let-out clause for poor performance, you know, that there is going to be no criticism of people, and we're all friends....

Speaker 1: I think, ..., that this is the misconception that most of the industry is suffering from: they think of partnering as being a soft option; they see partnering as being nice, about hugging trees, and... it's not, and I agree with Ian, I think that they are very few organizations out there practising *real* partnering. To make it real partnering you've got to be more demanding, much more demanding, its about stretching all the parties within the team considerably further than they would've been

stretched under a traditional contract. It's about using those much deeper relationships to get results, and not just deepening relationships for the sake of deepening relationships. So its about a lot of things you're talking about as well, Neil, about taking personal accountability for something you said you are going to do, delivering that, and following through on it. And when you don't, being held to account for not doing that. But I - a little interesting story, I was asked to go down and have a look at partnering contract just before Christmas which had gone... which was *going* off the rails. A sixty-week project, five million pounds, week 25 and they were all at each other's throats. And there were all in their separate little camps - the architect over there, the contractor over there, sub-contractor over there, and client over there. And what I did, I got them to say, right if you had your time again, what would you do differently on this project? And I just wandered round and listened to what they were talking about. And all of them are saying 'if we had our time again we would've had this issue out on the table; but we couldn't have done that because it would've spoiled the relationships'. And yet, the end result was that the relationships were diabolical in the room and they all thought that partnering was about being nice to each other. And what actually happened was, the contractor ... the project had changed to a greater or lesser extent ... I don't know, but it *had* changed, and the contractor was saying 'yes we are getting on with it, but by the way, we want paying for it'. And the professional team were saying 'stop winging. All jobs change. Get on with it'. So after two or three months the contractor thought 'I've had enough of this', so he slapped in a daft claim. And the client's setting there thinking - saying 'you can't do this: this is a partnership'. And the contractor actually stood up in front of 40-odd people and said 'it's a daft claim, but its got you all here, hasn't it?' And the point I'm trying across is, its not about being soft, its not about being nice, its about, probably, being more demanding. But built on top of solid relationships.

Speaker 3: Isn't that about bringing conflict out and making sure it gets sorted?

Speaker 1: Yes, absolutely, I attended a lecture here by Tony Bingham, it must be five or six years ago, and what really struck me was that he said ' you will always, always, have disputes in construction - its part of the nature of the business. But the secret is to tackle them as disputes before they become conflicts'.

Speaker 4: We've actually put a KPI on people's performance individually, in a partnering arrangement that we have, and at first everybody thought that would send people back to type, that they would be defensive ... or whatever, but it actually has worked. Everybody round the table realises the other people around the table are going, assess performance and produce a score of whatever might be, and at the end of the day the whole team - the score for everybody is added-up, so that it becomes an overall score for the project. So you are all interdependent. If somebody is under-performing, you have to find out why, support them and help them, because you as a team had got lowering overall score. And it was thought maybe it would bring out conflict, but it hasn't, its actually brought out very positive routes forward. And it does define issues that need to be addressed, and it stops people hiding behind the partnering banner, and saying 'we're partners' and can't tell him that he's not doing it at the time he should be doing it and we need to move forward.

Speaker 1: I get involved in facilitating a lot of team building meetings between construction teams, clients and what have you, and its like what you were saying Peter, it has to do with communication, one of the first things I do is say 'what do you want to

get out of the project for you and your organization?' and get everybody to write that down on a bit of paper and share that with everybody, and that gives you, almost, a picture of what the team's aspirations are. And it begins to build common objectives, because that's hugely missing in most of the construction teams that I've worked in - a common objective; a common agenda. The contract always thinks that the client just wants time, quality and money; the client wants a whole lot of other things as well, and the contractor hasn't got a clue. And for years I used to think that I should be client focused, I've got to understand what the client needs. Then all of a sudden the penny dropped. No I don't, if got to understand what the client does. Before I can understand what he needs. I mean, how does the nurse get from there to there, or the surgeon do his job; get to understand what they actually do, so you can understand what they need.

Speaker 3: I think that would make a big difference in a successful projects, as far as client attributes, if clients did this process - resolve the conflict themselves. I've had an experience in another part of the UK where the project's going on fine, and somebody who wasn't involved and really ought to have been, because it wasn't politically expedient to involve them turns up, and gets in the way and the contract's compromised. Whereas if you've got that person along to start with and sorted out what they need, then the brief goes ... [indistinguishable]

Speaker 2: There is one incident, I can think of that is not major project, but a small element of a PFI, there was some installation in the operating theatres, it was meant to be specified but we can't because generically its meant to be ...the PFI contractor selects it, and installs, and they about...And in the hospitals I deal with there could be two hundred surgeons, who will act in any particular theatre, any of those consultants turn around and say "I don't want that". And this has happened recently in two local cases (I will not mention who they are) , where there have been a headlines, because a surgeon, and when the surgeon says ...he sounds as if he is speaking for all of them. He is not, he speaking on his own, as a consultant, but he can stand up on his own and say that kind of thing - that if he can't do any cataract operations, or any hip replacements, it makes the news. Its because they haven't got together and said 'what value', I mean ' what do you want by this?' and it's the same kind of issue. That's a fundamental success factor.

Speaker 1: What struck me when I first got involved in the procure 21, just how much power these consultants wield.

Speaker 2: that's another element of the politics.

Aggiag: it seems is not really far away from [the situation in] Tripoli as well. We are keeping everybody involved in the business from the beginning, otherwise later on everybody will blame, because the brief is not prepared well according to their needs and that's why it is most common that we have to keep everybody involved in the health sector. So OK, let us come and discussed it all together from the beginning, let us clear that our brief is clear and defined and we have to respect our planning as well. I'm not expecting after three or two years later on, you are coming and said to me "Oh, I think I don't need that, I need another thing" and that's really effecting everything.

Speaker 4: So, you have panel of people who participate in that decision. I did a course once with the Leadership Trust, and one of the things that they trying to get you to do was to actually listen, so you know you have all the levels - ears, mouth at 2:1,

and all of that sort of thing- because its quite interesting that the people who often just sat quietly round the table, have the biggest 'voice' in terms of the quality of the comment they are making. Not necessarily the quantity, but sometimes the loud voice was drowning them out, and they never even got to speak. And I think if you get these circumstances where you've got the Ward Nurse who's sitting in her table with her boss or the consultant, who she's terrified of, because that's the culture of the business, she'll probably not say "actually we need the wash-basin at that side of the wall". That will only come when it's actually already equipped in the wrong place, and you've got to do some remediation work to put it right. And it's how you draw that information, and I think that can be one of the keys to success overrun in both cost and time.

Speaker 1: One of the key client attributes is to be listening client, but for that client to be able to draw on the resources, at his disposal, and I 'm talking about resources all way down the supply chain, like the subcontractors. Subcontractors know how to design.. had design cladding systems; subcontractor know how to design air-conditioning systems; *most* of them. And yet they're not really given a voice. And we're talking about bringing contractors in earlier, but we main contractors don't really know how they design air-conditioning systems and building management systems, and yet when the subcontractors are given a voice, I can see a lot of clients not trusting them. 'Oh, they are just trying to flog [sell] us their particular brand name air-conditioning system, it is not really what I want, so I think more listening clients, ... being able to tap into that huge reservoir ...

Speaker 3: and that's very poor, isn't it? Not being able to access the subcontractor and report back into our own organisation.

Speaker 4: But if you were saying to the subcontractor, and I guess something like M&E, its probably something like 50% of the cost of the project- if you said to them we, 'what is you're the level of profit?' and almost like you were suggesting, Ian, go to their reported accounts - 'what do you make gross?' 'What do you make net?' 'Right, that's acceptable, make another one per cent on that, so it's worth it, we are one of your key clients and key profit producers, now you don't need to go and change the specification on the air-handling units to make profit, will you give us five hundred pound back if you make fifteen hundred pound in the deal, and we get something which. Looking at capital cost, not cost-in-use... so all of those things start coming out. And I think you are right, it's, my view is, you know, it is almost goes against the grain... yes, involve those people that are down the supply chain, because in the same way that nobody has all that expertise. And if it is a big enough package and its material [critical] to the project and you got to involve that expertise, it's just then managing the number of people who are going to be involved.

Speaker 1: BAA, one of the things that they, what BAA have said is, you three (of which Mansell are one) you've got much further down the supply chain and cost chain. I did a workshop with them 2 or 3 months ago and one of the things we got talking about was a balustrade. Where there are miles and miles of these things and they are being produced by architectural ironworkers. And they are only really interested in providing the stainless steel tube - there's a glass panel between, it's miles and miles of these things, so it's hundreds of thousand of tons. BAA specified a glass of panel *that* wide, and lo and behold the supplier of the glass panels produce a glass of panel *that* wide [indicates a different width] a 40mm difference. So for every panel inside the BAA [building] there is a 40mm cut - a real high quality cut - masses and masses of

waste, and that's the sort of thing that comes out when you get further down supply chain, and link right back to a where the glass is mad. And the guys that are preparing the standard panels. So they said all right we will change our standard panel size, and that saved them hundreds of thousands of pounds.

Speaker 6: There is always an issue of course - a big problem in any construction project is that you tend to solve one problem and create four others. So that you really need really someone to take some holistic, helicopter view about how you pull these things together. And I think the example you used of a wash hand basin and the wall, and you know, then there is a good reason because the pipe riser is behind there, and if you move the pipe riser then the fire escape door doesn't work and that's necessary to reorganize more of that sort of thing. So inevitably, and I guess linked to that was when you are talking about listening, one of the things which I always try to listen to, one of the things about listening when I was younger, I did some work for the firm of Architects that were interested in community architecture. They got people together, and talking about what they wanted, and at the end of the day, what stuck in my mind was that as an architect we listen to what people want and then we explain to them why they can't have it? (Participants laughing) But really quite often that's what the listening skills came down to. It's saying exactly that, 'look you know I realize it will be good idea to have that wash hand basin there, but the reason why you can't have it is, because A, B, C,' and actually that process because sometimes the answer's 'yes you can, actually', 'I just hadn't thought about it, there's no reason that you can't have it there'. But the process of explaining to someone why something doesn't happen, means that they immediately understand, that immediately, you know, they adjust to that's the way the thing's going to be. You know that famous quote 'I don't know what the secret of success is but the secret of failure is trying to please all of the people all of the time'. There is no such a thing as a perfect project; there is a sort of threshold that it needs to cross for everybody.

Speaker 4: If you are dealing with perceptions though, if you explain why to the nurse ... if you can explain why she can't have that there, there will be an understanding.

Speaker 6: that's right and you know, there won't be a complain there won't be this endless, you know, 'twenty years ago I told you...'

Speaker 6: It's very difficult to explain that, it needs someone who understands how the whole building works------in the old days when buildings were simpler things, architects used to do that. They understood enough about building science and technology, nowadays they don't know about that sort of thing, so there they can't do everything, and it's very difficult to find leadership, you know, ...one of the criteria for a good successful project to my mind is leadership, and that leadership is incredibly rare and difficult to find. You know, leadership, you know, someone who can understand the financial issues, the design issues, the engineering issues, and, you know, it does expect a lot of people, it's faint and very hard to find the equivalent of a chief executive or a managing director in a project, you find them in a companies... but in projects...

Speaker 4: So is that what you should do then, you should set up a structure for a project, and say 'right you are all the supply chain; designers, contractors, (Participants interruption) you all have to make a living, we go and final everybody margin is, we just say out the, you know you could pay for everybody's margin easily out of the

different between the 78 and 156, over there, now this is just about us making sufficient effective finishing upon time and best value to the built in.

Speaker 1: I think the industries over recent years lost lots, if a capital cost is really that in the whole life cost is really that -------- ------ back two hundred, if a contractor is making more 2% profit, his profit is one ten thousand the whole life cost, yet he spent all of his energy all of this brief in a--------down from one ten thousand to one nine thousand five hundred, but we lost-------, we wasting time.

Speaker 4: is that though because the whole, nearly every system, and I doubt you involve a capital cost, and the team or the department deals with capital cost,

Speaker 2: you right, you right,

Speaker 4: on the maintenance projects,

(End of side B, Tape 1)

Speaker 4: for the next twenty years twice a year, I will take them ten times as long to correct the problem.

Speaker 2: Just to come in exactly on what you're saying, I work in strategic environment now, but for a lot of years of worked on the operational side, and although I was fortunate in that I was involved, a) in the briefing of teams in the health service, in fact it was not a very scientific approach, looking at the whole life cycle, you would have a notion of what was best, it just went on feelings, you didn't have time to sit down, and enumerate how that reflected on the whole life cost. Which I think PFI does very well now, obviously, its business to them to enumerate that very well, so yes I think that is a real issue.

Speaker 4: But, PFI that we've worked on, we've realised that the syndicate for the contact are saying, 'well it doesn't matter to me whether its three or four per cent net profit', I mean that's irrelevant, because you are looking at the two hundred per cent of the whole period of the existence of the building, and I think that's the one time where we can actually sort of, throw-in these, maybe, different ways in doing things.

Speaker 1: I think this is the difference between cost focus and value focus (participants interference).

Speaker 5: You can't totally ignore it. You've got to keep an eye on cost because it'll always be there to some extent, and I think if you can get a client who's prepared to receive less for long term benefit, then you are dealing with another good client. And I know the pressures on many [clients], if you say 'you've got a million pounds, so I'm giving thousand square metres for that'. [The client] says fine, I want more, but OK, then I came back and said 'I could give you 900 square metres, but with a better materials, so therefore over a 25 or 30 year period... you pay less. You [the client] are more likely to say 'No'. And I don't know why that is, I don't whether its because people have a vision of the future that doesn't extend very far. I mean, particularly [to Neil] in your line of business.

Speaker 2: The interesting thing of PFI - I think it gets a lot of bad press in the Health Service - but my impression of PFI, it does to some extent de-politicise the issues. You have to have, to some extent a guaranteed sort of environment for twenty to thirty years, and whether you are agree with the cost or not from an operational point of view, or from a revenue point of view, you know it's going to be defined over the next twenty or thirty years.

Speaker 3: That's true Ken, and you don't have the in-built alternatives to doing it, if you like, the way you described... I mean, Ken and I are on opposite sides of the fence, and it's quite interesting, because Ken will come to me and say 'James, why can't you put this or that bit in?' and my side of it is 'it's bloody well expensive' or 'if it gets delayed, it's my backside that gets kicked'.

Speaker 2: And I was thinking of it the other way, if he does this, and it's going to cost me, then it's my backside.

Speaker 3: Exactly. So there we were, battling this out...

Speaker 2: It can get quite adversarial, can't it?

(Break)

David: What about client attributes, I think you all see the direction he's coming from, and I think a lot of people have mentioned it in terms of communication, and maybe even the leadership of the client that we talked about, you know, the big egos of consultants, and I sure that all these different ministers that they came to take over the project in Tripoli had equally, if not bigger egos than the consultants that James has to deal with.

Speaker 1: I think there's a big issue for clients and a note of caution for them. It might just help them to look at their attributes. The construction industry is at capacity now, and the government is still talking about tripling the spending on construction. Everybody I speak ... everybody's flat out, not enough time, and that's, at the moment industries doing about ten or twelve billion. There's talk of it doing nineteen billion within three years, so one of the side effects of this contractors becoming more discerning. They're not prepared to work some of, if you like, the aggressive and adversarial clients who are only interested in 'first past the post' [i.e. lowest tender]. So I think clients need to start to becoming 'best clients' otherwise they are going to struggle to find the best contractors to work with.

Speaker 4: Does that link, what we're talking about there, to a 'clients' charter' moving down that road where, you know, I guess if it turned the other way and the demand for construction activity was far greater than the capabilities of the industry to supply, or to meet that demand then you do exactly that, don't you, you choose jobs where either you can make the most profit or where actually you enjoy working, in that it's fulfilling for your staff, because staff retention will be the key issue.

Speaker 1: I found, I found this about two or three years ago, I stop when I spoke with some of the subcontractors who were prepared to put up with some of the grief they were getting from my organisation. And you know, when you analyse the market, there are two prices for subcontractors, either I want to work for Dave Stitt, or I'm not too bothered about working for Dave Stitt, but I'll give him a price anyway. I'm

hearing stories now from contractors, like you said, Neil, you [were offered] a job and you said 'No I can't; I can't resource it', and the client came back to you and said, 'well you can put a good margin on it if you want' and you say ' No thanks, sorry, I can't do it' and I've heard that three or four times.

Speaker 2: One of the issues managing at the big end, how often do you have a manager, maybe of the old style - leadership style, and we've mentioned leadership, ----he doesn't have a basic understanding of the culture, the background, you put the wrong person in the wrong place. And that's client organizational thing. I think its client who has to understand this, what the necessity is. Either you have a well-trained, well- equipped manager at the outset, or you're lost.

Speaker 4: Do you think in a project like this [TMC], that the people who were ultimately the clients making a decision, had ever had any training on how to be a client? They'll have had a discipline ... doctors, or if they were quantity surveyors, or architect or whatever or government ministers, but they probably had no tuition, they had no, they didn't attend the course on how to be a good client, or what the attributes of a good client were, well because you hasn't written the book yet, you know may be that's something when you looking to a prestigious project like that maybe you weren't if less to do with the contractor and just more to do with the....

Speaker 6: What you teaching them on this course, then, Neil? What will be lesson one?

Speaker 4: What you teach them? Well....

Speaker 5: The first lesson is how you define the client? I would say this is the first lesson. Then you can start to look at the pressures that are on them, [...] the ability to say what it is they are after. But I think that really, I've gone into jobs and made mistakes and found out half way through that I'm dealing with somebody, that really is not making the decisions, I thought they were the client, and they haven't always even been the purse holders - that's one kind of category of defining. But until you define it [client] you can't help the client set up a system that you think is right to make their particular project work.

Speaker 6: So what are the skills you are trying to get across to them? Are you going to try and teach them about the technology of what's happening? Do they need to know about that?

Speaker 5: I would have thought, if you define it [the client], probably your next one is to listen to what they have to say rather than try and tell them too much, find out what it is that, that ... not that they *require*, [because] the mistakes that have been made with clients is not realising what was coming at them from above and sideways. I was seeing them from below and saying 'I don't know if it's right or not....' But one of their problems was they never communicate to me - their pressures - and I'd set up an action plan where one of the first items was that there would be an interchange that would be a full discussion of the respective pressures - not desires, of profit for me, or the job for you - but who's pulling at you in different direction other than the people on the job.

Speaker 2: [unintelligible]

Speaker 5: Yes, that's right, and it really does open your own eyes, apart from that it opens of a lot of what is inherent secrecy within building - the true client and the team including the contractor, as well as the consultants. The client that will say I have only got ten million pounds, but really they are keeping half a million pounds back, and then you get the consultant that say 'right there's really only £950,00 on this. And they are keeping a bit back. And then you have the contingency on the contract that everybody knows will be required. And then you get the contractor looking through for errors in the documentation to say 'right I know its really going to cost this'. And if you can get that, that openness, and it is not partnering, it's just an understanding of each other, some of those barriers, I've found, have been broken down.

Speaker 2: I've sat around a table and listened to contractor - technically I was meant to be a client's advisor - and it wasn't until lately that I've realised that when we're talking about PC sums and the like its just begging the question are we really going to spend this?

Speaker 5: One last one, a very, very big point, and that is the tendency for the consultants primarily, or if you involve the contractor as well, to an extent the contractor, that the money is theirs. That the budget set aside is there to be spent. And that the contingencies will go into the job and eventually filter down. And the money really isn't yours [the clients], and you have no right to say ' I want to know what that's being spent on!' or 'Where is my contingency then?' And I wonder how many Q.S. and architects would turn around to you [the client] and say 'well it wasn't yours, it's the job's'.

David: Can we just put slightly a different spin on it, and say, what we've been talking about quite a lot is what I'm calling normative thinking of what client *should* be, I'm wonder whether you got any views on more descriptive things, what clients *are*? And how project outcomes are effective by that? I think, I think I have looked at that any way, by inference, because we've talked about what a good client should be, and therefore we assumed that in fact clients aren't all like that. But do you see in your experience, any relationships between big clients, little clients, rich clients, poor clients, complex clients, simple clients and the out-turns of the project. I think we've touched on one with *complex clients;* hospitals *are* complex clients aren't they? It's probably *the* most complex, I've ever come across, I don't know? We talked about clients that are well informed and know the industry, and things like that, so I wonder if we just have a look at that. Does that stimulate any thoughts for anybody on this descriptive thing, I mean obviously one client attribute they we would really want, for the project's success is access to funding, I have a feeling that the Guys Hospital job that Aggiag compared with Tripoli Medical Centre - no I know it wasn't, it was the British library where I read the damning report on the Audit Commission, and although in fact as usable facility I think it is fantastic, (so coming back to what we said about the life of the thing and the use of it) but as a capital thing it was a bit of a disaster, and that put at the door of *trickle funding*, because nobody knew at any one time how much money *was* available; it came in trickles. Does that open up any thoughts?

Speaker 1: Take as an example NHS. NHS are a complicated client who, quite oven, deliver very simple projects - the extension to a car park or something like that. And when I was working with the NHS as contractor, if we were building a new operating

theatre in the middle of several operating theatres, the tender documents will be that thick, and if we were building an extension to a car park, the tender document will be that thick [i.e. the same for both, whether it was a complex job or a simple one]. And that's one of the big complaints that my estimator would have about working for the NHS. It wouldn't matter what size or how complicated the job is, the tender documents are still that thick.

Speaker 6: That means it's an inflexible client, isn't it?

Speaker 2: My would tend to be *as* the client, rather than providing the service, but the first appointment you make is not the architect it's the Q.S., and he then becomes your knowledgeable. Sort of client [representative]... is that right James?

Speaker 3: Not necessarily, in my experience, Ken. But turning to ...this thing about what client attributes match up to what outcome. I suspect the clients with the most clear focus on what they're about, you know, 'what do we do? What do we want to do?' Lets forget the health service, it might be a developer or something like that, perhaps they were very focused about what they want, and have this internally discipline perhaps have a better chance coming up with a better project.

Speaker 6: Certainly if you define clients as being - well, I don't know, you mentioned developers - if you work with developers you will find they're very, very small organizations that turn over an awful lot of money, and it tends to be that you don't get a vast department of people. Developers are typically, four or five people who are in partnership together, or a companied together, and they are all senior people and they can all can make a decisions, and its their own money, or in fact its the banks money, but it's effectively their own risk, which makes it their own money.

Speaker 2: That's an interesting point about it being your own money, because we had a particular - and its only and idea I can relate to - there was this developer came on to the site and he sat in this meeting (and he was a pin-striped fellow) and he used to fly up once a month for a meeting and fly back - and he sat in this meeting, and this QS patronised him and near the end of the project we were talking about a particular factory development which meant spending £x amount of money on a particular detail - and he [the QS] said to the client 'its only going to be crinkly tin'. 'Oh' he says [the client] 'you mean a portal frame with profiled steel cladding'. But it would be different if you asked
a surgeon or someone in the health service same kind of question. They're embroiled in doing their job, and they don't have a view on the particular aspects of the job.

Speaker 6: If you listed the qualities you wanted the client to have, and you listed next to it the types of client... as a sort of matrix of the types of clients and what they have, and if you got for instance *decision-making*, developers in my experience score very highly, because the decision-making is very immediate, and there are the people who are actually the person who's made the decision, the person who's borrowing the money, the person who's. ...It's within their gift, to say 'yes I am going to do that' or 'I'm not going to do that', but where [these] clients tend to be very good on decision-making they tend to be very bad on taking the longer view of things, because they are interested in their immediate capital returns. So what you tend to do, you find that if you wanted to construct a perfect client it will be a mixture ---(Participants interference)-----of people, and often actually, I think what we find, is that there, the

things they are good at are not necessarily what the project needs them to be good at, so there is a mis-match between
the qualities they have, and the type of project that they are trying to run. I don't know whether that makes sense to people. I mean, the thing, the reason that I thought about it is that I've never found any sort of pattern in - when I trail back through my memories of whether expert clients were better than inexpert clients.
And I'm thinking of the people I'm working for at the moment, I'm working for a Trade Union at the moment, and honestly they are brilliant, because they don't know any thing about the buildings, and they're really not interested, and all what they want is for me to advise them, and they are very trusting, and that's very good, you know, they sit down and they say 'what shall we do Peter?'. And I tell them what they should do, and that's, it's not the 'ego thing'; it's just a very, very good way of actually dealing with someone. Saying 'this is what I suggest you do' and they say 'right, we'll do it', and they get on. It puts a lot of pressure on you as the consultant because if you get it wrong, then by definition its you that got it wrong. But I can also think of very good clients on bigger projects, where they have had a lot of expertise, which is been very helpful in keeping me on the straight and narrow, you know, in saying 'this is what it is', so it would be nice to be able to say that 'expert clients aren't very good, because...' and 'naïve clients aren't very good because...', but I can't see any pattern in my own experience that...

David: Unless it's a mixture of the knowing what they want, knowing what they *should* have and knowing what they *want*, you know, this is a sort of a mixture, your expert client that is able to actually say to you, 'yes that's fine', they want to vacillate and are all over the place.

Speaker 6: In other words don't make use of their expertise...

Speaker 2: Is it this thing about people that don't know, and know they don't know etc.

Speaker 1: I think that's depends on the people you are dealing with. On lots of occasions where I've you have come across subcontractors and one guy has been brilliant, and in the same organization has been bad. I've heard clients say that this job you did over there was great because you had a good site management, whereas the one you did over there was dreadful, and what are you going to do about it. I think the one thing about construction is it is a social business, and there are lots and a lots of the people involved, it is not like the manufacturing process where most of its is automated. Where there is a lots, and lots of people involved there is the potential for huge opportunities, but also the potential for the converse.

Speaker 6: It's the way in which you advise clients in construction, it's quite different from way doctors advise their patients or lawyers advise their clients, somehow the advice is much more immediate, you know, something you can act on. And it's there and then. The advice you give to, ... well a good way to express it is what Frank Geary the American architect said 'all the folks that actually touch your project between you thinking of the idea and it coming into operation. And it goes through all these processes, you know, planning permission, building control, contractors and everybody touches this thing on the way through. Whereas if you are advising your client as a lawyer in a bit of litigation that's between you and them, you do it. And I don't know whether somehow, it's the problem, it's that we don't, we can't layout the advice in a way that is manageable for clients, I think that's very, very difficult, you know, every

time that you're giving them the advice you're trying to give them as much as you can, and the next time you see them, they say 'you didn't tell me that'. And you say 'well there's so many things, how can I tell you everything!'

Speaker 4: So is that not about the client who only takes the 'helicopter view' and delegates the responsibility for tasks to consultants, contractors and whatever, and as long as he can keep that vision, that overview, - 'this is what I want in terms of time scale, and cost, and you guys you can have to sort that bit out because you're expert with that. And maybe he is good at relationship management between all of the individuals who make that scheme happen or not happen, so he maybe he doesn't have the expertise in being a quantity survey or an architect or whatever. He employs an expert to do that - a professional or whatever you call them, and maybe he just manages it well, or he understands his vision and he is good at communicating it. So you all know what you are going to do. But on a big project like that where it changes - that is the difficulty.

Speaker 6: ...may end up with a different helicopter! Or several strapped together!

Speaker 2: I just wonder what happens. Trying to make a comparison hoping you can give some response from, from your experience in the private sector. In the public sector obviously you develop your business case, which is the foundation, and you take some advice on that; you generate a notional [scheme] based on the business case, and it may or may not vary, but if it does, [unintelligible]... committee. And years ago they tried to [improve the situation] by endorsing the Griffith Report on committee management in the Health Service, I dare say to some extent ' Sainsburys -type management' has percolated into the Health Service, and we're probably the better for it, but it still exists that we've got this committee, and it is not managed from, as you say, from the body of people that should be given the authority to manage it, it still managed really from a committee at a high level, and I think that's one of the issues that...

Speaker 4: Is it a committee a power culture, do you somebody who is the big voice there? That everybody sort of, defers to, I mean you often do, don't, when you get a group of people around a table, and a decision to be made, someone drives the decision.

Speaker 2: Yes. The notions. They might have a fixed idea about what value is, they influence the rest of the committee and say 'yes, this is good value this is what we need', and 'we'll do this, another cardiotheric theatre, or whatever ...

Speaker 3: That's true, it's very much about organization politics and there are people in there that are more are listened to than others and that can have a huge impact, good or bad...

Speaker 4: If you think it - just before we close there - if you think about that in the way that information is communicated from the person with the vision there - the ultimate client, if you like, to the guys who actually producing and design it through them. I just wonder if we have communication route for the return journey for that information or the idea, and I think, I just look at the organization away from the construction, but how we communicate internally within our organization, and you often find that people are looking for 'what should my answer be, and how well will it

be received?' rather than 'which is the right answer?' And I guess that's the same in any organization whether it's the building, whether it's the project or the organizations within it, you not really getting the truth, and the guy makes a decision unless he can from checks isn't go to know if he is doing the right thing.

Speaker 2: I think - and James might contradict me - that often we are in a situation in a Health Service project, and you know you have got a delay, or its going to be over-spent, and you go into a value engineering exercise or a de-spec. , Just to save face so you don't have to go back to the Trust Board, and I know that if you say you're overspent it won't be well-received and it will go up the line, to the Regional health Authority.... To 'top office' to Tony Blair if it goes that far...

Speaker 5: Isn't the important thing, at that stage, Ken, to give the client options. For me as a client I always wanted options if something goes off the rails and say right, well, give me more money, or you can do this. I think it may be unpalatable.

Speaker 2: The bureaucracy and the dynamics of the system! It may take you sort of 2 months from the day you think it's going off the rails, to realise that it *is* going off the rails, and then you've got another dynamic of what we're going to do about it, and then, yes, who's going to tell them.

Speaker 4: Do you [as client] really know its going off the rails? Because you don't want it to go off the rails; the design team and the contractor know you don't want to hear that, so they don't tell you until it's physically impossible to achieve it, so when every one of the activities is stacked vertically and it's a day before you're due to hand over, they tell you its actually going to be handed over six months late.

Speaker 5: You can get in a way with consultants. You've got to have people that can recognise what's going on. You've got to have a contractor who will tell the consultants, and you've got to have subcontractors who can tell the contractor ...

Speaker 4: We have the mechanistic processes of course, and then there are the people that sort of make those works, don't they, and I think that if you have one without other it doesn't work.

David: Well, thanks, it's really good I hope we learnt a bit, we will deconstruct your words.

(THE END)

Appendix H. Transcript of Focus Group 2, held at Room A211, Ellison Building, University of Northumbria, on 03.12.2004.

Note: to preserve anonymity the participants have been identified (see below) as A, B, etc. whereas in the transcription participants have been allocated unidentified numbers.

Researcher: Mohamed Aggiag, Northumbria University
Participant A: David Greenwood, Northumbria University
Participant B: Jeremy Barnett, Miller Construction
Participant C: Keith Hogg. Northumbria University
Participant D: Glenn Steel, Sunderland University Business School
Participant E: Simon Lewis, Dickinson Dees, Law Firm
Participant F: Stephen Scott, Newcastle University
Participant G: Philip Thomas, Northumbria University
Participant H: David Beaney, Northumbria University

TRANSCRIPT

Aggiag: Good afternoon everybody thanks for coming. I will just present a summary of my research. The title is the impact of client attributes on project success, a study of UK public construction projects. The main thing that I am looking for is the client related attributes in relation to project outcomes. Here is a brief diagram of the model. On the left hand side is the client organisation and client project manager. Associated with each one are variables and sub-variables. The independent variables representing *consistency*, *continuity* and *proficiency* are for both client organisation (CO) and for the client project manager (CPM). The target is to see or to demonstrate or to find any association between the independent variables and the dependent variables (represented by *time cost* and *functionality*. So, from data collected from 31 public projects in the North East of England we received 132 data points. Then data were input into SPSS software for analysis. The results are shown in these tables and diagrams. The red colour means that there is a moderate correlation and the beige colour means a weak correlation between the independent variables and the dependent variables.

So, we are going to see the result of the client attributes in all projects surveyed, which resulted in the following findings. The first finding is that the actions of the client organisation and the attitudes of the client organisation appear to affect project *time*. We see that increased *cost* is associated with the *complexity of the client organisation* plus the *actions* plus the *attitudes*, as well as with the actions and the proficiency of the client Project Manager (CPM). The *functionality* of the project appears to be affected by the *consistency of actions* of the client organisation, plus the *proficiency* of the client organisation, as well as the *actions, attitudes, proficiency and experience* of the Client Project Manager.

Later on, the procurement types have been considered as a moderator variable.. So we split the 31 projects according to their procurement types; *traditional lowest tender*, *traditional negotiated*, *design and build lowest tender*, and *design build negotiated*. The results were as follows:

The *traditional lowest tender* showed a moderately strong association between project *time* and consistency of clients' actions and attitudes. On cost there were nothing more

than relatively weak correlations.. For *functionality*, this showed moderately strong association with the *continuity of client organisation* and the *experience* of the Client Project Manager.

For the *traditional negotiated* procurement method, there were no strong correlations with any of the client organisation factors, though there were associations with the attitudes and the experience of the CPM. Neither were there any significant associations in the *design and build lowest tender* projects. It seems that in design and build the role of the client is less influential on project outcomes, because the type of procurement wouldn't enable the client's further involvement. In traditional procurement the client is affecting the process of the whole procurement and construction stages while for the design and build, it is limited for the client to do so, it is only for certain time and then everything will be done by the contractor.

Within the client organisation, the findings indicate that *unified organisation* and *consistent actions* and *consistent attitudes* are associated with keeping to schedule and to budget and improved project functionality. High levels of client proficiency will also improve project functionality. As for the Client Project Manager, its actions, attitudes, proficiency and experience show slight-to-moderate associations (if we compare it to the client organisation) affecting the duration of the project less, but they are crucial in maintaining functionality. This was for *all* projects, irrespective of procurement type. There were differences between the various procurement types.

Under the traditional route the involvement of the client organisation is likely to impact project outcomes more than the CPM, while in the design and build the impact of both client organisation and his Client Project Manager is less acute and this is logical when one considers the patterns of control in the two procurement types.

Speaker 2: There was a lot of shorthand here (in the diagrams) but most of us can work things out from the diagram.

Speaker 5: How do you come up with that categorisation the difference attributes? So why didn't you measure it against things like efficiency.

Aggiag: So the question is why we are selecting those sub-variables, those ones? Well all of them on the left are factors that affect outcomes, according to the literature review which was done over the last 3 years. Though the existing studies do not show how they affect these outcomes in any detail. They fitted well with the two case studies as well (Tripoli Medical Centre and Guys Hospital) where it was observed that in both projects, these sub valuables are critical in causing time and cost overruns. So I started from those two case studies plus the literature review in order to generate those variables and sub valuables.

Speaker 5: Could I ask how do you collected your data, whether by mail shots, surveys or interviews?

Aggiag: First of all, I made contact with Newcastle City Council, Sunderland, Durham, Gateshead and some other council here in the North East. Then, I made a brief introduction about the scope of work for the research, and we asked them whether they would like to participate in such a study, and most of them said okay. And next, I prepared questionnaires and sent them, explaining the details of every questionnaire.

Sometimes, in cases where the respondents needed more clarification, then I had to talk face-to-face or by telephone to them as well.

Speaker 5: So on the far left you have got a number of issues like the complexity and attitudes, which you bundled under the heading of consistency, you don't do any parallel comparison?

Aggiag: Yes I tried, when I first input the data into SPSS, to see whether we have to combine one or two variables in order to see the effect. Alpha tests were carried out and showed that it was better to go for each sub independent variables directly instead of combining any of them. So they are bundled from the start (sometimes they were mentioned in the literature as more composite variables) but then they were treated individually when doing the correlations.

Speaker 5: So when people received the questionnaire, were they able to answer your questions? Did they know what you were asking about? These are difficult issues, aren't they?

Aggiag: It looks so, but as I mentioned, most of the time I was there at the Council and meeting the Head of the Department. They collected people into the room and then I explained and all of them said 'okay', they understood, 'the questions are clear' and they were ready to respond to the questions according to the statement which was presented.

Speaker 5: So you ran a focus group?

Aggiag: We *had* a focus group, after getting the findings from the two case studies just the purpose of narrowing down the definitions of the client attributes and also the project outcomes, in terms of time, cost, and functionality. There are plenty of factors that could have been looked at, so the first purpose of the first focus group meeting was to narrow that down and to make the research a little bit more focussed.

Speaker 2: So, it certainly was not sort of a blind mail shot? You knew everybody that received the questionnaires and you were in contact with most of them?

Aggiag: Yes

Speaker 5: so they had a better clearer understanding than they would have had, assuming a postal questionnaire.

Aggiag: Yes

Speaker 6: Functionality... what do you mean? What was your explanation of what it meant? Can you explain that?

Aggiag: Functionality here is targeting the final... the evaluation of the final output of the project. Whether it is meeting the space requirements, the satisfaction of the client, or whether it is looking at the process stated in the brief.

Speaker 8: How do you actually distinguish the variable *costs* - whether the project is successful or not?

Aggiag: Yes, for both time and costs we have the actual costs of the project and then we have the final account costs, we used cost index by divining the final costs to the actual costs and finally the final figure shows the cost indication and details of that were shown in the thesis.

Speaker 8: Where is that index derived from? Is that a subjective thing or how?

Aggiag: No. It is just obtained by dividing actual cost by budget cost, one by the other, whether it is 10% over runs. It just makes the figure easier.

Speaker 8: Just coming back to the definition of functionality, you were saying it was sort of subjective assessment about the client, the extent to which the client the usual project was happy that it met what the client wanted.

Aggiag: Yes.

Speaker 3: Just picking upon that functionality aspect - whether clients *do* get quality on design and build - because there is an important link - there is a perception that clients don't get functionality or quality on design and build projects. Is there anything that says something about that?

Aggiag: You mean comparing design and build with traditional?

Speaker 3: Yes, Design and Build against Traditional projects and the views on what project/product there is at the end? Was there any, because I remember you were saying that the results on Design and Build and negotiated projects were not very conclusive.

Aggiag: The results showed no strong effects or correlations in the Design and Build projects.

Speaker 3: So does that suggest that there's no effect on functionality?

Aggiag: In Design and Build projects there is no apparent effect of the client organisation and the client project manager on time, cost and functionality.

Speaker 2: Yes I think there is an interesting point that you didn't do what... (to my knowledge)... which was to see whether Design and Build projects score worse on functionality than traditional ones. But that's because that wasn't really what you were looking at. What you were looking at, I think, was the effects of those things on the left of the model on all project and then, individually on differently procured projects. It would certainly be an interesting by-product of your research.

Speaker 6: The interesting thing is that time and costs are fairly objective and functionality is what your client wants in the first place and they are aware of what it is, and the attitudes that they have and lessen the expectation.

Speaker 2: What the other factor is, is that clients have different levels of expectation ... a developer might not want the same sort of functionality as another type of client.

But the way that this gets around that this is all these are public sector clients. You would imagine that they have the same sort of idea of what they want out of a project.

Speaker 6: Again, in term of measurability, the top few things in term of attributes are difficult (but possible) to measure in a quantitative way but how do you measure proficiency and experience from the client point of view?

Aggiag: Again, it is by putting those questions to other members of the project team to evaluate them. Namely the architect, the structural engineer, the quantity surveyor, the services engineer and the main contractor that all work with the client in project x. So, their evaluation is put in a scale... how they evaluate their client in terms of its proficiency, in terms of its capability to run the contract etcetera. So it is again another evaluation from other members of the project team.

Speaker 2: You put it on a scale?

Speaker 5: So most of this on a qualitative 1-5 sort of scale?

Aggiag: Yes, except the time and cost. These were quantifiable.

Speaker 3: So the question to the client is about how the complexity affects time and cost?

Aggiag: No, we are talking about project complexity, but about the complexity of the client organisation itself.

Speaker 3: So what were 'actions' then? I see, they measure consistency in their actions.

Aggiag: Yes

Speaker 4: You produced some strong correlations between these activities and those outcomes shown by the diagram and for those things, for some reason negative correlations if you look at 4 slides further on? I wonder, if you look at consistency and actions there against time, it means that things correlate negatively I just wondered how it expressed in the data?

Aggiag: Okay. The analysis of the negative correlations depends on the predications that were assumed for the hypotheses. For example, the results show that there is a moderate negative correlation between *consistency of client organisation actions* and *time*, reflecting the fact that a *higher level of consistent actions* by the client organisation would result in the *project being more likely to be on schedule*. While for the *complexity of the client organisation* (which is positive correlated) this indicates that high levels of *complexity of the client organisation* would *increase the cost* of the project.

Speaker 3: Was that a record of actual communications or was it an evaluation on the scale of one to five? So, in other words, the more actions there were, the more consistency there was and the less the time.

Aggiag: No, the more consistency there was the less the time the project took.

Speaker 2: In fact, you looked at them all first and predicted what you expected to find? In other words, you didn't get a situation where the better the project manager the greater the cost, or something illogical like that?

Speaker 8: Was the project manager a single person or an organisation?

Aggiag: A single person.

Speaker 2: And again 'project manager' is a dodgy term.

Speaker 3: So you were asking the client's people about how their consistency or whatever affected the project proficiency? You were asking the client themselves, how they considered they performed?

Aggiag: No, we were asking other construction team to evaluate clients

Speaker 2: How many different bodies' quotes do you have for the each project? You ran through them a few minutes ago?

Aggiag: There are five: the main contractor, the architect, structure engineer, QS and service engineer. And the client, they were usually the lead-in to the other respondents.

Speaker 3: So do you differentiate between the different groups of the subjects or do you grasp all of them together?

Aggiag: No. What happened was when we first met during the meeting with head of the department and we got the City Council involved, for example, we just had those first meetings and he said that he will meet with the rest of his people as well and will distribute the questionnaire to them, explaining the same thing which I have already done and in some cases revisiting them as necessary.

Speaker 6: Presumably some of the consultants were in-house consultants, and some were external consultants?

Aggiag: most of them were external.

Speaker 3: I think you probably found that in-house design team is in a better position to talk about the client than the external consultants.

Speaker 2: What are everybody's general thoughts about the results? I know that we'll probably need to look back at them again, probably a little bit slower than last time.

Speaker 4: The lines that are coming up, the red line, the yellow line are they strong correlation, weak correlations?

Aggiag: No, in fact only the strong correlation has been shown. There are two types shown on the chart. The red arrows are for client organisation and yellow for client project manager.

Speaker 2: So we could say there was a strong negative correlation between consistency of action and time. In other words, the more consistent the client is with its actions, the less the time overrun of the project is likely to be. I think this is what originally interested Aggiag in the first place because he worked on a project that was 12 years overdue.

Aggiag: Yes 12 years overdue (for Tripoli Medical Centre) and 3 years in the case of Guys Hospital, and maybe you heard recently about the Scottish Parliament as well. Costs and time as well produced the same effects.

Speaker 2: That makes sense. Clients and consistency or to put it anther way inconsistent client actions and attitude have a disastrous effect on the timescale of the project.

Speaker 8: It all makes sense totally.... probably because of variations ...

Speaker 2: And what happens later on is that if you take just Design and Build projects.. the gate is shut on them to an extent, because the client can't change its mind afterwards. That makes good sense.

Speaker 8: So, there's another thing, there's a vested interest in how and how much the client is changing his mind and his attitude and the others on the contractual structure sees this as a reason for it and then said ' yes we want an extension of the time'.

Speaker 2: We talked about consistency and continuity. That (continuity) was probably an easy one to count in the Case Studies because it was possible to count at how many times and how many different people were on the committee of Tripoli Medical Centre and so forth, to take account of that. For consistency, you could perhaps count variations and add some sort of standard variation on a typical project and so forth. You were not down to routes of just asking people is this better or worse than normal?

Speaker 9: How many projects were there, again?

Aggiag: Thirty-one. And they were broke down to D and B and traditional.

Speaker 7: How would you define the term continuity?

Aggiag: Probably, there's no effect on continuity except maybe in one of the chart which we shall see later but it seems continuity of the client organisations or CPM has no effect on project outcomes except in one case which would appear in the next chart.

Speaker 7: Likewise with the project manager?

Aggiag: Yes.

Speaker 2: The interesting thing there is the two things that are actually going in case study project originally were central government projects as opposed to local government projects and I think you are likely to get continuity in a local government project. Whereas you know the member of Parliament, the Scottish Parliament

whenever you are going to get changed and the changing team of client as people pass the buck. These are all local authority public sector projects, so they are less likely to have 'continuity of client' problems.

Speaker 4: Was there any attempt to record/ code project type as well? Project of a certain type.

Aggiag: There was a mix of projects from schools to project relating to the Home Office, university, there are some hospital and medical care. So it was a mix of projects.

Speaker 8: What was interesting in this study is that the *experience* of both client organisation and client project manager didn't seem to have any affect on time and cost.

Speaker 7: We are talking about the predictability of costs aren't we, not value, we are just looking at predictability, with no outside comparison of the costs?

Aggiag: Yes.

Speaker 7: But .... is right, in that what happened because they were all local authorities they were not big variation between their experience, maybe there is with their proficiency I don't know.

Speaker 7: Do you separate design time and construction time?

Aggiag: No. I'm just looking at construction time, construction time from start to finish. I think most of the contracts stipulate that actual start of the time starting from the signing of the contract which will run from the actual start of the ...

Speaker 2: I don't know whether there is any, whether the DB tend to come from one or from another local authority or another one or do they spread equally throughout.

Aggiag: They are spread equally throughout.

Speaker 8: About the relationship between the sophistication of the client and the procurement method. Those clients that are relatively uncomfortable in term of the construction process would go for traditional procurement or perhaps Design & Build, and the more sophistication you get the more you move towards Construction Management procurement type...

Speaker 3: Yes, indeed. The projects within each local authority... do they fall into any specific categories, in terms of what type of project they were...

Aggiag: We have classified them in one table but this could be shown to you later.

Speaker 9: The 'lowest' category out of your 31 ... when it says 'it doesn't mean that it was the lowest bid ... the winning bid was the lowest...

Aggiag: It just means that these projects were let on a 'lowest bid' basis. It was traditional selective tendering based, that was what it means. 'Lowest' just meant

traditional selected tender as opposed to traditional negotiated. So, we are looking to traditional procurement on time... against actions, attitudes...

Speaker 2: I think there maybe a learning point there, where, you know ... let's take the obvious with traditional selected tender as opposed to Design and Build or anything else. The consistency of client action and attitudes really does have a big impact, you know this direct line between how long the job going to take and whether the client got his act together. This is what is emphasised in that sort of procurement, would that be right?

Speaker 7: Yes, that's right.

Speaker 3: It sometimes means (with Design & Build).... being signed off: 'there you go'. That certainly has an impact on the costs certainly. For the contractor, it would be in their interest to finish on time because this is more their obligation...

Speaker 2: I think that ties in with what someone was saying ... that the approach of the client and how they go for traditional lowest selective tender.

Speaker 4: They are all public sector projects in the UK. Has there been any indication of the fair amount of pressure on local authorities over the past few years, to change the way of their operation with new initiatives to try and deliver Best Value? I was wondering whether there was any difference between pre-2000 and those projects after the (Best Value) legislation. Whether there's any projects pre- government intervention... and the ... temporal shift.. between client attitude before government legislation and those cheap post-2000.

Speaker 2: How old are the projects... when were the earliest start and when the latest finish dates?

Aggiag: 1999-2002

Speaker 9: so that's after the [Best Value] legislation.

Speaker 7: 1999 is the Best Value policy..

Speaker 9: 2000 is when the Best Value regime started.....

Speaker 6: So, I don't think in this situation Best Value [legislation] made a lot of difference, in the sense that local authorities were still doing what they always did sometime after the coming of Best Value policy.

Speaker 9: Did somebody ask earlier whether there's any different in project functionality between D&B and traditional?

Aggiag: Yes.

Speaker 8: Were there many Partnering projects within the data you collected... There are obviously a lot of local authorities that have had different levels of input into partnering; whether projects like the like those of Durham, North Tyneside... were there many partner projects?

Speaker 2: Well I think most of the one you called negotiated, were partnered, weren't they? They might be negotiated traditional, negotiated Design and Build; most of them would probably fall into that category, yes. So how many were negotiated in those two categories?

Aggiag: They were four for D&B and four for traditional.

Speaker 8: So, what was the financial size of the project? In terms of the costs?

Aggiag: They varied from £0.3 million to £15 millions

Speaker 5: How did your results compare with those of others? Did any of the previous studies that you found or literature that you found attempt to look at the impact of these issues on time, costs, functionality? Just in order to find out your result were in line with them?

Aggiag: Some of the findings of this study matched the results demonstrated by previous scholars and these were shown in the discussions. But client attributes were not fully analysed and highlighted in previous studies as they were in this study. That's what I attempted to investigate.

Speaker 7: So, this was a knowledge gap?

Aggiag: Yes, that was the rationale of the research problem.

Speaker 2: Interestingly, it seems that the one [from the literature] that was nearest to what you have done was the impact of different clients on their consultants not on projects as it were.

Aggiag: So, with traditional and negotiated projects there were two moderately strong associations between the *consistency of attitude* and *experience* of the client project manager and *cost*.

Speaker 5: Yes, you can understand how experience is better associated with an individual rather than when it is with an organisation.

Speaker 2: Yes. I feel more comfortable with that.

Aggiag: As for the results on D&B projects...

Speaker 2: You haven't got an arrow diagram on that. Presumably this means that in the D&B projects the associations are quite slight, so really D&B projects are, like you were saying ... D&B takes away that kind of client influence...

Aggiag: So again, the research findings.... the result of the interpretation of the data ... shows that unified organisation, consistent actions and consistent attitudes of client organisation are associated with keeping to schedule and to budget and with project functionality, a higher level of proficiency in the client organisation improves functionality.

Speaker 2: I think the bottom one [i.e. *functionality*] you just wonder whether - especially when the way these things were measured - whether there was a backwash - that because the project is functional, they think the client is very proficient or is it because the client is proficient that the project that turns out to be functional. That probably, of all the finding, is the one that you ... should be a bit sceptical about. Whether it was a one-way street. But I think the top two - time and cost - are relevant...

Speaker 7: I think that is entirely subjective.

Speaker 2: The project is finished.

Speaker 9: They are operating, yes.

Speaker 7: All of them are based on fact. ....not just the question of ...local details.....

Speaker 2: And I think you are right ... I think the fact that it is public local authority gets you closer to the end user than it would be in the case of a developer... or whatever... they are more aware of what's needed by the end user than a normal client....I think that corner of the diagram which is least used... the chart on functionality.. and I think the time and costs one is quite robust.

Aggiag: For the client project manager, his action and attitude, the proficiency... its shows that they are less likely to effect the duration of the project but are critical in reducing cost and maintaining functionality.

Speaker 9: Is it external or internal client project manager? Well, did you differentiate between them?

Aggiag: They were sort of 'client on site'... representing the client

Speaker 9: With a lot of these things, you do get surprises. Because a thing doesn't show up it doesn't mean it is not true; absence of evidence isn't evidence of absence.

Speaker 7: The findings, they are many things that haven't being found, they are novel, as you said.

The End

Item	*comments*	*Reference*
Importance of the research area	'These are difficult issues...'	P. 3 line 14 -15
	'The research helps to fill a knowledge gap.'	P. 10 line21
	'The findings are novel.'	P. 11 line 30
Responses and sample quality	'...clearer understanding (of respondents) because not just a postal questionnaire...'	P. 3 line 30 - 31
	Group noted that there was a good sample of respondents	P. 6 line 15 - 18
Effect of procurement type D+B and Traditional on functionality and actions	Interest in whether D+B projects give inferior functionality than Traditional	P. 4 line 18 - 21 line 27 - 30
	In *traditional selected tender*, the consistency of client actions and attitudes really does have a big impact	P. 9 line 7 - 12
	'D+B takes away that kind of client influence.'	P. 10 line 35
	'the more consistent client is with its action and attitudes, the less time overruns. It all makes sense totally.'	P. 7 line 5 - 6 P. 7 line 15
Client changes	'In D+B clients can't change its mind.'	P. 7 line 17
	'How much the client change his mind and his attitude.'	P. 7 line 19 - 20
Public sector clients	'Public sector clients are likely to have a better appreciation of what the end users want.'	P. 5 line 3 - 4 P. 11 line 17 - 20
Explanations of how +ve and –ve works	Wondered how +ve and –ve correlation were expressed in the data	P. 5 line 27 - 28
Project manager	'The term PM is ambiguous.'	P. 6 line 10
Continuity of the client	There was no effect of this factor because of the sample type (LA)	P. 7 line 22 - 27 P. 8 line 1 - 7
Effect of project type	Was there any attempt to record/ code project type?	P. 8 line 8 - 9
Experience of CO and CPM	'The experience of both CO and CPM didn't seem to have any affect on time and cost.'	P. 8 line 13 - 15
Indication of procurement preference	'...Whether the D+B tend to come from one or another LA.'	P. 8 line 26 - 27
Sophistication of the client	The relationship between sophistication of the client and the procurement method	P. 8 line 29 - 33
Best value legislation	The influence of BV upon public projects	P. 9 line 19 - 34

Table I.1 Summary of the findings from the second focus group meeting

Appendix I: Questionnaire

M. A. Aggiag

University of Northumbria
School of Built Environment

Dear participant,

I am writing to you asking your cooperation for a research I am undertaking for my PhD looking at how can client-related attributes in public-project building construction affect the project outcomes. I would like you to complete and return the enclosed questionnaire. The following information explains what the questionnaire is about and includes instructions on how to complete it.

Questionnaire Introduction

- These questionnaires are designed to explore the role of the client organization and the client project manager in specific way, which can be demonstrated as how can client organization and client project manager attributes in regards of their consistency, continuity and proficiency affect the project outcomes in regards of time, cost and function.
- The questionnaire is designed to minimise handwriting as much as possible.
- Questions with a tick box should be answered with an X.
- The extra information line (comments) can be left blank or filled in with as much or as little information as you want.
- These questionnaires are completely anonymous and information will be used solely for this research project. The questionnaires will be destroyed after the completion of the project. No record of respondent's names will be kept or used.
- The result of this study after completion will be available for respondents who may are interested in obtaining it.

Please return to:
M. A. Aggiag
6 Dereham Court
NE5 4TZ
Newcastle upon Tyne

or fax it to:
M. A. Aggiag
School of the built environment
Fax no. 01912273167

Main study-1

Project Number [ ] (for the researcher only)

Name of the project:

The respondent represents:

Main contractor ☐ Architect ☐

Section 1 – Questions Related to Criteria of Measuring Project Certainty

Time

1. The programmed duration of the project was weeks
2. The actual duration of the project was [ ] weeks
3. In case that the actual duration exceeded the programmed, how much of the extension was authorised by the client? [ ] weeks

Cost

4. The overall original contract sum for the project was £s.
5. The final account of the project was [ ] £s.
6. In case that the final account exceeded the contractual price, is it due to: (Please quantify if possible)

	A little				A lot
(a) Variation	1	2	3	4	5
(b) Claims for loss and expenses	1	2	3	4	5
(c) Inflation	1	2	3	4	5
(d) Others	1	2	3	4	5

Functionality

7. The project meets its functional requirements in terms of quality and inter-relationship of space, and the way in which the building is designed to be useful. (Please circle your answer to one score)

Weighting of Functionality	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(very poor)	(poor)	(satisfactory)	(good)	(very good)

Comments:

.....

Section 2 – Questions Related to Factors Affecting project Certainty.

2.1 Consistency of client organization

8. The client organization was highly unified or highly complex.[36] (Please circle your answer to one score)

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Unified or Complex)	1	2	3	4	5
Score	(Highly Unified)				(Highly Complex)

Comments:

.....

9. The client organization was consistent in its ***actions*** during the construction process. (Please circle your answer to one score)

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Actions)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

[36] Example: highly unified would be where there was a single individual as client. A highly complex client would be where there were many organization represented in the client role.

10. The client organization was consistent in its ***attitudes*** during the construction process. (Please circle your answer to one score)

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Attitudes)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.2 Continuity of the client organization

11. Changes in the client organization had impacted this project.

(Please circle your answer to one score)

Weighting of Continuity	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.3 Proficiency of the client organization

The client organization was proficient (e.g. in taking decisions-making early 12. and keeping good communication, etc.). (Please circle your answer to one score).

Weighting of proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

13. This client organization is experienced in construction projects.

(Please circle your answer to one score)

Weighting of Proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

2.4 Consistency of client project manager

The client project manager was consistent in its ***actions*** during the construction process. (Please circle your answer to one score).

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Actions)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

14. The client project manager was consistent its ***attitudes*** during the construction process. (Please circle your answer to one score).

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Attitudes)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.5 Continuity of the client project manager

15. Changes in the client project manger had impacted this project. (Please circle your answer to one score)

Weighting of Continuity	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.6 Proficiency of the project manager

The client project manager was proficient (e.g. in taking decisions-making early 16. and keeping good communication, etc.) (Please circle your answer to one score).

Weighting of Proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

18. The client project manager is experienced in construction projects.

(Please circle your answer to one score)

Weighting of Proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

Thank you for taking the time and effort to complete this questionnaire.

Main study -2

Name of the project:

Project Number [ ] (for the researcher only)

The respondent represents:

Architect ☐ Structural engineer ☐ Quantity Survey ☐

Service engineer ☐

Section 1 – Questions Related to Criteria of Measuring Project Certainty

Functionality

13. The project meets its functional requirements in terms of quality and inter-relationship of space, and the way in which the building is designed to be useful. (Please circle your answer to one score)

Weighting of Functionality	I----------I	I----------I	I----------I	I----------I	I
	1	2	3	4	5
Score	(very poor)	(poor)	(satisfactory)	(good)	(very good)

Comments:

……

Section 2 – Questions Related to Factors Affecting project Certainty.

2.1 Consistency of client organization

14. The client organization was highly unified or highly complex.[37]

(Please circle your answer to one score)

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Unified or Complex)	1	2	3	4	5
Score	(Highly Unified)				(Highly Complex)

Comments:

.....

15. The client organization was consistent in its ***actions*** during the construction process.

(Please circle your answer to one score)

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Actions)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

16. The client organization was consistent in its ***attitudes*** during the construction process. (Please circle your answer to one score)

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Attitudes)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

[37] Example: highly unified would be where there was a single individual as client. A highly complex client would be where there were many organization represented in the client role.

2.2 Continuity of the client organization

17. Changes in the client organization had impacted this project.

(Please circle your answer to one score)

Weighting of Continuity	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.3 Proficiency of the client organization

The client organization was proficient (e.g. in taking decisions-making early 18. and keeping good communication, etc.). (Please circle your answer).

Weighting of proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

7. This client organization is experienced in construction projects.

(Please circle your answer to one score)

Weighting of Proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.4 Consistency of client project manager

8. The client project manager was consistent in its ***actions*** during the construction process. (Please circle your answer to one score).

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Actions)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

9. The client project manager was consistent its ***attitudes*** during the construction process. (Please circle your answer to one score).

Weighting of Consistency	I----------I	----------I	----------I	----------I	----------I
(Attitudes)	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.5 Continuity of the client project manager

10. Changes in the client project manger had impacted this project. (Please circle your answer to one score)

Weighting of Continuity	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

2.6 Proficiency of the project manager

11. The client project manager was proficient (e.g. in taking decisions-making early and keeping good communication, etc.) (Please circle your answer to one score).

Weighting of Proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

12. The client project manager is experienced in construction projects.

(Please circle your answer to one score)

Weighting of Proficiency	I----------I	----------I	----------I	----------I	----------I
	1	2	3	4	5
Score	(strongly disagree)	(disagree)	(satisfactory)	(agree)	(strongly agree)

Comments:

.....

Thank you for taking the time and effort to complete this questionnaire.

APPENDIX J. PUBLICATIONS

Greenwood, D. J., Osborne, A. N. and Aggiag, M. A. (2001) A Comparative Analysis of Administrative Delays in Hospital Building. *Proceeding of the Association of Researchers in Construction Management Seventeenth Annual Conference*, University of Salford: 5th – 7th September, pp. 795-802.

Abstract

Hospitals tend to be large, complex projects, with a variety of technological needs that usually change over time. For this and other reasons, hospitals present considerable challenges for those planning their procurement. It is a measure of the extent of the challenge that hospital projects are particularly susceptible to delays, some of which appear to be common to the construction of large hospitals wherever they are built. In a number of surveys of construction professionals, one of the most influential causes of delay on large public projects has been found to be *administrative* reasons, and we undertook to research this factor in more depth in the context of hospital building. In order to do this, two completed hospital projects were chosen as case studies: the Tripoli Medical Centre in Libya and Guy's Hospital, London. The choice was based on the particular interests of the researchers and the availability of information. The aim of the research is to use these studies as a basis for exploring the impact of administrative delays on the construction of hospitals.

Greenwood, D. J. and Aggiag, M. A. (2004) The Impact of Client Attributes on Project Success. *Proceeding of The 1st International Conference World of Construction Project Management*, Toronto, Canada: 27-28 May, pp. 671-677

Abstract

The process of managing large-scale construction projects can be fraught with difficulties for all the parties concerned. Many factors contribute to this; some are related to the parties themselves, others to the project itself or its external environment. The research was prompted by two case-study projects, both large public-sector hospitals that had suffered from considerable delays and cost overruns. When the causation was examined, similarities emerged that were remarkable, given that the projects were constructed in situations that were geographically, economically, and politically very different. Many of the delays and cost increases related to administrative matters and issues of communication with and within the client [owner] team. Following the examination of these cases and a review of the literature a model was proposed that sought to reflect the impact of such matters as the consistency of client decision-making, and the actual continuity of client organizations upon the normally accepted project success criteria of cost, functionality and, in particular, that of timely completion. The model is currently being tested on a fairly large sample of projects, with data being analysed using structural equation modelling software. The paper presents the context to the study, a description of the formation of the model, the methods of data collection and analysis, and the research findings to date.

Appendix K Glossary of Model Definitions

Code	*Definitions*
CO	Client Organisation
CPM	Client Project Manager
COCS	Client organisation Consistency
COCN	Client organisation Continuity
COPR	Client organisation Proficiency
CPMCS	Client Project Manager Consistency
CPMCN	Client Project Manager Continuity
CPMPR	Client Project Manager Proficiency
V1	Complexity of the Client Organisation
V2	Actions of the Client Organisation
V3	Attitudes of the Client Organisation
V4	Continuity of the Client Organisation
V5	Proficiency of the Client Organisation
V6	Experience of the Client Organisation
V7	Actions of the Client Project Manager
V8	Attitudes of the Client Project Manager
V9	Continuity of the Client Project Manager
V10	Proficiency of the Client Project Manager
V11	Experience of the Client Project Manager
CS	Consistency
CN	Continuity
PR	Proficiency