



THE SOUTH AFRICAN COUNCIL
for the
QUANTITY SURVEYING PROFESSION

Established in terms of the Quantity Surveying Profession Act 2000 (Act 49 of 2000)

PROFESSIONAL SKILLS MODULE NO. 3

**PROVIDE PROCUREMENT ADVICE, ADVICE ON CONTRACT
DOCUMENTS AND PRICE DETERMINATION DOCUMENTS FOR BUILT
ENVIRONMENT PROJECTS**

Unit C27, Block C, Lone Creek, Waterfall Park
Bekker Road, Vorna Valley Ext 21
MIDRAND, 1686

P O Box 654
HALFWAY HOUSE
1685

Tel: (011) 312 2560
Fax: (011) 312 2562
E-mail: registrar@sacqsp.co.za

ORGANISATIONAL COMPONENT

1.0 GENERAL PREMISE AND EDUCATIONAL APPROACH

The general objective with this module is to emphasise **understanding** rather than **memorising** and to develop the professional's skill to apply the principles in a practical way. A problem-driven approach to learning is followed.

2.0 LEARNING ACTIVITIES

2.1 The relevant study material is available through the office of the South African Council for the Quantity Surveying Profession (SACQSP).

3.0 ASSESSMENT CRITERIA AND FEEDBACK

3.1 The learning achieved will be assessed via an on-line multiple choice exam.

3.2 The minimum pass mark for a module is 60%.

4.0 CREDITS

4.1 The credit weighting of this module is 5 category 1 CPD hours. Studying the content of this module alone is not sufficient to master the required skill. Professionals are recommended to study and compare procurement strategies of different types of projects in their places of employment. The combination of different conditions of contract in relation to the different methods of price determination should also be mastered.

5.0 RECOMMENDED READING

5.1 M. Hackett, I. Robinson, G. Statham. *The Aqua Group Guide to Procurement, Tendering & Contract Administration*. Blackwell Publishing, 2007.

5.2 A. Ashworth, K. Hogg. *Willis's Practice & Procedures for the Quantity Surveyor (Eleventh Edition)*. Blackwell Science, 2002.

5.3 J. W. E. Masterman. *An Introduction to Building Procurement Systems (Second Edition)*. Spon Press, 2002

5.4 Construction Industry Development board. *Understanding the Structure of Tender and Contract Documents*. 2009.

5.5 Construction Industry Development board. *Standard of Uniformity in Construction Procurement*. 2010

5.6 CIDB. *Best Practice Guideline A1. The Procurement Cycle*. 2007.

5.7 CIDB. *Best Practice Guideline A5. Managing Construction Procurement Risk*. 2004.

5.8 CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works*. 2005

5.9 Candidates are required to read the following papers dealing with current issues and developments in procurement strategies:

- Pertti Lahdenpera. (2012). "Making sense of the multi-party contractual arrangements of project partnering, project alliancing and integrated project delivery." *Construction Management and Economics*, Volume 30, Issue 1 (January 2012), pp 57–97.
- David Greenwood, Shuwei Wu. (2012) "Establishing the association between collaborative working and construction project performance based on client and contractor perceptions". *Construction Management*

and Economics, Volume 30, Issue 4 (April 2012), pp 299–308.

- Helen Walker, Stephen Brammer. (2012). “*The relationship between sustainable procurement and e-procurement in the public sector*”. International Journal of Production Economics, Volume 140 (2012), pp 256-268.
- Nigel Caldwell, Helen Walker, Christine Harland, Louise Knight, Jurong Zheng, Tim Wakeley. (2005). “*Promoting Competitive Markets: The Role of Public Procurement*”. Journal of Purchasing and Supply Management, Volume 11, pp 242-251.
- Bing Li, A. Akintoye, P. J. Edwards, C. Hardcastle. (2005). “*Critical success factors for PPP/PFI projects in the UK construction industry.*” Construction Management and Economics, Volume 23, Issue 6 (June 2005), pp 459–471.
- Duc Thanh Luua, S. Thomas Ngb, Swee Eng Chen. (2003). “*A case-based procurement advisory system for construction*”. Advances in Engineering Software, Volume 34 (2003), pp 429-438.

STUDY COMPONENT

The competencies, skills and range statement stated in this section are those contained in the South African Qualifications Authority Unit Standards: (i) Provide procurement advice for built environment projects ⁽¹⁾ and (ii) Provide advice on contract documents and price determination methods for Built Environment projects ⁽²⁾.

1.0 PERSONS WHO SUCCESSFULLY COMPLETE THIS MODULE WILL GAIN THE FOLLOWING COMPETENCIES:

The ability to:

- 1.1 understand built environment project procurement systems.
- 1.2 collect information required to determine built environment project procurement requirements.
- 1.3 evaluate built environment project procurement systems.
- 1.4 undertake built environment project buildability analysis ⁽¹⁾.
- 1.5 advise the client on alternative types of contract documents appropriate to the built environment project under consideration.
- 1.6 recommend and agree with the client and consultant team the choice of price determination method, associated method of measurement, and input document requirements.
- 1.7 access and distribute input documents ⁽²⁾.

2.0 RANGE STATEMENT

Candidates are expected to demonstrate their acquired skills through their ability to perform the following in their place of employment:

- 2.1 establish clients' strategic objectives

-
- 2.2 demonstrate a clear understanding of the characteristic, advantages and disadvantages associated with different procurement systems.
 - 2.3 evaluate alternative procurement (project delivery) systems.
 - 2.4 demonstrate the ability to match procurement system characteristics with clients' strategic objectives.
 - 2.5 analyse methods of construction-related buildability.
 - 2.6 demonstrate an understanding of the constructability implications for procurement system choice ⁽¹⁾.
 - 2.7 analyse and understand client objectives and prevailing market conditions.
 - 2.8 demonstrate an understanding of the merits and demerits of alternative contract documentation options.
 - 2.9 demonstrate an understanding of the merits and demerits of alternative quantification methods options for different price determination methods ⁽²⁾.
 - 2.10 combine facts, ideas and proposals into a complex whole.
 - 2.11 understand and apply basic computer skills.
 - 2.12 demonstrate problem-solving skills.
 - 2.13 demonstrate communication and presentation skills ^(1, 2).

MODULE CONTENT

	Page
ABBREVIATIONS, LIST OF FIGURES AND LIST OF TABLES	
1.0 INTRODUCTION	7
1.1 Procurement	7
1.2 Procurement Cycle	7
2.0 BUILT ENVIRONMENT PROJECT PROCUREMENT SYSTEMS	9
2.1 Introduction	9
2.2 Procurement Systems / methods	10
2.3 Choosing the most appropriate procurement system	11
2.4 Types of procurement methods	15
2.4.1 Fixed Price Contracts	15
2.4.2 Cost Reimbursement Contracts	17
2.4.3 Design and Build Contracts	19
2.4.4 Package Deal Contracts	20
2.4.5 Turnkey Contracts	20
2.4.6 Continuity Contracts	21
2.4.7 Integrated Management Contracts	21
2.4.8 Separate / Divided Contracts	24
2.4.9 Partnering Contracts	24
2.5 THE PROFILE OF CLIENTS	26
2.5.1 Categorisation of Clients	26
2.5.2 The influence of Government on Procurement	27
3.0 ALTERNATIVE TYPES OF CONTRACT DOCUMENTS	31
3.1 Introduction	31
3.2 Types of Contracts	31
3.2.1 JBCC Series 2000 Documents	31
3.2.2 GCC 2010 Documents	32
3.2.3 FIDIC 1999 Documents	34

3.2.4	NEC3 Family of Standard Contracts	37
3.3	Selection of the Appropriate Form of Contract	38
4.0	COLLECTING INFORMATION, ETC.	40
4.1	The Client's Needs	40
4.2	The Client's Objectives	41
4.3	Objectives of Procurement Systems	42
5.0	EVALUATING PROJECT PROCUREMENT SYSTEMS	43
5.1	Matching Procurement System Characteristics against Client's Objectives	43
5.2	Understanding Implications of Procurement System Choice Relative to the Selected Form of Contract	43
6.0	UNDERTAKE BUILT ENVIRONMENT PROJECT BUILDABILITY ANALYSIS	44
6.1	Introduction	44
6.2	Forms of Construction	44
6.3	Costing and Optimizing Forms of Construction	45
6.4	Making Recommendations Regarding Buildability Relative to the Cost Implications	45
7.0	RECOMMENDING AND AGREEING ON THE CHOICE OF PRICE DETERMINATION	46
7.1	Alternative Methods of Price Determination and Associated Methods of Measurement	46
7.2	Expected Quality and Timing of Input Documents	46
7.3	The Clients on the Price determination Method and associated Method of Measurement	47
7.4	Identifying, Scheduling, Timetabling and Prioritizing Documents	47
8.0	ACCESSING AND DISTRIBUTING INPUT DOCUMENTS	48
8.1	Checking and Recording Input Documents	48
8.2	Distributing Input Documents to Quantity Surveying Team	49
9.0	TRENDS IN THE USE OF PRICE DETERMINATION DOCUMENTS	49
	SELF-ASSESSMENT QUESTIONS	50
	REFERENCES	51

ABBREVIATIONS

CIDB - Construction Industry Development Board

LIST OF FIGURES

- Figure 1: Client's and Contractor's perspectives of the project objectives
- Figure 2: Variations on the eternal triangle, showing different priorities
- Figure 3: Sequence of activities foregoing procurement
- Figure 4: Allocation of risk
- Figure 5: Relationship of parties for Fixed Price Contracts
- Figure 6: Relationship of parties for Design and Build Contracts
- Figure 7: Relationship of parties for Management Contracts
- Figure 8: Relationship of parties for Construction Management Contracts
- Figure 9: Categories of Clients in the Built Environment
- Figure 10: The Selection of an appropriate form of contract for building and engineering works

LIST OF TABLES

- Table 1: Advantages and disadvantages of Fixed Price Contracts
- Table 2: Advantages and disadvantages of Cost Reimbursement Contracts
- Table 3: Advantages and disadvantages of Design and Build Contracts
- Table 4: Advantages and disadvantages of Package Deal Contracts
- Table 5: Advantages and disadvantages of Continuity Contracts
- Table 6: Advantages and disadvantages of Management Contracts
- Table 7: Advantages and disadvantages of Project Management Contracts
- Table 8: Advantages and disadvantages of Separated / Divided contracts
- Table 9: Advantages and disadvantages of Partnering Contracts
- Table 10: Features of a JBCC Principal Building Agreement
- Table 11: Features of a JBCC Minor Works Agreement
- Table 12: Features of a GCC 2010 Agreement
- Table 13: Features of a FIDIC 1999 Red Book Agreement
- Table 14: Features of a FIDIC 1999 Yellow Book Agreement
- Table 15: Features of a FIDIC 1999 Silver Book Agreement
- Table 16: Features of a FIDIC 1999 Green Book Agreement
- Table 17: Features of a NEC3 ECC Black Book Agreement

1. INTRODUCTION

1.1 Procurement

The purpose of this module is to discuss the available procurement options, different types of contracts and the appropriate associated price determination methods and to advise the client on the general characteristics, advantages and disadvantages thereof. To put these aspects into perspective, it is necessary to elaborate on what procurement is and what the entire procurement process entails.

Procurement is the process of obtaining goods and services from another party. Procurement systems establish the roles and relationships for the project organisation. The choice of the procurement system is crucial as it influences the overall level of success of the project. The choice of a procurement system requires that the client's objectives and the nature of the end product are analysed early on in the project's life. Care must be taken throughout the project that the established roles and relationships, information systems, forms of contract and the overall style of the project are in keeping with the chosen procurement strategy⁽⁹⁾.

In the built environment, procurement is the process of establishing, maintaining / managing and fulfilling contracts and it is a very integral part of every construction project that occurs at various stages whenever external resources such as plant, material, services, etc. are required⁽³⁾.

The choice of a procurement strategy has the most significant influence on any building project. The strategy revolves around two components, namely the conditions of contract that spell out the roles, responsibilities and liabilities of the contracting parties and the price determination method that is the process through which the services of the contractor is selected. The procurement strategy thus determines the efficiency with which the entire project is produced from design through to completion of construction⁽¹⁴⁾. The procurement strategies pertain to the relationship between the designers and the contractor.

The strategies currently in use are divided into two categories namely traditional and non-traditional strategies. With traditional strategies the contractors only get involved when the design is almost complete while with the non-traditional strategies the contractors are involved at an early stage so that they can contribute to the design process. Price determination documents play a more significant role in the traditional procurement strategy where the project emphasis is on cost, but are also important in non-traditional procurement strategies where more flexibility is required in the design and emphasis is rather placed on the time of completion⁽¹⁴⁾.

The traditional procurement strategies are still widely practiced. However the development of alternative or non-traditional procurement strategies are continually taking place to accommodate modern tendencies and business practices.

1.2 The Procurement Cycle

The procurement cycle is outlined in the CIDB's Best Practice Guideline #A1⁽³⁾ to include the following activities and steps.

Activity 1: What is to be procured?

- Step 1.1 Prepare broad scope of work for procurement.
- Step 1.2 Estimate financial value of work to be procured.
- Step 1.3 Obtain permission to start with procurement process.

Activity 2: Decide on Procurement Strategy

- Step 2.1 Establish applicable preferential procurement policies
- Step 2.2 Establish contract and pricing strategy
- Step 2.3 Establish targeting strategy
- Step 2.4 Establish procurement procedures
- Step 2.5 Obtain approvals for procurement strategies

The focus of this particular module is on this activity

Activity 3: Solicit Tender Offers.

- Step 3.1 Prepare procurement documents.
- Step 3.2 Obtain approvals for procurement documents.
- Step 3.3 Confirm that budgets are in place.
- Step 3.4 Invite contractors to submit tender offers or express interest.
- Step 3.5 Receive tender offers or expressions of interest.
- Step 3.6 Evaluate expressions of interest.
- Step 3.7 Prepare valuation report on the short listing process.
- Step 3.8 Confirm short lists.
- Step 3.9 Invite tender offers from short list.

Activity 4: Evaluate tender offers.

- Step 4.1 Open and record tender offers received.
- Step 4.2 Determine whether or not tender offers are complete.
- Step 4.3 Determine whether or not tender offers are responsive.
- Step 4.4 Evaluate tender submissions.
- Step 4.5 Perform risk analysis.
- Step 4.6 Prepare a tender evaluation report.
- Step 4.7 Confirm the recommendation of the evaluation of tender offers.

Activity 5: Award contract.

- Step 5.1 Notify the successful tenderers and unsuccessful tenderers of the outcome.
- Step 5.2 Compile the contract document.
- Step 5.3 Formally accept the tender offer.
- Step 5.4 Capture the contract award data.

Activity 6: Administer contracts and confirm compliance with requirements.

- Step 6.1 Administer contract in accordance with the terms and provisions of the contract.
- Step 6.2 Ensure compliance with requirements.
- Step 6.3 Capture contract completion / termination data ⁽³⁾.

It must be borne in mind that the CIDB, as an entity of the South African Department of Works, promotes the traditional procurement strategy since all government entities are subject to the regulations laid down in the Public Finance Management Act.

Regardless of whether a traditional or non-traditional procurement strategy is preferred the six activities of

- deciding what needs to be procured;
- choosing a procurement strategy;
- soliciting tender offers;
- evaluating tender offers;
- awarding the contract and
- administering contracts and confirming compliance with requirements

will take place. The activities may not all occur sequentially and may not all be clearly identifiable. For example when a contract is negotiated the criteria for soliciting the tender will not be based on a price determination document. The award of the contract occurs before the pricing is evaluated.

2. BUILT ENVIRONMENT PROJECT PROCUREMENT SYSTEMS

Learning outcomes

After studying this section, you should be able to:

Understand built environment project procurement systems and advise clients on alternative types of contract documents appropriate to the built environment project under consideration by:

- demonstrating knowledge of advantages, disadvantages and general characteristics of the project procurement systems (strategies).
- demonstrating knowledge of differences between public and private sector procurement systems
- understanding the implications of procurement system choice relative to built environment project team structure
- explaining the alternative types of contract documents to the client and relevant stakeholders
- making recommendations to the client and relevant stakeholders on contractual arrangements to be implemented

2.1 INTRODUCTION

The traditional or so-called single stage tendering was the order of the day up until the 1960's. Although the concept of procurement in the built environment was only introduced in the 1980's, several catalysts for changing the way in which projects are procured were identified. These catalysts are:

- international comparison with the USA and Japan and the influence on the European market;
- the apparent failure of the built environment to satisfy the client's perceived needs particularly with the way projects are organized and executed;
- influence of innovation, research and educational development;
- trends to satisfy greater efficiency and effectiveness;
- improved information technology applied in office practices and in manufacturing processes;
- attitudes of professionals towards each other and the
- client's desire for single point responsibility ⁽⁸⁾.

The development of different / alternative procurement systems (strategies) therefore stem from the features of the built environment and changing tendencies driven by the quest for increased value and quality on the one hand and decreased cost and time on the other. The features are:

- an unusually fragmented industry. Every building project requires the involvement of a large number of specialists from both consultancies (architects, engineers, quantity surveyors, etc.) and the construction (main contractors, general contractors, specialist sub-contractors, etc.).
- the specialists are selected on a competitive basis which automatically creates two poles (two parties to a contract) hence the conflict of interest is elevated which complicates building the spirit of co-operation.
- the role of specialists is changing. As their specialisation increases it becomes more likely that their contractual arrangement would be a design-and-construct option.

- the overarching role of the architect requires their involvement in all aspects of design although some of the design expertise is not vested in-house which complicates the management of the design process and makes establishing the design liability difficult.
- expert and experienced clients play a more active role in their projects and apart from setting tough time, cost and quality targets they are also actively involved in all aspects of the project seeking better value, faster construction and bigger profits.

The importance and difficulty of choosing the most appropriate procurement systems to deal with these features cannot be over-emphasised ⁽⁹⁾. The successful management of any procurement system requires the following:

- determining the client's requirements and objectives in terms of time, cost and quality;
- discovering what the real needs are and what is secondary;
- assessing the viability of the project and advising on funding, etc.;
- advising on the organisational structure for the project as a whole;
- advising on the appointment of various consultants and contractors and
- managing the information and coordinating the entire process from inception to completion ^(8, 11).

2.2 PROCUREMENT SYSTEMS / METHODS

The procurement systems applied in South Africa are largely based on those developed in the United Kingdom. Several UK government sponsored reports commissioned to investigate the improvement of the organisation and procurement of construction projects strongly influenced the development of alternative procurement systems. The most important of these reports are:

- Constructing the Team, 1994. (The Latham Report).
- Rethinking Construction, 1998. (The Egan Report).
- Rethinking Construction innovation and Research, 2002. (The Fairclough Report) ^(6, 8).

Procurement systems revolve around two components namely the **conditions of contract** that spell out the roles, responsibilities and liabilities of the contracting parties and the **price determination method** that is the process through which the services of the contractor is selected ⁽¹⁴⁾.

Price determination is conducted through **fixed price contracts (also referred to as measurement contracts) or cost reimbursement contracts**. These terms refer to the method of payment included in the contracts. However in reality contracts are not entirely executed on one or the other but rather on a combination of the two and the most dominant method determines the classification of the contract.

Fixed price items are defined as "... items paid for on a basis of a predetermined estimate of the cost of the work, including an allowance for the risk involved and the market situation in relation to the contractor's workload". The fixed price can either be a unit rate, a section of the work or the complete contract. The contract can thus consist of a multiplicity of unit rates, a series of trades or elements or a single lump sum. A fixed price contract also need not have a finite sum attached to it at the beginning of a contract. For example a schedule of rates is a form of a fixed price contract of which the quantities are unknown ⁽⁶⁾. The measurement that estimates are based on could either be prepared by a quantity surveyor appointed by the client or by the quantity surveyor in service of the contractor. In the first instance the client carries the risk for the accuracy of the quantities and the contractor carries the risk of the accuracy of the pricing and in the second instance the contractor carries the risk for the quantities and the rates ⁽¹¹⁾.

Cost reimbursement items are defined as "... items paid for on the basis of the actual cost of the work".

The essential difference between the two methods is that with the fixed price contract, the contractor takes the risk of being paid at an amount estimated in advance and carries the loss if the estimate is incorrect and with the cost reimbursement contract the client pays the actual amount regardless of whether it is higher or lower than the expected amount ^(6, 11).

2.3 CHOOSING THE MOST APPROPRIATE PROCUREMENT SYSTEM

The challenge of choosing the most suitable method of procurement for any particular construction project is complicated by the need to comply with numerous regulations, achieving value for money, and demonstrating accountability through involvement of professional consultants and management of contractual relationships all within a limited time scale. Regardless of how complicated this might seem to be; the three basic (primary) objectives that procurement is based on are cost, time and quality. These three objectives must always be in balance to ensure a successful product. As soon as one of these factors becomes more important, the other two will “suffer” ^(6, 11).

The extremes of any one of the objectives taking precedence over the other is demonstrated from the client’s perspective at the one end of the spectrum and from the contractor’s perspective at the other end of the spectrum where the respective expectations would be:

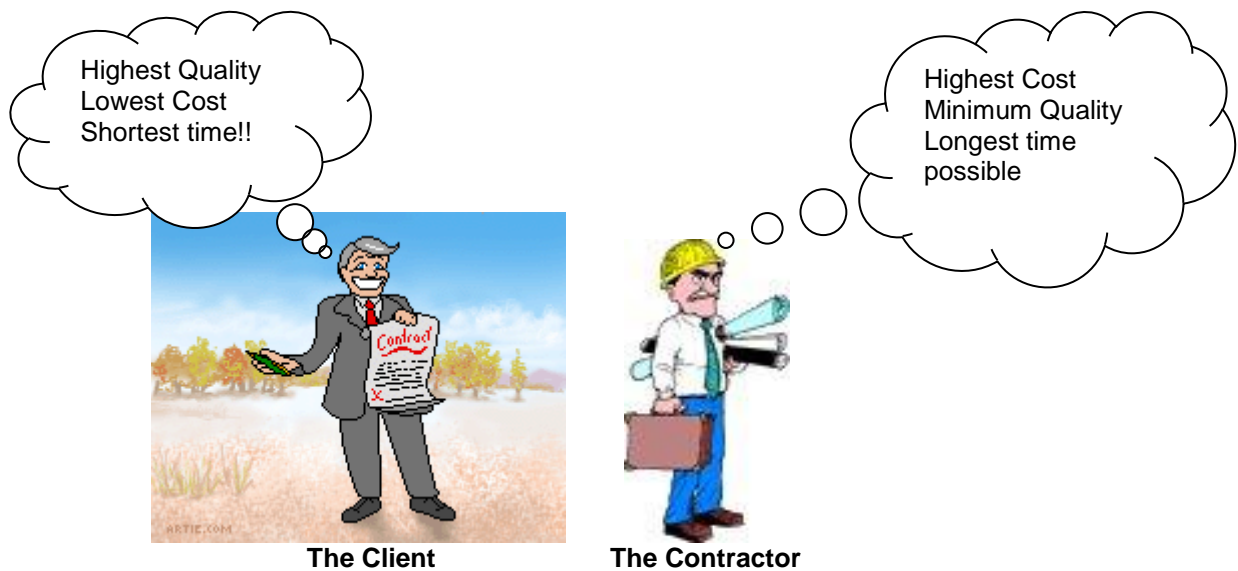


Figure 1: Client’s and Contractor’s perspectives of the project objectives
Source: Author

Both parties will have to compromise if they intend doing business with each other!

The importance and the weight given to each of the three objectives are established in the briefing process with the client. These factors primarily influence the procurement strategy to be embarked upon. If quality is of paramount importance, more time must be allowed to perfect the design, specification and execution. If time is of the essence both cost and quality might be affected detrimentally. When cost is the priority the time would not be affected but there may be an impact on quality ⁽⁶⁾.

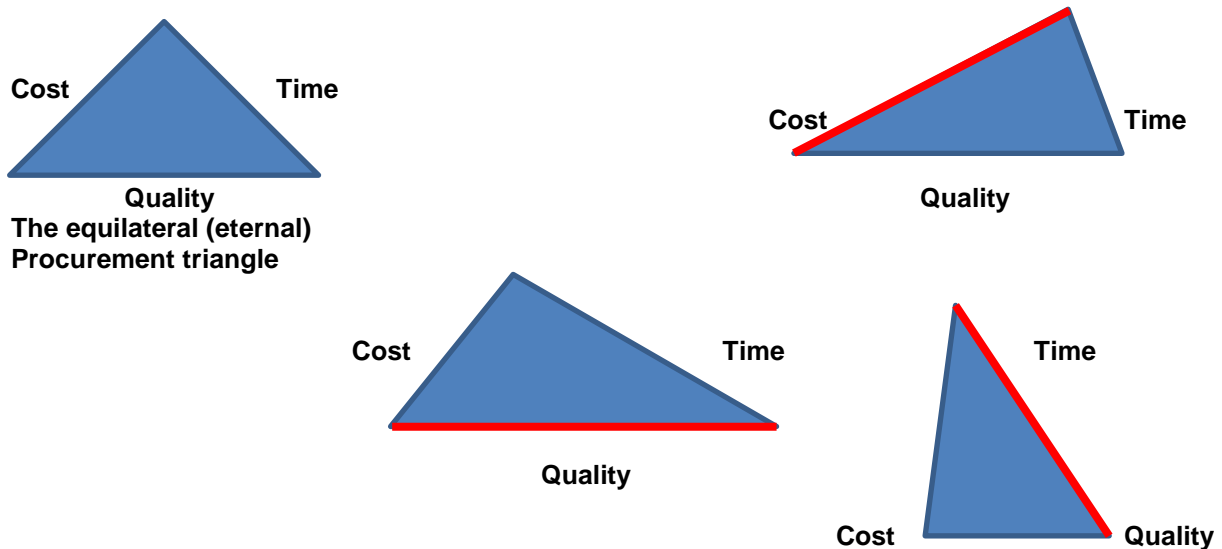


Figure 2: Variations on the eternal triangle, showing the different priorities
Source: *The Aqua Group Guide to Procurement, Tendering & Contract Administration* (page 23).

The interaction between the client (the party that wishes to procure the service) and his professional advisors prior to the establishment of a contract can be viewed as follows:

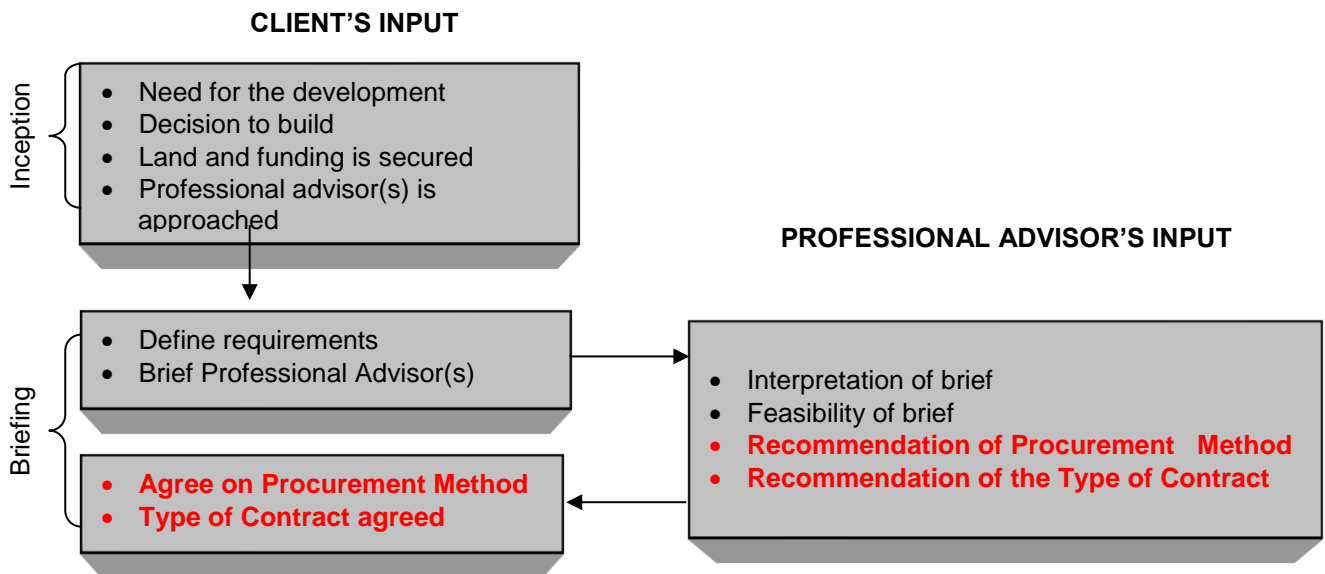


Figure 3: Sequence of activities foregoing procurement
Source: A. A. Kwakye. *Construction Project Administration*. Addison Wesley Longman, (1997:31).

The adequacy and clarity of the brief is of utmost importance as an inadequate brief complicates the design and leads to poor documentation that in turn leads to abortive work and / or excessive variations that in turn lead to additional costs and time.

Apart from cost, quality and time there are two other considerations that need to be addressed and these are risk and accountability^(6, 19).

Every built environment construction project is subject to risk. Risk can be managed, minimised, shared, transferred or accepted, but cannot be ignored. Risk can be managed by applying one of or a combination of the following strategies:

- Eliminating risks – only the most severe risks will be eliminated.
- Reducing risks – reduction is done by the re-evaluation of items, designs, etc. that carry the risks.
- Transferring or sharing risks – risks are transferred by purchasing insurance or shared through contractual arrangements.
- Accepting the risks – minor risks are accepted and an allowance is made for a contingency fund to cover the financial impact should these risks occur ⁽¹⁹⁾.

The choice of the procurement system determines how risk is allocated to the two contracting parties. Figure 4 below illustrates the allocation of risk based on the contracting and pricing strategies commonly implemented.

The illustration shows that a “design and build” procurement system (contracting strategy) allocates minimum pricing risk and affords the employer minimum flexibility to effect changes with maximum pricing risk and incentive to curb costs to the contractor. A typical example where such a strategy would be applicable is the construction of an industrial building where a modular building system is utilised.

At the other end of the spectrum lies the “construction management” contracting strategy that allocates maximum pricing risk to the client with maximum design flexibility and minimum pricing or incentive to curb costs to the contractor.

The “design by client” contacting strategy with bills of quantities as the pricing strategy strikes the “happy medium” with a fair distribution of pricing risk and medium flexibility to absorb changes between the client and the contractor. This is clearly the advantage that ensures that this combination remains a popular choice.

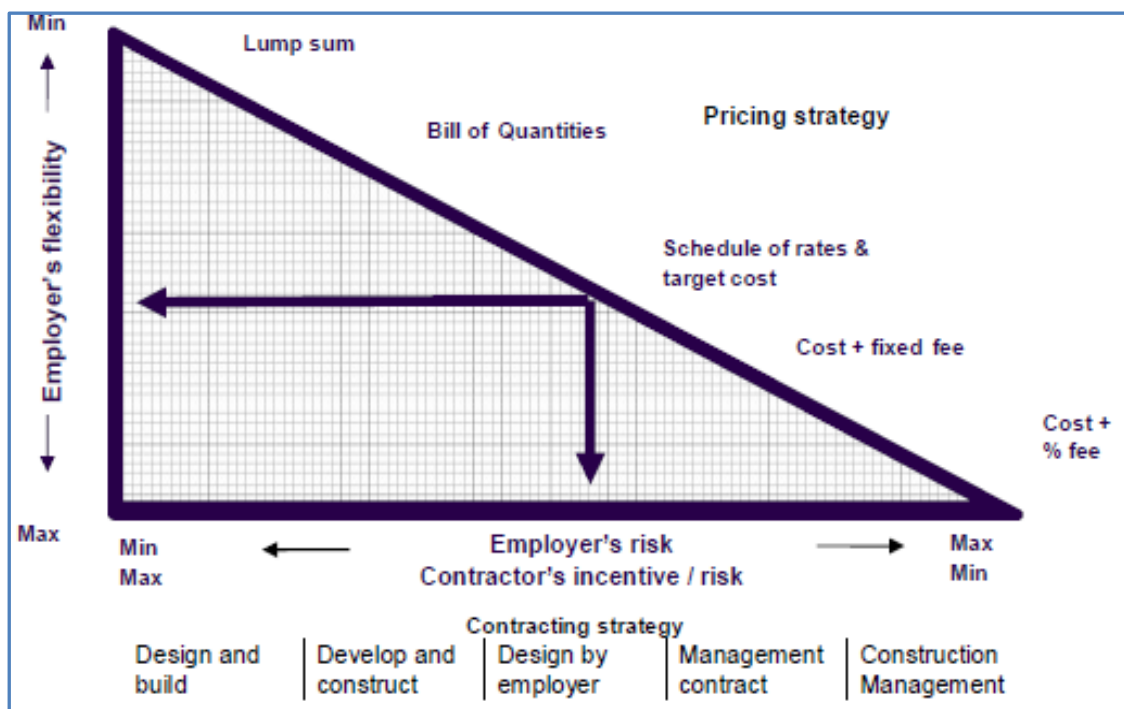


Figure 4: Allocation of risk

Source: CIDB. Best Practice Guideline A5. Managing Construction Procurement Risk. 2004

Candidates are referred to Professional Skills Module No. 13: “Manage Risk on Built Environment Projects” for more detailed information on risk management.

Accountability arises when one party carries out activities on behalf of another party. This is common practice in building contracts where the principal agent is appointed by the client with full authority and obligation to act on behalf of the client. The level of accountability depends on the **terms of the contract** that the agent enacts.

In order to identify the most appropriate procurement strategy the following criteria need to be considered:

- ***The economic use of construction resources:***

The first priority in tendering is to ensure economic use of the contractor's resources and that the price paid for the resources is as low as reasonably possible. Considerations with regard to the traditional elements of labour, material, plant and capital can be summarized as follows:

Labour:

In times of boom there is more work available than there are contractors to do the work therefore the use of competition may be inappropriate and direct negotiations may be more sensible ⁽⁶⁾. The reverse is equally true. Other labour-related issues to consider are labour shortages for specific trade and the possibility of factory-based labour as opposed to site-based labour.

Material:

The incorporation of new materials, the availability, the possibility of bulk purchasing, negotiation of discounts and special relationships with suppliers are all worth considering. Whole life appraisal has also proved that an initial higher investment in quality materials pays off in terms of less maintenance and replacement of materials ⁽⁶⁾.

Plant:

The need for the continued use of expensive plant on site must be considered. Although the implementation of factory-manufactured components that require extensive crane capacity saves on time and site labour, the cost of a large crane could outweigh the advantage ⁽⁶⁾.

Capital:

Maintaining a healthy cashflow is of paramount importance to contractors. Therefore overdraft and loan facilities should be kept to a minimum. From the contract execution perspective, retention funds should be kept to an acceptable minimum and escalation and variations should be promptly addressed and reimbursed. Careful planning of the use of material, labour and plant in the planning stage is of no use if the contractor doesn't possess the management skill to execute the plan ⁽⁶⁾.

- ***The need for the contractor to contribute to the design and the construction process:***

Where buildability is a challenge, the contractor could contribute to the design solution and the project could be fast tracked. This is particularly relevant for propriety systems or specialist sub-contract installations ⁽⁶⁾.

- ***The incentive to save on production cost and to control it:***

The best way to ensure the efficient and effective use of construction resources is to couple it with a commitment to perform the work for a fixed sum of money by way of fixed price contracts. Contractors do not assume design responsibility, hence it is difficult to realize production cost savings that do not entail a change in the design. Value engineering exercises performed as part of the design phase also limit this possibility. There are however circumstances such as continuity contracts where special contractual arrangements incorporate incentives for possible savings ⁽⁶⁾.

- ***Continuity of work:***

The saying "practice makes perfect" comes to mind when considering continuity of work. The benefit is gained by one contractor performing a series of contracts for similar kinds of projects that result in improved efficiency, design and construction solutions. Careful planning needs to be incorporated into the initial contract's arrangement. The danger herein lies in a possible work-overload ⁽⁶⁾.

- ***Risk assessment and allocation:***

As discussed above, risk is an integral part of construction contracts. It is appropriate for contractors to accept the risk for activities that are entirely under their and the professional team's control in return for a profit. It is however not appropriate for the contractor to take on the entire risk for the

project, hence some risk will be channeled to other parties better equipped to assume the risk such as insurance companies through purchasing insurance for a fixed premium and the client and designers through conditions of contract ⁽⁶⁾.

○ **Accountability:**

As stated above accountability arises when one party acts on behalf of another party. The extent of the accountability depends on the authority and responsibility delegated to the agent. The responsibility for the main objectives in built environment projects; cost, time and quality are addressed in the conditions of contract.

It should be recognised that many contracting firms would be able to successfully construct a project from architect's drawings but would not have the desire or the ability to make the kind of contribution required by alternative or non-traditional procurement systems ⁽⁶⁾.

2.4 TYPES OF PROCUREMENT METHODS

Several non-traditional or alternative procurement methods have been developed to address the shortcomings of the traditional procurement method. The methods are however not mutually exclusive and a combination of options related to contractor selection and professional team relationships can be combined to achieve the option best suited to the projects at hand ⁽⁸⁾.

The procurement methods discussed below are currently the most commonly practiced. New procurement systems will continue to be developed as requirements and demands from clients, consultants and contractors change ⁽⁸⁾. The procurement systems are discussed in terms of their general characteristics, advantages and disadvantages.

2.4.1 Fixed Price Contracts (also termed the traditional option)

This method entails that the client appoints an architect to produce a design and construction information according to the brief, invite tenders, administer the contract during construction and settle the final account. The contractor is selected on a competitive basis or through negotiation and is only responsible for the execution of the work according to the contract documentation ^(6, 8, 9, 11, 13, 16, 17).

With Fixed Price Contracts the fixed price items are paid for on the basis of predetermined costs. Contracts of this nature may consist of an array of unit rates, a series of trades or a single lump sum. Fixed price contracts do not necessarily have a finite sum attached to them at the beginning of the contract for example a schedule of rates. These contracts are still regarded as the norm ^(5, 6).

The alternative forms of fixed price contracts currently used are:

- **Lump sum contracts (drawing and specification)(contracts without Bills of Quantities)**

This is the simplest type of a fixed price contract and should really only be used on small and simple projects. This method entails that each contractor measures the quantities from the drawings and specifications and prices them to determine the contract sum. The contractor consents to execute the works for a stated total sum. Many resources are wasted due to multiple parties measuring quantities and the price comparison can be unfair. Contractors will tend to increase prices due to the increased risk they carry to compensate for possible measuring errors. The contractor is paid accordingly regardless of whether the cost of the increased risk is incurred or not ^(8, 11, 15, 16, 19).

- **Contracts based on Performance specification**

With this method the contractor is required to provide a price based upon the client's brief and user requirements only. This is quite a vague approach and contractors would tend to choose the least expensive materials and method of construction that complies with the performance standard ^(8, 11).

- **Contracts with Schedule of Rates**

This method is used when it is impossible to determine the scope of work at tender stage. A document similar to a bill of quantities is prepared but contains no quantities. The contractor prices the items and the price is determined when the quantities are re-measured. The biggest disadvantage with this method is that there is no indication of a contract sum or final price until all the work has been re-measured ^(8, 11, 15, 19).

- **Contracts with Bills of Quantities**

The bill of quantities is prepared by the quantity surveyor and all the contractors price on an equal basis and are evaluated on price only. This form provides the best basis for estimating, tender comparisons and contract administration ^(8, 11, 15, 16, 19).

- **Contracts with Provisional Bills of Quantities**

In some instances early start on site is required and the accuracy of quantities is compromised as the measurement is carried from incomplete drawings and/or specifications as close as possible to the items and quantities contemplated ^(11, 15, 16, 19).

The key feature of the procurement method is that the design and the construction are separated and the contractor accepts no design responsibility. The relationship of the different stakeholders with this method is as follows:

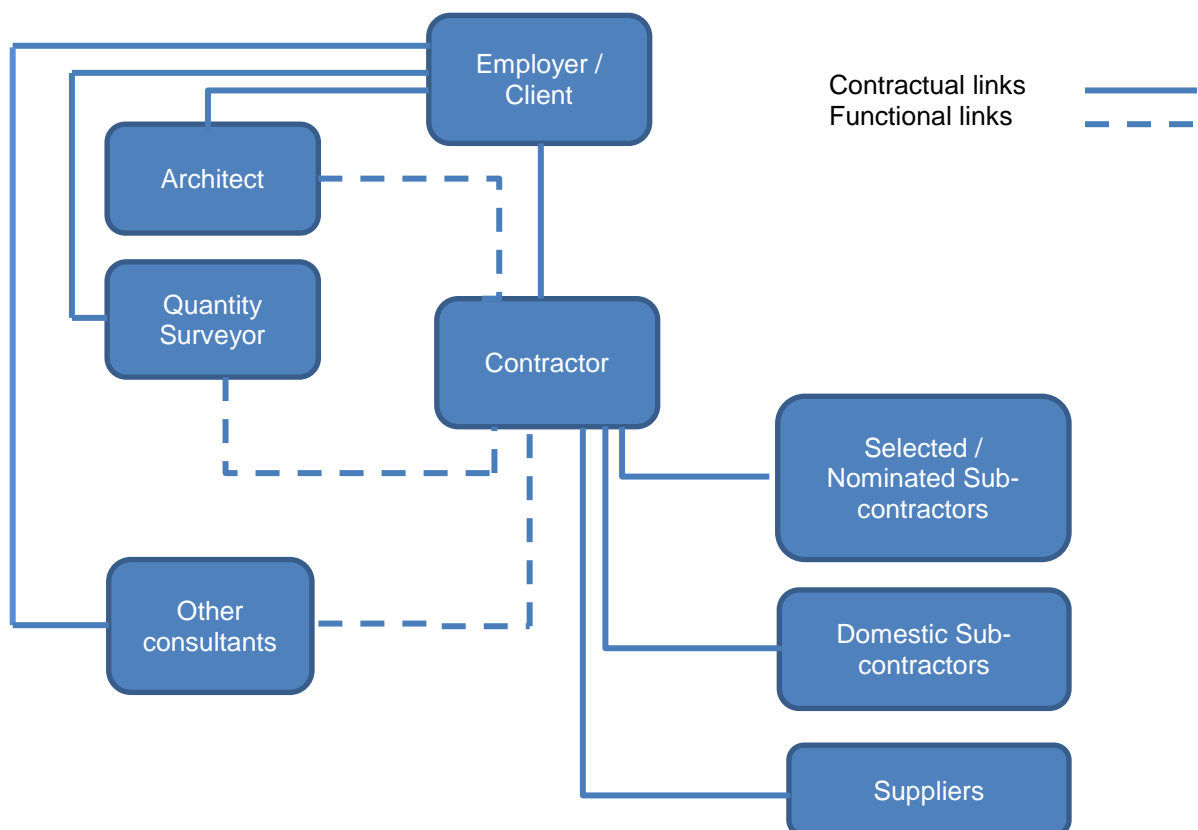


Figure 5: Relationships of parties for Fixed Price Contracts

Source: A. Ashworth, K. Hogg. *Willis's Practice & Procedures for the Quantity Surveyor (Eleventh Edition)*. Blackwell Science, (2002:185) adapted

The main advantages and disadvantages of the fixed price procurement options are as follows:

ADVANTAGES	DISADVANTAGES
Employer's financial commitment is known before entering into a contract.	Design takes time that results in an increased overall project time and a lengthy time for inception to start.
The design is complete or far advanced.	Client has no control over the contractor's programme.
Cash flow requirements can be determined.	Unavailable information for documentation may result in inadequate contract documentation.
Relatively low tender prices are obtained.	Contractual claims are endemic – late supply of project information and variation orders.
Risk of variations is contained. Client assumes less financial risk.	Premium for the risk is paid to the contractor whether the risk materialises or not.
Built-in incentive for the contractor to work effectively and to complete the work as soon as possible to maximise his profit.	Time and production cost savings are lost to the client and only the contractor benefits.
	Lack of contractor involvement in the design.

Table 1: Advantages and disadvantages of Fixed Price Contracts

Source: Combination of several sources (6, 8, 11, 13, 16, 17, 19)

2.4.2 Cost Reimbursement Contracts

Under this contractual arrangement the client undertakes to pay the contractor the actual cost of labour, plant and material used in the execution of the work and agrees on a charge to cover the contractor's overheads and profit. This charge is normally expressed as a percentage of the actual cost.

This construction arrangement is applicable in special circumstances such as emergency work projects and for projects where the character and scope of the work cannot really be determined. Instances where cost reimbursement contract may be applicable

- the client wishes to have the flexibility to influence the execution of the works and assumes the entire risk;
- the extent of the work cannot be accurately predicted but early start is required;
- exceptionally high quality standards apply and the
- work is of an experimental nature (6, 8, 11, 16, 19)

The different form of cost reimbursement contracts are:

- **Cost plus percentage**

The contractor is paid for actual costs plus a pre-determined percentage to cover profits. The main criticism of this contractual arrangement is the lack of financial incentive because the contractor's profit is directly related to higher expenditure (6, 8, 11, 16, 19).

- **Cost plus fixed fee**

Where the contractor is paid a fixed pre-determined fee instead of a percentage of the cost, some degree of financial incentive is introduced. The downside is that the contractor can only enhance his profit margin by reducing management cost and this defeats the reason for choosing this method (6, 8, 11, 16, 19).

- **Cost plus variable fee (also termed target cost contracts)**

With this method a target fee consisting of a fixed amount and a variable amount that is dependent on the actual cost is set before the contract commences. The variable portion of the fee is then adjusted to correspond with the increase or the decrease of the actual costs. The challenge here is to determine a realistic target ^(6, 8, 11, 16, 19).

The main advantages and disadvantages of the cost reimbursement procurement options are as follows:

ADVANTAGES	DISADVANTAGES
Early contractor appointment and commencement with construction is guaranteed.	Client assumes higher financial risk.
Time saved because there is no preparation of valuations and site measurements.	Little financial incentive for the contractor to work efficiently.
The fixed fee introduces an element of competition.	Cost effectiveness cannot be controlled.
High quality is assured as the client assumes the financial risk for time spent on site.	Increased site supervision cost to manage the economical use of materials.
The client has greater flexibility to issue variations during construction.	Contractor selection is based on the added fee and doesn't guarantee the contractor's efficiency.
Contractual disputes and claims are minimized.	
Time and cost for tendering is saved.	

Table 2: Advantages and disadvantages of Cost Reimbursement Contracts
Source: Combination of several ^(6, 8, 11, 16, 19)

2.4.3 Design and Build Contracts

This option was developed to overcome the problems caused by separating design and construction. With this approach one firm or organisation takes on the design and build responsibilities and carries the entire liability. This is usually the contractor. The client identifies the need for the building, appoints an architect to develop a concept design and the requirements for the design and then invites a selected number of contractors to submit proposals incorporating detailed design and estimates ^(6, 8, 9, 11, 16, 17, 19).

Motivation for this method is the comparison between the manufacturing sector and a building project. Although there are similarities there are also some important difference such as the building is built on the client's property, where the buildings are unique ^(8, 16).

Standardised and industrialised buildings such as factories, warehouses, etc. are suited to this strategy

The relationship of the different stakeholders with this method is as follows:

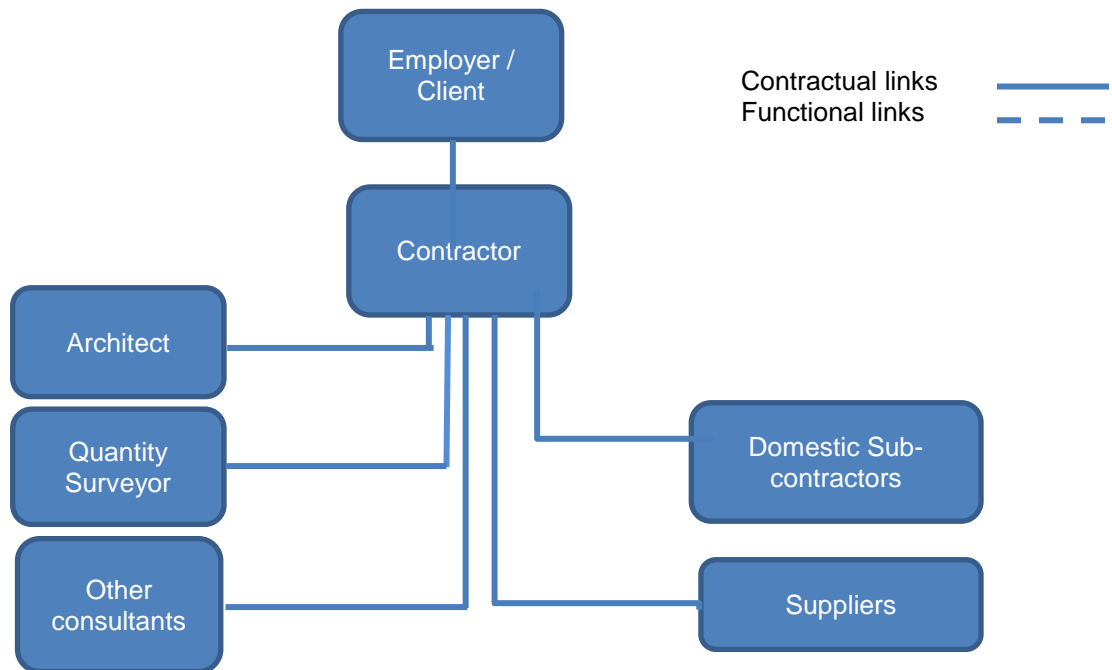


Figure 6: Relationships of parties for Design and Build Contracts

Source: A. Ashworth, K. Hogg. *Willis’s Practice & Procedures for the Quantity Surveyor (Eleventh Edition)*. Blackwell Science, (2002:186) adapted

The main advantages and disadvantages of Design and Build procurement options are as follows:

ADVANTAGES	DISADVANTAGES
The integrated design and construction results in production efficiency due to the contractor’s familiarity with the project from inception	Contractor’s in-house design might not be sufficient to solve the design needs.
The contractual arrangement is simple	Accurate proposals, designs and estimates might increase the cost of tendering.
The project duration is shortened due to the contractor’s familiarity with his own system where the design and construction phases could overlap	An inexperienced client still needs a professional advisor to prepare the brief and evaluate the quality and cost of the design.
The communication between the client and contractor is simple (single point responsibility) therefore blame cannot be shifted to other parties if something goes wrong	Tender comparison is complex as it involves design, quality and cost. The evaluation of differing design alternatives contained in the proposals complicates the tender review process.
Total financial commitment known at an early stage provided that the client doesn’t request any changes	Client might end up with a building unsuitable for his needs.
Competition in pricing and design	The level of cost information is much reduced and would create significant cost management problems.
Design cost element is lower than that of an independent design	
An improved degree of buildability exists because of the contractor’s influence on the design. This would however depend on the initial brief	

Table 3: Advantages and disadvantages of Design and Build Contracts

Source: Combination of several sources (6, 8, 11, 16, 17, 19)

2.4.4 Package Deal Contracts

In practice, the terms “Design and Build” and “Package Deals” are used interchangeably but in fact a package deal is a special kind of Design and Build option where the client chooses a building from the manufacturer’s catalogue. The client is able to view a similar type of building already built elsewhere⁽¹⁶⁾.

The client would supply the contractor with the site, design information and performance specification. The contractor obtains planning permission, negotiates the price (or prepares a tender based on the information) and constructs the building. This system is applied to industrial, commercial buildings and farm buildings⁽¹⁶⁾.

In some instances the client may wish to retain the services of an independent advisor such as an architect or a quantity surveyor to advise on the requirements such as time, cost, quality, etc.⁽⁸⁾.

The relationship between the different stakeholders is the same as for the Design and Build Contracts.

The advantages and disadvantages of Package Deal procurement options are as follows:

ADVANTAGES	DISADVANTAGES
Client saves time in negotiating and execution of the building	Variations during construction are discouraged
Financial commitment is known at an early stage	Control of quality slightly compromised due to the absence of an independent inspector
Direct line of communication between the client and the contractor	Package designs are not aesthetically pleasing
Keen competition between contractors ensures a fair deal	Limited design availability
Client enjoys economy of scale from mass produced building components	

Table 4: The advantages and disadvantages of Package Deal Contracts

Source: R Kirkham. *Ferry and Brandon’s Cost Planning of Buildings*. Blackwell Publishing Pty Ltd, 2007.

2.4.5 Turnkey Contracts

Although this option is not commonly practices it is worth mentioning. The name is derived from the client’s expectation that the building is not just ready for occupation on completion, but also ready for use. In other words “turning the key” and entering. The contract entails the process from inception to completion, including the procurement of furniture^(8, 16).

2.4.6 Continuity Contracts

The aim of these contracts is to save on tendering costs and to expedite production

2.4.6.1 Serial contracts

The contractor undertakes a series of separate fixed price contracts in accordance with the terms and conditions of the initial offer. The only adjustment to be made would be for inflation^(6, 8, 19).

2.4.6.2 Continuation contracts

The benefit of continuity of work is attractive to the client and negotiations are conducted based on the original fixed price contract provided that there is satisfactory performance on the first phase. Each negotiation results in a separate contract with reviewed contractual arrangements. Examples are additional sections of a highway development or an industrial building where the initial demand for a product is underestimated and the facility needs to be extended^(6, 8, 19).

2.4.6.3 Term contract

Specified work is undertaken within a defined cost limit for a definite period. The valuation of the work is based on a schedule of rates or on a cost reimbursable method. This approach is suited to repair and maintenance contracts ^(6, 8, 19).

The main advantages and disadvantages of Continuity procurement options are as follows:

ADVANTAGES	DISADVANTAGES
Contractor can plan ahead.	Terms must be reviewed regularly to ensure optimum cost in a volatile economic market.
Time and money is saved for the preparation of contract documents.	Contractor could suffer loss of profit and reduced income if the client curtails development plans.
Long-term relationships increase quality and speed of the work.	
Cost information from previous work assists in cost forecasting, planning and control.	

Table 5: Advantages and disadvantages of Continuity Contracts
Source: Combination of several ^(6, 8, 19)

2.4.7 Integrated Management Contracts

This contractual arrangement is applicable when the contractor's expertise is required in the design and the construction phase and can be implementing in different ways. The contractor is appointed to manage the construction work in return for a lump sum or percentage fee. This method (and variants) is most suited to large, complex projects where the contractor's input in the design phase is essential and the aim is to reduce the risk that the contractor carries.

2.4.7.1 Management Contracts

The client appoints a contracting firm that contributes their expertise and supplies common service facilities such as site offices, crane, scaffolding, storage, security, temporary facilities for electricity, power, water, etc. normally associated with the Preliminaries trade. The management contractor acts as a consultant and does not perform any work but appoints subcontractors to do so. The management contractor is paid a management fee and compensated for the service facilities and expert advice ^(6, 8, 9, 11, 16, 17, 19).

The relationship of the different stakeholders with this method is as follows:

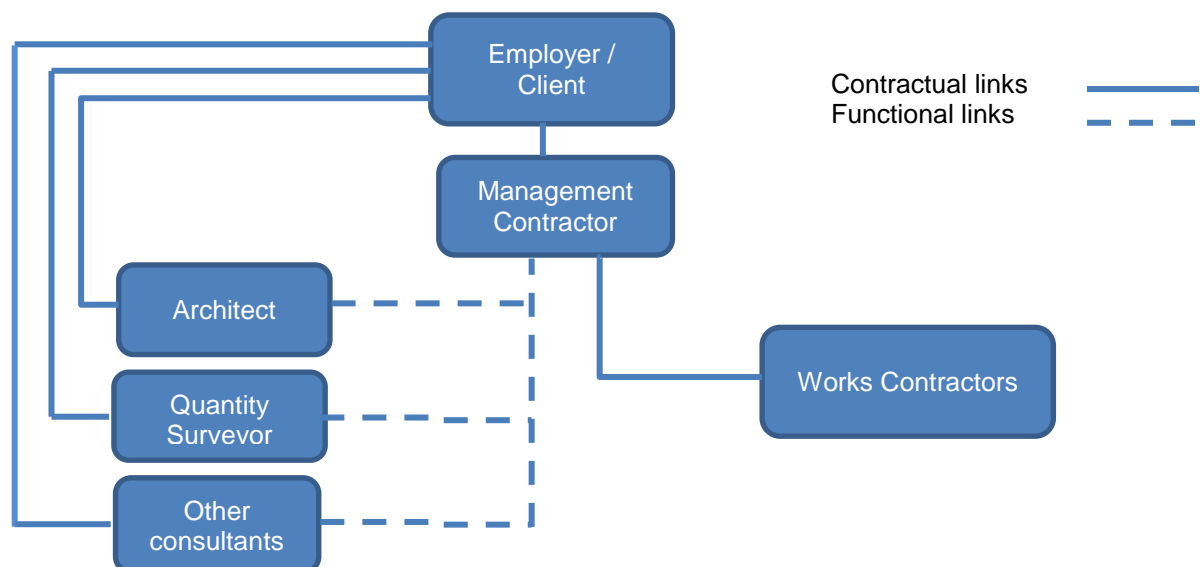


Figure 7: Relationships of parties for Management Contracts Source: A. Ashworth, K. Hogg. *Willis's Practice & Procedures for the Quantity Surveyor (Eleventh Edition)*. Blackwell Science, (2002:189) adapted

The main advantages and disadvantages of Integrated Management procurement option are as follows:

ADVANTAGES	DISADVANTAGES
Early involvement of the management contractor allows the contractor to make substantial input into practical aspects of the building technology process	The increased number of works contractors may lead to problematic co-ordination
Design/construct split is compensated for by the contractors input on quality, buildability, sustainability, method of construction, sustainability and availability of plant, labour and material	Biased contract documentation allocates increased responsibilities to the works contractors
Project time is reduced due to the overlap in design and construction. As soon as sufficient work has been designed construction may start	Duplication of site services due to letting the work in packages
Late design decisions is a possibility because the work is let in packages	The client's financial commitment cannot be established upfront since the design is incomplete at the time of commencement therefore aspects such as price, quality and time are uncertain
Risk of potential contractual claims is minimised	The client has no redress against the management contractor with regard to performance, quality of works contractor's work, late completion or recovery of damages for late completion
	The fees are increased due to the professional services still required and the added construction management services

Table 6: Advantages and disadvantages of Management Contracts

Source: Combination of Various Sources ^(6, 8, 11, 16, 17, 19)

2.4.7.2 Construction Management Contracts

The arrangement is similar to the management contract approach except that the construction manager acts as a consultant in a managerial role and the client enters into direct contracts with the various works contractors and therefore assumes higher financial risk ^(6, 11, 16, 17, 19).

The relationship of the different stakeholders with this method is as follows:

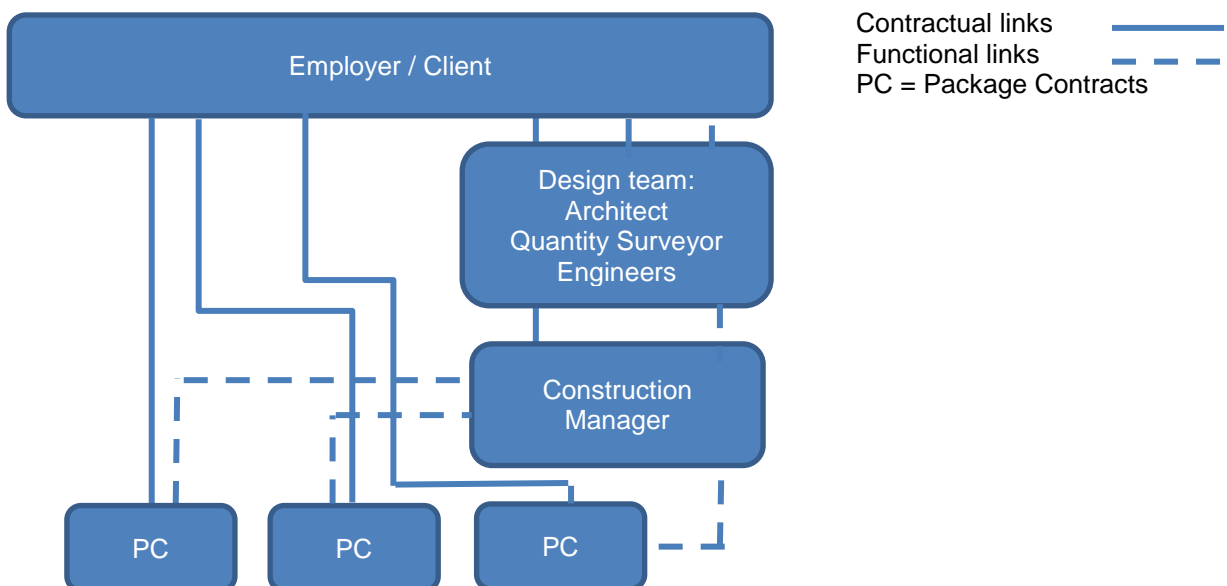


Figure 8: Relationships of parties for Construction Management Contracts

Source: M. Hackett, I. Robinson, G. Statham. *The Aqua Group Guide to Procurement, Tendering & Contract Administration*. Blackwell Publishing, (2007:85)

2.4.7.3 Project Management Contracts

This strategy entails appointing a Consultant Project Manager that is reimbursed by a percentage of the project cost. The project manager is responsible for an all-inclusive service and is involved from the inception of the project to its completion. The functions that the project manager is responsible for range from identifying and acquiring the land, arranging financing, establishing the overall project objectives and directing, planning, controlling and co-coordinating the efforts of the project team to achieve the objectives^(11, 16, 19).

This approach is suitable for projects of high value and complexity and limited time-scales where there are a large number of participants and limited / scarce resources. Due to the multiple direct contract arrangements with the client more involvement is required from the client. This implies that the client possesses adequate experience and resources^(11, 16, 19).

The main advantages and disadvantages of the Project Management procurement option are as follows:

ADVANTAGES	DISADVANTAGES
The project manager is an independent consultant with no vested interest	This approach is not suitable for smaller projects
The overlays between design and construction saves time	The project manager requires executive authority to achieve the objectives
The project manager is an expert and the client can trust that his interest is protected	The project manager carries no financial risk only professional indemnity insurance that is very limited

Table 7: The advantages and disadvantages of Project Management Contracts
Source: Combination of Various Sources^(11, 16, 19)

2.4.7.4 Design and Manage Contracts

This approach is similar to management contracts except that the management contractor now also takes responsibility for the management of the design. The advantage is the gain of a single point responsibility and the loss is the client's control of the design^(11, 16).

2.4.8 Separate / Divided Contracts

The architect designs and manages the contract on behalf of the client. After the client approves the design the architect arranges a number of separate contracts with different contractors. The client enters into direct contracts with each of the contractors

The main advantages and disadvantages of Separate / Divided procurement options are as follows:

ADVANTAGES	DISADVANTAGES
Short lines of communication enables prompt decision-making to avoid delays	Financial commitment only becomes clear when the development is at an advanced stage
Overlapping of the design and construction results in shorter overall development time	Management skills of the architect may be inadequate
Client is able to access the development sooner and this ensures earlier return on investment	Client has extended involvement
	Increased cost for contract documentation due to separate tenders

Table 8: The advantages and disadvantages of Separated / Divided Contracts
Source: Combination of Various Sources^(11, 16, 19)

2.4.9 Partnering Contracts

Many of the problems that occur in construction are attributed to the barriers created between clients and contractors through the contracting relationships. The idea of partnering is therefore to break down these barriers and improve the relationships by establishing a working environment that is based on mutual objectives, teamwork, trust and sharing of risks and rewards ^(6, 11, 16, 20).

The three key characteristics of the approach are to formalise the mutual objectives, to search for continuous measurable improvement and to adopt a common approach to problem solving. The key to successful partnering is a changed and more flexible mental attitude based on honesty, co-operation and deeds.

The nature of partnering allows for different forms of collaboration depending on the situation and the objectives of the parties involved. Partnering is practiced at different levels by forming a variety of relationships. The partnering could either take place at a project level or at a strategic level. Project partnering is the most common practice where mutual project objectives such as improved efficiency, cost certainty and reduction, enhanced value for money and reliable product quality are formulated around the specific project. The aim of strategic partnering is to forge long-term relationships that include the establishing of common facilities and systems, learning through repeated projects and developing an understanding of the partners' long-term business objectives ^(6, 11, 16, 20).

Partnering is not an easy option and there are a number of key factors that need to be in place for the process to be successful. These are:

- Commitment of working together at all levels with an organisation to make the project as success
- The partners need to have confidence in each other's organisations and each organization needs to have confidence in the individuals presenting their organisations.
- Partners need to collectively agree the objectives of the project to ensure alignment of goals.
- The clear needs to communicate the responsibilities of all participants clearly.
- All participants should share in the success of the project relative to their contribution.
- Methods of measuring performance must be clearly defined.
- Conflict resolution methods must be in place to address the conflicts that would inevitably arise.
- All participants must be trained in the philosophy of partnering ⁽²⁰⁾.

The partnering approach is appropriate to projects that are:

- Technically complex and difficult to specify
- Where advice is required across traditional supply chain communication streams (upstream and downstream)
- Construction conditions are uncertain and solutions require joint problem solving

The advantages and disadvantages of the Partnering option are as follows:

ADVANTAGES	DISADVANTAGES
Reduced learning curve due to the combined efforts of experts	Lack of accountability
Reduced abortive tendering costs	The constant search of improvement can lead to unrealistic targets for cost, quality and time
Administrative efficiency	The threat when key members of the team

	leave and the replacement staff don't understand the concept
Improved communication and decision-making and an improved working environment	Mutual goals can become unachievable when programming is amended
Improved design, quality, programming and safety	Termination of any partnering arrangement can lead to financial problems. Strategic partnering depending on single source employment becomes very vulnerable if the source of work is threatened
Risks are identified and improved	Initial high cost
Problems are identified at an early stage and solved therefore disputes are reduced	There is a lack of confidentiality with regard to the client's or contractor's processes and systems
More stable workloads and income	Complacency due to the lack of competition
	The absence of partnering arrangements with sub-contractors

Table 9: The advantages and disadvantages of Partnering Contracts

Source: Combination of Various Sources ^(6, 8, 11, 16)

Quantity surveyors are generally well equipped to act as independent advisors to the client outside of the partnering arrangement and thus could act as a partner within the arrangement and lead the integrated supply chain as they have proven to be very good project managers ⁽²⁰⁾.

2.5 RECOMMENDATION TO THE CLIENTS

It is fundamentally important for built environment clients to obtain appropriate advice on the choice of methods of procurement. The selection of an inappropriate form of procurement or mere acceptance of the regular or "comfortable" practice can have a major impact on the success of the project. Advice should be void of individual bias, self-interest and the consequence of the choice of first port of call ⁽¹¹⁾.

The advantages and disadvantages of each of the **contractual arrangements** discussed above must be considered in relation to the client's priorities with regard to the following performance requirements

- The technical complexity, nature and size of the development
- The degree of quality and performance required
- Flexibility of the budget
- Essence of the time

The requirements must be listed and rated in order of importance, taking specific cognisance of where the risk is allocated.

2.6 THE PROFILE OF CLIENTS

Every project starts with a client that is the party that initiates the project, has thought about the need for the facility, is convinced that it is a worthwhile investment and has organised the funding. In modern multi-faceted organisations with several departments each with their own requirements and priorities, project where developers form consortia or partnerships and projects where the developers are not the end-users of the facilities being created, it is not always easy to identify the real client. Establishing the identity of the real client and reconciling the demand of different end-users requires considerable expertise, tact and diplomacy. The multi-faceted organisations need to appoint an individual as the organisation's agent / representative in order to reduce potential conflicts ⁽¹³⁾.

2.6.1 Categorisation of Clients

Built environment clients are categorised as follows:

- **Public or private.**

The categorization of clients as “public” and “private” refers to the ownership and / or the funding of the project and their different sources income. Distinguishing between the two is necessary because public spending (taxpayer’s money) is subject to rigorous administrative, financial controls and public accountability to eradicate the possible occurrence of fraud and corruption and all procedures are subject to annual audits ^(10, 11, 13). In South Africa all public entities are obliged to apply the principles as proposed in the Construction Industry Development Board’s Standard for Uniformity in Construction Procurement ⁽¹²⁾.

Private sector clients on the other hand are known to maximize profits, share value and dividends hence more aggressive policies and commercial risks (associated with profit reward) are entertained ^(10, 13).

- **The level of knowledge and expertise within the client organisation.**

Experienced clients:

- have detailed knowledge and understanding of the built environment and its procedures.
- are regularly involved with large and complex developments.
- possess the ability to produce a comprehensive brief that prioritises objectives.
- have management expertise (consultants and contractors) that can be applied throughout the duration of the project.
- employ various built environment professionals.
- have the desire to be constructively, consistently and continuously involved throughout the duration of the project, without undermining the authority or status of appointed consultants and / or contractors.

Inexperienced clients on the other hand lack:

- knowledge and understanding of the built environment other than maintenance and small building work.
- experience in managing a construction project.
- the ability to draft and understand the importance of drafting a brief or even formulating objectives on their own.
- the willingness to accept the consequences of changing project parameters (a frequent tendency) during design and construction.
- the ability to accept sound advice from involved parties and are easily influenced by outside parties ⁽¹⁰⁾.

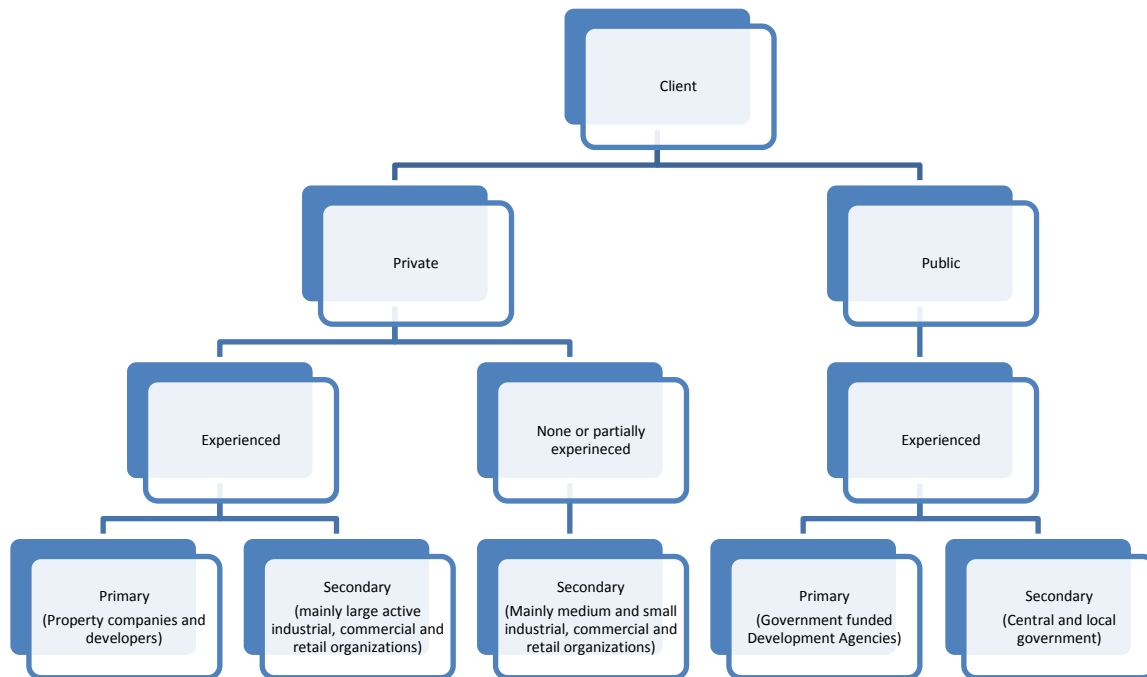
- **Whether the project will house the client’s own organisation and operation or whether the intention is to let or sell the property.**

This aspect determines whether a client is regarded as primary or secondary. Primary clients derive their primary income from constructing buildings to sell, lease, etc. and secondary clients are the users of the buildings to house their businesses, etc.

- **What the client activities are and what type of buildings are required.**

The type of industry the client is involved in and the type of business they conduct determines the type of building required for example factories, warehouses, offices, educational and health facilities, etc. The type of building influences the methodology for acquiring documents. There is a strong correlation between the type of building and the choice of procurement system ⁽¹⁰⁾.

The categorization of built environment clients is illustrated as follows:



Where primary means that these clients derive their primary income from constructing buildings to sell, lease, etc. and secondary means that these clients are the users of the buildings to house their businesses, etc.

Figure 9: Categories of Clients in the Built Environment

Source: B. Greenhalgh, G. Squires. Introduction to Building Procurement (2011:25)

2.6.2 The Influence of Government on Procurement

Since the early 1990's governments (nationally and internationally) have committed to financing options that entail private investment into major public projects with the purpose to relieve the financial burden on public funds. In South Africa we refer to these arrangements as Public-Private Partnerships (PPP's) but elsewhere on the globe these arrangements are also referred to Private Finance Initiatives (PFI's) or Design, Build, Finance and Operate (DBFO's) ⁽¹⁷⁾.

In essence a PPP can be described as “a long term relationship between the public and private sector that has the purpose of producing public services or infrastructure. ⁽²⁰⁾”. The goal of the relationships is that the parties work together and share the risk and reward ⁽²⁰⁾. The term of such an agreement is usually in the order of 25 to 30 years

It is commonplace for the private sector to deliver public services and it is commonplace for government to borrow money from the private sector. The PPP's have however introduced a unique dimension to procurement, because the two parties follow two totally different procurement strategies with very different objectives. With PPP's the private sector now has a predictable and guaranteed long-term income and the public sector has time and cost certainty in the delivery of a new or upgraded public asset. This is a much improved situation compared to the traditional procurement strategy mostly followed where short to medium term planning is done for projects and the projects could only proceed when the finance was obtained, time and cost is frequently overrun and the maintenance of the facilities requires continuous public funding ⁽²⁰⁾.

The critical success factors for a PPP project are:

- Effective procurement demonstrated through the transparency and competitiveness of the procurement process, good governance, well organised and committed public agencies, social support, thorough and realistic analysis of costs and benefits and shared authority between the public and private entities.

- Project implementation with regard to a favourable legal framework, appropriate risk allocation, technical feasibility of the project, commitment and accepted responsibility of public and private sectors and a strong private consortium
- Government guarantees must be delivered in the early stages of the project to ensure evolution of the project
- Favourable economic conditions created by a stable macro-economic conditions and sound economic policies
- Available financial market determined by the availability of suitable and adequate financial resources ⁽²¹⁾.

In October 2012 President Zuma announced a R4 trillion infrastructure spend over the next 15 years and indicated that some (estimated 645) of the projects would be rolled out according to PPP procurement principles. What is envisaged is the creation of new infrastructure to enable economic and social development and stimulate manufacturing by using South African manufactured construction materials ⁽²²⁾.

This announcement and the future implementation of these projects will have a significant influence on the entire built environment in future. The development and refinement of these partnering procurement strategies will also have a significant influence on how large and complex projects will be undertaken in future.

3. ALTERNATIVE TYPES OF CONTRACT DOCUMENTS

3.1 Introduction

The choice of the **form / type of contract** follows the choice of procurement strategy which then influences the form / type of contract as the contract merely provides the **administrative framework** through which the procurement process can be achieved.

Deciding on the contract requires three considerations namely:

- Deciding on the type of contract and the specific terms and conditions that will guide the execution of the work
- Selecting the contractor
- Selecting the price determination method

3.2 Types of contracts

The choice of contract must be made early on in the process because it will influence the way in which documents are prepared ⁽⁶⁾.

There are a considerable number of standard types of contract and even more in-house types of contract in use in the South African built environment. This is not conducive to effective and efficient procurement nor does it encourage the depth of skills training necessary for development and growth.

The Construction Industry Development Board (CIDB) recommends four series of types of contracts that cater for a wide range of contracting and pricing determination methods. These series are:

- Joint Building Contracts Committee (JBCC) Series 2000
- General Conditions of Contract for Construction Work (GCC) 2010
- FIDIC (French acronym for International Federation of Consulting Engineers) 1999
- New Engineering Contract (NEC) 3 family of standard contracts ⁽³⁾

JBCC 2000 is a specialized building work type of contract while the GCC is used on engineering contracts and the FIDIC and NEC3 forms of contract can be used on engineering and building contracts ⁽³⁾.

The standardized forms of contract recommended for use in South Africa by the CIDB are as follows:

- JBCC Series 2000 Principal Building Agreement (Edition 5.0: July 2007) as published by the Joint Building Contracts Committee.
- JBCC Series 2000 Minor Works Agreement (Edition 4.0: August 2007) as published by the Joint Building Contracts Committee.
- Conditions of Contract for Construction for Building and Engineering Works designed by the Employer (“Red Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).
- Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Plant and for Building and Engineering Works, designed by the Contractor (“Yellow Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).
- Conditions of Contract for EPC Turnkey Projects (“Silver Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).
- Conditions of Contract for Design, Build and Operate Projects (“Gold Book”) (2008) as published by the International Federation of Consulting Engineers (FIDIC).
- Short Form of Contract (“Green Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).
- Contract for the Supply and Delivery of Goods as published by the Construction Industry Development Board (1019).
- General Conditions of Contract for Construction Works (2010) as published by the South African Institution of Civil Engineering.
- General conditions of purchase as published by the Construction Industry Development Board (1018).
- NEC3 Engineering and Construction Short Contract as published by the Institution of Civil Engineers
- NEC3 Engineering and Construction Contract as published by the Institution of Civil Engineers.
- NEC3 Professional Services Contract as published by the Institution of Civil Engineers
- NEC3 Term Services Contract as published by the Institution of Civil Engineers
- NEC3 Term Services Short Contract as published by the Institution of Civil Engineers
- NEC3 Supply Contract as published by the Institution of Civil Engineers
- NEC3 Supply Short Contract
- Standard Professional Services Contract as published by the Construction Industry Development Board (1015).
- General Conditions of Service as published by the Construction Industry Development Board ⁽¹⁸⁾

3.2.1 JBCC Series 2000

The JBCC Principal Building Agreement is the most important document in the series and the features of this document discussed below are adopted from the CIDB Best Practice Guideline #C2: Choosing an appropriate form of contract for engineering and construction works ⁽⁵⁾.

ASPECTS TO BE CONSIDERED	APPLICABLE
--------------------------	------------

Application of Contract	This form of contract is suitable for use with building contracts where the work is designed and managed by consultants appointed by the client and is only suitable for use with procurement strategies that require the design to be done by the employer's consultants
Design responsibility	Although the main contractor does not accept design responsibility, selected and nominated subcontractors do carry design responsibility
Risk allocation	The risk is allocated evenly between the two parties
Role of the Employer and his consultants	The principal agent is given full authority and obligation in terms of the contract to act on behalf on the Employer

Table 10: Features of a JBCC Principal Building Agreement

Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:7).

The applicable procurement methods are:

- Fixed Price Contracts
- Cost reimbursement Contracts
- Continuity Contracts

The price determination methods for selecting the contractor are:

- Bills of Quantities
- Provisional Bills of Quantities
- Schedule of Rates
- Lump sum based on drawings and specifications
- Performance specifications

The JBCC Minor Works Agreement is designed to be used with small and simple works where only one agent is appointed to administer the contract on behalf on the client and the employer appoints direct contractors to undertake specialized services. The features of this document discussed below are adopted from the CIDB Best Practice Guideline #C2: Choosing an appropriate form of contract for engineering and construction works ⁽⁵⁾.

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for use with small and simple buildings where the work is managed by one consultant appointed by the client and is only suitable for use with procurement strategies that require the design to be carried by the employer's consultants
Design responsibility	The contractor accepts no design responsibility
Risk allocation	The risk is allocated evenly between the two parties when the employer carries the risk for the quantities, but weighs heavier on the contractor if he is responsible for taking-off the quantities and pricing
Role of the Employer and his consultants	The employer appoints only one agent and gives him/her full authority and obligation in terms of the contract to act on behalf on the Employer

Table 11: Features of a JBCC Minor Works Agreement

Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:14).

The applicable procurement methods are:

- Fixed Price Contracts
- Cost reimbursement Contracts

- Continuity Contracts

The price determination methods for selecting the contractor are:

- Bills of Quantities
- Provisional Bills of Quantities
- Schedule of Rates
- Lump sum based on drawings and specifications

3.2.2 GCC 2010 documents

This document is used with a bill of quantities that is prepared in accordance with the provisions of SANS 10403, Formatting and Compilation of Construction Procurement Documents. This contract is mostly used with engineering contracts ⁽⁵⁾. The features of this form of contract are as follows:

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for engineering contracts
Design responsibility	The employer usually carries the design responsibility but the contractor may accept limited design responsibility as stipulated in the conditions of contract.
Risk allocation	The risk is allocated according to the principle that risk lies with the party that is best suited to deal with it.
Role of the Employer and his consultants	The employer appoints the Engineer that has full authority and obligation in terms of the contract to act on behalf on the Employer

Table 12: Features of a GCC 2010 Agreement

Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:6).

The applicable procurement methods are:

- Fixed Price Contracts
- Cost reimbursement Contracts
- Continuity Contracts

The price determination methods for selecting the contractor are:

- Bills of Quantities
- Provisional Bills of Quantities
- Schedule of Rates
- Lump sum based on drawings and specifications

3.2.3 FIDIC 1999 documents

FIDIC contracts are specifically developed for civil engineering, mechanical and electrical infrastructure projects ⁽⁵⁾. There are 5 different standard forms of contract for application in different circumstances. These 5 are:

- Conditions of Contract for Construction for Building and Engineering Works designed by the Employer (“Red Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).

- Conditions of Contract for Plant and Design-Build for Electrical and Mechanical Plant and for Building and Engineering Works, designed by the Contractor (“Yellow Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).
- Conditions of Contract for EPC Turnkey Projects (“Silver Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).
- Conditions of Contract for Design, Build and Operate Projects (“Gold Book”) (2008) as published by the International Federation of Consulting Engineers (FIDIC).
- Short Form of Contract (“Green Book”) (1999) as published by the International Federation of Consulting Engineers (FIDIC).

The FIDIC Red book is suitable for use on building and civil engineering contracts for which the design is carried out by the Employer’s agents but the contractor undertakes limited design responsibility⁽⁵⁾.

The features of this form of contract are as follows:

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for building and engineering contracts
Design responsibility	The employer usually carries the design responsibility but the contractor may accept limited design responsibility as stipulated in the conditions of contract.
Risk allocation	The Employer carries a fair amount of risk if risk is allocated according to the principle that risk lies with the party that is best suited to deal with it.
Role of the Employer and his consultants	The employer appoints the Engineer that has authority and obligation in terms of the contract to act on behalf on the Employer. The Employer may restrict the engineer if required.

Table 13: Features of a FIDIC 1999 Red Book Agreement

Source: CIDB. Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works. (2005:3).

The applicable procurement methods are:

- Fixed Price Contracts

The price determination methods for selecting the contractor are:

- Bills of Quantities
- Provisional Bills of Quantities
- Schedule of Rates

The FIDIC Yellow book is suitable for use with mechanical and electrical process plants based on design and build strategies where the contractor carries most of the risk, but the Employer still carries some risk⁽⁵⁾.

The features of this form of contract are as follows:

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for electrical and mechanical plant contracts
Design responsibility	The contractor carries the design responsibility to design a “fit-for-purpose” plant according to the Employer’s requirements.
Risk allocation	The contractor carries most of the risk.
Role of the Employer and his consultants	The employer appoints the Engineer that has authority and obligation in terms of the contract to act on behalf on the Employer. The Employer may restrict the engineer if required.

Table 14: Features of a FIDIC 1999 Yellow Book Agreement

Source: CIDB. Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works. (2005:3).

The procurement methods and price determination methods are similar to those for the Red Book.

The FIDIC Silver book is designed for a situation where certainty of cost and time are so crucial that the client is willing to pay a premium for the certainty that the final cost and completion date will not be exceeded. Contractors are therefore required to accept more risks than under the Red and Yellow Books ⁽⁵⁾.

The features of this form of contract are as follows:

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for international turnkey projects.
Design responsibility	The contractor carries the complete responsibility for an Engineer-Procure-Construct turnkey project. The Contractor is responsible for the fit-for-purpose design, and the accuracy and completeness of the execution according to the Employer's requirements
Risk allocation	The contractor carries virtually all of the risk.
Role of the Employer and his consultants	The Contractor or Employer is required to determine any matter according to a consultation process and make a recommendation according to the conditions of contract if an agreement cannot be reached.

Table 15: Features of a FIDIC 1999 Silver Book Agreement

Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:3).

The applicable procurement methods are:

- Management Contracts
- Design and Build Contracts

The price determination methods for selecting the contractor are:

- Activity schedules (work breakdown schedule broken down into activities and lump sum prices provided for each activity)

The FIDIC Green book is recommended for use with building and engineering projects that are relatively small in value; simple designs with short construction periods that do not require specialist subcontractors ⁽⁵⁾.

The features of this form of contract are as follows:

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for small, simple projects of small value.
Design responsibility	The design responsibility lies with the Employer
Risk allocation	The risk vests with the party best equipped to handle it.
Role of the Employer and his consultants	The employer appoints only one agent and gives him/her full authority and obligation in terms of the contract to act on behalf of the Employer

Table 16: Features of a FIDIC 1999 Green Book Agreement

Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:5).

The applicable procurement methods are:

- Fixed Price Contracts
- Design and Build
- Cost reimbursement Contracts
- Continuity Contracts

The price determination methods for selecting the contractor are:

- Bills of Quantities
- Provisional Bills of Quantities
- Schedule of Rates
- Lump sum based on drawings and specifications

3.2.4 NEC3 family of standard contracts

The NEC3 family of standard contract is described as an integrated and multidisciplinary set of contracts for engineering and construction projects as well as the associated professional services. The contract is said to be more than just a contract and incorporates three key components namely

- Conditions of contract
- Risk management
- Process/project management

The ECC (Black Book) is designed to support the principles of partnering as discussed earlier in this document. The implementation of this contract form poses some serious challenges such as rigorous time-scales and response times, issuing and monitoring of notices, understanding the early warning processes to mention but a few.

The NEC3 Engineering and Construction Short Contract (ECSC) doesn't allow for an agent. The work is to be valued based on a price list which should either be in the form of an activity schedule with associated lump sum prices for every activity or a bill of quantities.

Although the NEC3 Engineering and Construction Contract (ECC2) makes provision for all the different strategies; this type of contract is not as widely used as may be perceived⁽⁵⁾.

The features of this form of contract are as follows:

ASPECTS TO BE CONSIDERED	APPLICABLE
Application of Contract	This form of contract is suitable for all types of contracts.
Design responsibility	The six main contracts make provision for all design options
Risk allocation	The risk vests with the party best equipped to handle it.
Role of the Employer and his consultants	The employer appoints a Project Manager and gives him/her full authority and obligation in terms of the contract to act on behalf on the Employer

Table 17: Features of a NEC3 ECC (Black Book) Agreement

Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:10).

The ECC contract supports all the practiced procurement methods and price determination methods currently known.

Candidates are referred to Professional Skills Module No. 15: Understand the basic principles of Construction Law in the Built Environment for more details on the different standard forms of contract.

The procurement strategies are now known and the preferred contracting and pricing strategies have been identified. All that remains now is the selection of the form of contract to support the chosen strategies

3.3 SELECTION OF THE APPROPRIATE FORM OF CONTRACT

There is a wide variety of different standardised forms of contract to choose from in the built environment. The choice depends of different circumstances such as:

- Client objectives
- Private client or public authority
- Type of work to be undertaken
- Status of the design
- Size of proposed project
- Price determination method ⁽¹¹⁾

The form of contract selected must make adequate provision for the price determination method and the contracting strategy ⁽⁵⁾.

The factors to be taken into account before selecting the type of contract are:

- The complexity of the design
- Management capacity, capabilities and expectation of the parties
- Specific contracting and pricing strategies' requirements
- Compatibility of contract administrative procedures with the client organisation
- Risk management
- The ability or desirability of the client body to handle different administrative procedures for building and civil contracts ⁽⁵⁾.

Figure 10 below illustrates the logic to be followed in choosing the form of contract:

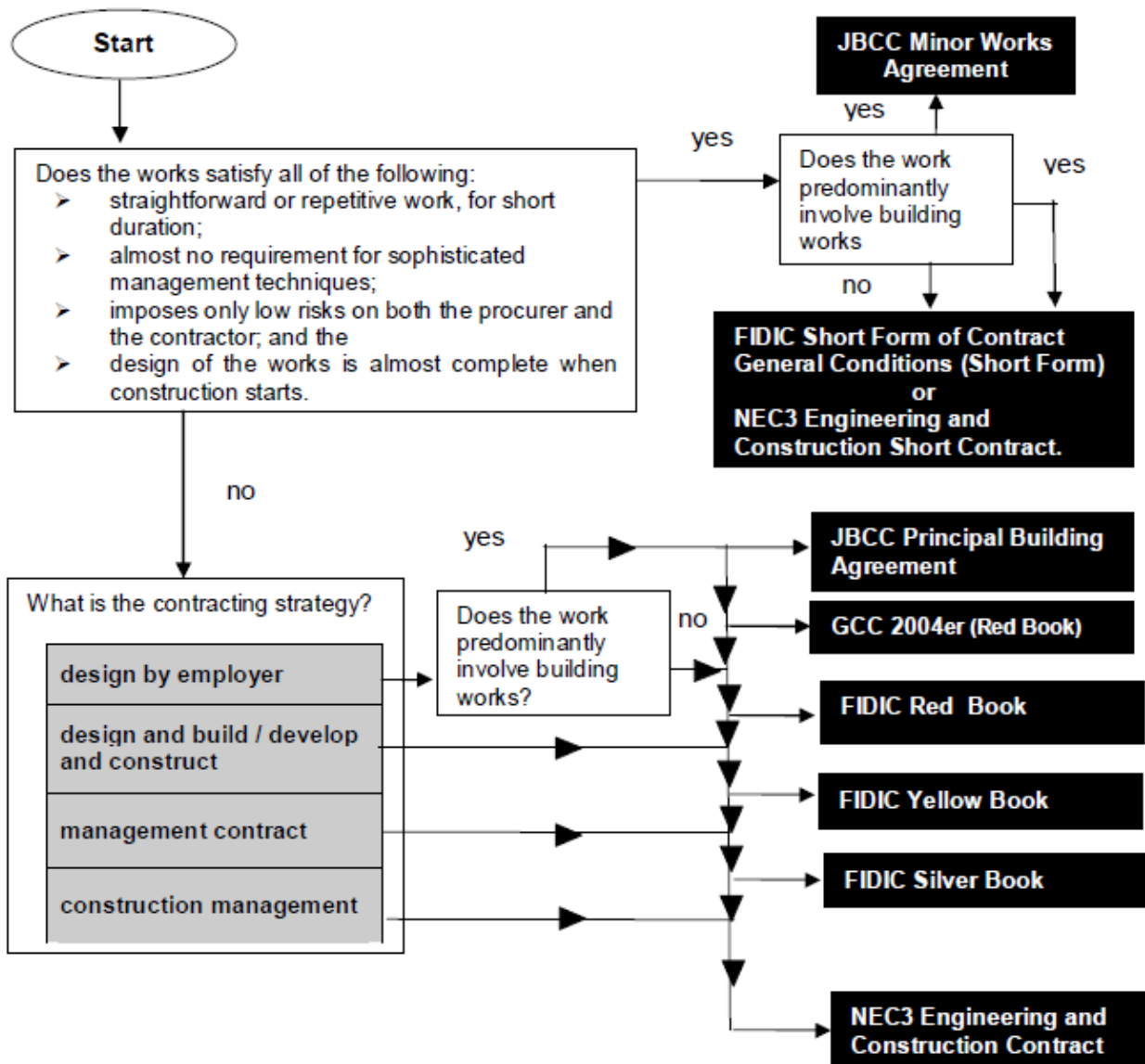


Figure 10: The Selection of an appropriate form of contract for building and engineering works
Source: CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works.* (2005:13).

4. COLLECTING INFORMATION, ETC.

Learning outcomes

After studying this section, you should be able to:

Collect information required to determine built environment project procurement requirements by:

- establishing and confirming the client's objectives.
- specifying objectives of the process
- evaluating market conditions and reviewing options

4.1 The Client's Needs

As discussed in the introductory section the client's procurement needs are:

- Time
Project completion dates may be critical to the success of the project. Most clients have a desire for early completion of their projects but a clear distinction should be made between the desire and a true need for early completion because of the impact this would have on the choice of the most appropriate procurement system ⁽¹¹⁾.
- Cost
Where a limited budget is a reality, quality will be compromised in the form of a reduced specification. The degree of cost certainty required before the client commits to the construction of the project limits the choice of the procurement method. A factor that should not be disregarded is the risk associated with abortive design fees if the project does not continue ⁽¹¹⁾.
- Quality
Quality is a subjective issue that is influenced by many factors such as the briefing process, suitability of materials, components and their interrelationship to the design and the quality control measures implemented during design and construction. The choice of procurement method has an effect on the design process and the way control measures can be applied ⁽¹¹⁾.
- Accountability
Accountability is equally important for projects performed for public or private clients although projects for public clients would be subject to more stringent scrutiny ⁽¹¹⁾.
- Certainty of project objectives
When clear certainty of the objectives is required before commencement of the project the procurement method must accommodate the certainty; for example design and build approaches do not allow for design flexibility where management contracts accommodate design development throughout the construction ⁽¹¹⁾.
- Market conditions
The general state of the economy influences the choice of the procurement method. When there is ample work available, contractors will be more reluctant to enter into more risky relationships and when the market is at a low point, they are willing to accept more risk. Clients should be aware of the increased risk in terms of more claims being lodged and the higher rate of occurrence of liquidations ⁽¹¹⁾.

4.2 The Client's Objectives

The main purpose of choosing a procurement system is to satisfy the client's objectives. Determining the client's objectives is of utmost importance in order to be able to recommend the most appropriate procurement system to the client. The client's objectives for projects include:

- obtaining value for money
- having a building that is fit for purpose
- receiving a building that is be free of defects at completion
- experiencing the building as aesthetically pleasing
- project being delivered on time
- the building must be supported by meaningful guarantees
- the design must result in reasonable operational costs
- satisfactorily durability ⁽¹⁰⁾

The major variables to consider in the selection of the appropriate procurement strategy are thus:

- **Consultants or contractors** – Which one is to act as the client's advisor? The client could either appoint an independent consultant to design and manage the project or appoint the contractor directly. The decision is influenced by tradition, loyalty and the satisfaction or disappointment with a previous project. The following needs to be considered:
 - Single point responsibility from the client's viewpoint
 - Integration of design and construction
 - Need for independent advice
 - Need for inspections, payments and warranties
 - Overall cost of design and construction
 - Quality, standards and time implications ^(8, 11)
- **Competition or negotiation** – evidence suggests that a better deal is obtained through competition. There are however circumstances where specific benefits are sought and where negotiation is preferred such as:
 - Business relationships
 - Early start on site
 - Continuation contract
 - State of the construction market
 - Financial arrangements
 - Geographical area

Every project should be examined on its own merit. Where competition is envisaged the choice could be open tendering or selected tendering. The preparation of tenders is both expensive and time consuming, thus the procedure should be carefully considered because the industry carries the cost of unsuccessful tendering. The development and promotion of partnering has influenced the view on the need for competition ^(8, 11).

- **Measurement or Reimbursement** – essentially these are the only two ways of calculating the cost of construction projects. Measurement contracts distribute the risk and incentives more evenly. The points to consider when choosing between measurement or reimbursement are:

- necessity for a contract sum
 - forecast of final cost
 - incentive for efficiency
 - distribution of price risk
 - administration time and cost ^(8, 11)
- **Traditional or alternative method** – In the past all contracts were procured according to single stage selective tendering. Mounting criticism of the traditional system has necessitated the reappraisal for many reasons such as the appropriateness of the service, time from inception to completion and overruns of construction period and expected cost, problematic quality control, mismatch between design and construction and the limitation on procurement advice. The factors contributing to the development of non-traditional methods are:
 - appropriateness of service
 - length of time from inception to completion
 - overall cost inclusive of design
 - accountability
 - importance of design, function and aesthetics
 - quality assurance
 - organization and responsibility
 - project complexity
 - risk apportionment ^(8, 11)

There is not one alternative or non-traditional procurement method that addresses the shortcomings of the traditional method. In practice it is rather a trade-off between the client's objectives, needs and wants to determine the alternative best suited to the circumstances ⁽¹¹⁾.

4.3 Objectives of procurement systems

The client's objectives for a procurement system are the need for:

- Certainty of final costs;
- Accountability;
- Value for money;
- Lowest possible tender;
- Active involvement and being informed;
- Single point contact;
- Elimination of or minimising risk;
- Minimum design and construction periods;
- Certainty of completion date;
- High quality and innovative architecture;
- Ability to change design ⁽¹⁰⁾.

Naturally all these objectives do not apply to every procurement system. The client must indicate the desirability of each objective in the order of importance.

5. EVALUATING PROJECT PROCUREMENT SYSTEMS

Learning outcomes

After studying this section, you should be able to:

Evaluate built environment project procurement system by:

- matching procurement system characteristics against client's objectives.
- understanding implications of procurement system choice relative to the selected form of contract

5.1 Matching procurement system characteristics against client's objectives

In order to be able to match procurement systems to the client's objectives there needs to be an understanding of the client's objectives, the operation, the characteristics and the method of appointing the different stakeholders ⁽¹¹⁾.

The size of the project would to a large extent determine the contractual arrangements. Small projects are not suited to the non-traditional and more involved arrangement and most likely such arrangements would not be cost effective. Medium to larger projects are suited for more advanced and complex types of procurement methods.

The characteristics of the standard forms of contract and the client's objectives were discussed earlier. Matching the two sets to each other would require a diligent process of elimination until the most suitable form of contract and associated price determination method are identified.

5.2 Understanding implications of procurement system choice relative to the selected form of contract

As stated in the introductory section the choice of the procurement system is crucial as it influences the overall level of success of the project. The choice of a procurement system requires that the client's objectives and the nature of the end product are analysed early on in the project's life ⁽⁹⁾.

The conditions contained the form of contract establishes the roles, responsibilities and liabilities of the contracting parties in relation to the aspects that are considered before choosing the form of contract. These aspects are:

- The complexity of the design;
- Management capacity, capabilities and expectation of the parties;
- Specific contracting and pricing strategies' requirements;
- Compatibility of contract administrative procedures with the client organisation;
- Risk management;
- The ability or desirability of the client body to handle different administrative procedures for building and civil contracts ⁽⁵⁾.

The features of the CIDB recommended standard forms of contract with regard the above-mentioned aspects have been discussed earlier. Consideration of the aspects will be evaluated in terms of the emphasis that the client places on the primary objectives of cost, time and quality.

6. UNDERTAKE BUILT ENVIRONMENT PROJECT BUILDABILITY ANALYSIS

Learning outcomes

After studying this section, you should be able to:

Undertake built environment project buildability analysis by:

- analysing forms of construction.
- costing and optimising forms of construction.
- making recommendations regarding buildability relative to cost implication

6.1 Introduction

Designing for buildability ensures the elimination of non-productive site processes enhances productivity and increases the efficiency of site management. Generally there are a few core items in the design that can influence the flow of the productivity on site and therefore affect the efficient use of time and resources. The design team should consider the following design measures to achieve buildability of a construction project:

- Promote repetitive production cycles through simplified design that requires standard or few technical activities, for example the sizes of concrete elements can be standardized to allow repetitive use of formwork.
- Coordinate dimensional aspects of design to minimize waste of materials.
- Stick to tried and tested design details.
- Utilise localized materials in design for future replacement.
- Select materials and components and their fixing methods with which all project participants are familiar
- Choose the construction method that is best suited to the site and location and to make best use of the available skill and resources
- Design services for the ease of operation and ease of installation. Effective design coordination of services saves capital and maintenance costs
- Timeous arrangement for service connections with the local authorities avoids costly delays ⁽¹⁹⁾.

6.2 Forms of construction

The concept of buildability encourages the 3S principles namely

- standardisation – refers to the repetition of grid sizes, component sizes and connection details
- simplicity – refers to uncomplicated building construction systems and installation details
- single integrated elements – refer to prefabricated off-site manufactured components that form a whole when installed on site

Build-ability principles can be applied to various elements of a building such as:

- the structural system that could be a precast concrete system, structural steel system, in-situ concrete system and roof systems
- the wall systems that could be precast concrete walling, curtain walling, brick walling

The buildability of, for example the external envelope of a building can be radically improved by adjusting the design parameters. The main purpose of the external envelope is to protect the inhabitants of the building from the weather conditions and the external environment. The main components of the envelope are the windows and wall. By changing the wall/window ratio, the orientation and size of the envelope and the types of material, the energy efficiency of the building is increased considerably ⁽²³⁾.

Dr Abdulaziz Jarkas conducted research on the influence of buildability on in-situ concrete and considered the influence of the workability of the concrete, reinforcement congestion, placing method and volume placed on the labour productivity and discovered that each had a considerable influence.

6.3 Costing and optimizing forms of construction

The positive relationship between buildability and increased productivity and quality is currently measured by applying the buildable design appraisal systems, productivity appraisal systems and quality appraisal systems. There is evidence of the positive relationship between buildability and improved quality and productivity hence there should be a cost saving.

The dilemma we are still faced with today is that a fair amount of projects are still procured according to the traditional procurement system where the design and construction is divorced from each other and price determination is done through bills of quantities. No evidence could be found that there is a considerable saving on rates due to improved buildability.

6.4 Making recommendations regarding buildability relative to cost implication

Attempts have been made to develop benchmarks for buildability according to which designs could be evaluated. Currently designs already incorporate a high degree of buildability even though they might appear fancy on the outside. Industrial building will possess a high degree of buildability and a building with a corporate image a lower degree of buildability.

Very few buildability analyses are done during the planning stages. The party that could influence buildability the most is the client through the design brief.

7. RECOMMENDING AND AGREEING ON THE CHOICE OF PRICE DETERMINATION

Learning outcomes

After studying this section, you should be able to:

Recommend and agree the choice of the price determination method, associated methods of measurement and input document requirements with the client and consultant team by:

- explaining the alternative methods of price determination and associated methods of measurement to the client.
- discussing and agreeing the expected quality and timing of input documents.
- obtaining the client's agreement on the method of price determination and associated method of measurement to be implemented.
- identifying, scheduling, timetabling and prioritising input documents.

7.1 Alternative methods of price determination and associated method of measurement

There are basically two methods of price determination firstly by measurement and secondly by reimbursement. Reimbursement does not require any measurement as contractors are reimbursed for actual costs plus a percentage for overheads and profit. The variants of cost reimbursement methods were discussed earlier.

Measurement contracts in use are:

- *Drawings and specification measurement contracts (also called contracts without quantities)* are only suitable for simple and straightforward projects where each tenderer is issued with a set of drawings and a specification and it is up to the tenderer to measure the quantities and interpret the specifications in order to determine a tender price.
- *Performance specification measurement contracts* require tenderers to prepare a tender price based on the client's brief and user requirements only, which leaves the tenderer to decide on the type of material and methodology to apply to meet the performance criteria.
- *Schedule of Rates measurement contracts* are similar to bills of quantities, which contain the items but not the quantities. No tender price can be calculated for such a contract.
- *Bills of Quantities measurement contracts* are based on Bills of Quantities that contain qualitative and quantitative information derived from the drawings and specifications and are prepared in accordance with standardised methods of measurement. The tender price for all the tenderers is determined on the same detailed information⁽⁸⁾.

All of these methods except the schedule of rates, entail the quantification of the required work according to a standardised method of measurement required for the finished project and the price is determined by multiplying the quantity of work by rates supplied by contractors. The rates include all the costs incurred by contractors such as material, labour, plant, direct and indirect overheads and an allowance for profit.

7.2 Expected quality and timing of input documents

The input documents required are the price determination documentation and the standard form of contract. The standard forms of contract are readily available for purchase from the voluntary associations of the different built environment professions; for example the JBCC documents can be purchased from JBCC themselves, The Association of South African Quantity Surveyors (ASAQS) or the South African Institute of Architects (SAIA) and their various provincial branches. The GCC, FIDIC and NEC documents are available from the South African Institute of Civil Engineers (SAICE).

The production of the price determination documents are subject to the availability and quality of design information. Before the production process commences, the availability and quality of the information will be determined at the briefing session with the principal agent.

The timing of information flow in the production process of price determination documents is very important since it impacts on all the parties involved; for example it is common knowledge that structural engineers approach their designs from the top down therefore their attention to the detailed design of the foundations will happen at a later stage in the design process. The quantity surveyor need not insist on having this information before the actual measurements can commence. The element of foundations can easily be isolated by deciding on a logical level to which foundations will be measured and continue with the measurement of the superstructure. Similarly the door and window schedules, finishing schedules and sanitary fitting schedules are developed at a later stage in the architect's design process therefore the methodology of measuring over doors, windows and openings and doing adjustments at a later stage also enables the quantity surveyor to continue with a considerable amount of work before the schedules are actually required.

The programme for the production process of the price determination documentation will therefore be coordinated with the design development process of all the design consultants.

7.3 The client's agreement on the price determination method and associated method of measurement

As soon as the design team has agreed on the most appropriate price determination method and the associated method of measurement, the decision needs to be discussed with the client for his/her agreement. Issues to pertinently discuss with the client are:

- The time implication for producing the price determination document
- The allocation of risk in terms of the quantification
- The allocation of risk in terms of cost certainty

7.4 Identifying, scheduling, timetabling and prioritizing documents

As the procurement process unfolds the relevant role-players are identified. The principal agent has the responsibility to draft a programme (Gantt chart) for the procurement cycle planning that illustrates the timing, sequence and length of each of the role-player's responsibilities. The priority of production of documents is coordinated with the programme.

The progress of the project can be tracked and planning can be adjusted timeously if necessary to ensure that the deadlines are met. Each role-player's workload is scheduled in a different colour so that the individual's commitment to the specific project can easily be identified.

Regular development meetings must be held to discuss

- new and revised information.
- the detailed design.
- the integration of the structural and service elements.
- specialised design input.
- health and safety principles.
- progress against programme ⁽¹⁵⁾.

8. ACCESSING AND DISTRIBUTING INPUT DOCUMENTS

Learning outcomes

After studying this section, you should be able to:

Access and distribute input documents by:

- checking and recording input documents.
- distributing input documents to quantity surveying team.

8.1 Checking and Recording Input Documents

The input documentation quantity surveyors would be receiving would be the drawings, schedules, specifications, etc. to prepare the price determination documents. Checking and recording the input documents is very important to ensure that the latest information is used at all times.

The first task to be carried out when a set of drawings is delivered / brought into the quantity surveyor's office is to stamp the drawings with the practices' name and date stamp. It is also useful to identify what the drawing is used for e.g. "Estimating", "Bills of Quantities", "For construction", etc.

A drawing register must be created to reflect the name and reference number of the project (in-house and client's), architect, and other consultants involved, titles and numbers of drawing, scales and drawing revision numbers. Separate registers should be created for architect's drawings, civil/structural engineer's drawings, electrical and mechanical engineer's drawings respectively. The register could have the following format ⁽¹¹⁾:

Project title: Consultant:			Project no. QSP 202 Register no. 1	
Drawing no.	Revision no.	Title/description	Scale	Date received
IA/2619/001	1	Site layout	1:200	10.10.2012
IA/2619/100	2	Ground floor layout	1:100	10.10.2012
IA/2619/200	2	Elevations	1:100	10.10.2012
IA/2619/300	2	Sections	1:100	10.10.2012
Etc. ...				

Table 8: Drawing register

Source: Author and Unpublished Core Notes

The drawing register must be updated as soon as any additional drawings are received and distributed to all project participants so that each one can ensure that any impact on their work is adjusted / corrected / incorporated.

It is customary for the design offices to produce and issue drawing registers with the drawings thus cross checks should be conducted to ensure that all the drawings listed have actually been received. These registers are however not sufficient to replace the in-house registers referred to above since they are not sufficiently comprehensive to ensure drawing control.

8.2 Distributing Input Documents to Quantity Surveying Team

As soon as the briefing meeting with the principal agent has taken place and the price determination method is agreed to by the client, the lead quantity surveyor that is responsible for the project will be in a position to do the in-house planning and develop a progress chart for service delivery at the pre-contract stage. The planning decisions must take the type, size and complexity of the project into account in deciding:

- which partner/director/member/ senior quantity surveyor will lead the project.
- establish the time needed to execute the work.
- determine how many staff members would be needed to do the work.
- whether it would be necessary to obtain the services of freelance staff

The information received from the principal agent is then shared with all the participants

9. TRENDS IN THE DEVELOPMENT OF PROCUREMENT METHODS

In the introduction to this module the importance of the procurement method that governs the relationship between the designers and the contractor through the conditions of contract and the price determination method was emphasized. Price determining documents play a more significant role in the traditional procurement strategy but are also important in non-traditional procurement methods ^(8.) However there is a tendency to develop alternative procurement methods in the quest of meeting client's objectives and keeping up with modern technology and tendencies.

With traditional procurement methods the emphasis of the project is focused on cost due to limited funds or the necessity to report on the use of public funds. Non-traditional procurement strategies place more emphasis on the flexibility within the design and shorter construction periods which do not allow for the preparation of bills of quantities before commencement of the project.

The need for and development of alternative procurement methods is frequently debated. Candidates are therefore required to take note of current national and international trends in this regard by obtaining and studying research papers on this specific topic. Some papers are listed in the recommended reading section for this specific purpose.



SELF-ASSESSMENT QUESTIONS

1. Explain the importance of the choice of a procurement method.
2. Discuss the different procurement methods in relation to advise that can be offered to built environment clients in terms of:
 - The client's main advisor
 - The process of price determination
 - The method of price determination
 - The type of procurement strategy
3. State and discuss the criteria to consider when choosing a procurement system.
4. There is a drive towards continuous development of so-called non-traditional procurement methods. Discuss the reasons and the needs for this tendency.
5. Illustrate and discuss the contractual and functional relationships of the parties for the different procurement methods
6. Governments nationally and internationally are more frequently entering into partnering arrangements with the public sector. Explain how this could possibly impact on the procurement methods currently applied

REFERENCES

1. South African Qualifications Authority, *SGB for Quantity Surveying, Unit Standard: Provide procurement advice for Built Environment projects*.
2. South African Qualifications Authority, *SGB for Quantity Surveying, Unit Standard: Provide advice on contract documents and price determination methods for built environment projects*.
3. CIDB. *Best Practice Guideline A1. The Procurement Cycle*. 2007.
4. CIDB. *Best Practice Guideline A5. Managing Construction Procurement Risk*. 2004.
5. CIDB. *Best Practice Guideline C2. Choosing an Appropriate form of Contract for Engineering and Construction Works*. 2005.
6. M. Hackett, I. Robinson, G. Statham. *The Aqua Group Guide to Procurement, Tendering & Contract Administration*. Blackwell Publishing, 2007.
7. A. A. Kwakye. *Understanding Tendering and Estimating*. Gower Publishing Company, 1994.
8. A. Ashworth. *Pre-contract Studies*. Addison Wesley Longman Limited, 1996.
9. P. S. Brandon. *Quantity Surveying Techniques New Directions*. Blackwell Science, 1992.
10. J. W. E. Masterman. *An Introduction to Building Procurement Systems (Second Edition)*. Spon Press, 2002.
11. A. Ashworth, K. Hogg. *Willis's Practice & Procedures for the Quantity Surveyor (Eleventh Edition)*. Blackwell Science, 2002.
12. Construction Industry Development board. *Understanding the Structure of Tender and Contract Documents*. 2009.
13. B. Greenhalgh, G. Squires. *Introduction to Building Procurement*. Spon Press, 2011.
14. R. Morton, D. Jaggar. *Design and the Economics of Building*. E & FN Spon, 1995.
15. M. J. Maritz, H. M. Siglé. *Quantity Surveying Practice in South Africa*. Construction Economics Associates (Pty) Ltd. 2012.
16. R. Kirkham. *Ferry and Brandon's Cost Planning of Buildings*. Blackwell Publishing Pty Ltd, 2007.
17. M. Brook. *Estimating and Tendering for Construction Work (Fourth Edition)*. Butterworth-Heinemann. 2008.
18. Construction Industry Development board. *Standard of Uniformity in Construction Procurement*. 2010.
19. A. A. Kwakye. *Construction Project Administration*. Addison Wesley Longman, 1997.
20. D. Cartlidge. *New Aspects of Quantity Surveying Practice*. Butterworth-Heinemann, 2006.
21. Bing Li, A. Akintoye, P. J. Edwards, C. Hardcastle. (2005). "Critical success factors for PPP/PFI projects in the UK construction industry." *Construction Management and Economics*, Volume 23, Issue 6 (June 2005), pp 459–471.
22. Engineering News Online. *SA plans R4-trillion infrastructure roll-out over 15 years*. 19 October 2012.
23. Natee Singhaputtangkul, Sui Pheng Low and Ai Lin Teo. (Integrating sustainability and buildability requirements in building envelopes *Facilities*, Vol. 29 No. 5/6, 2011, pp. 255-267