CHAPTER 1

THE PROBLEM AND ITS SETTING

1.1 Introduction

As a developing country, South Africa faces a number of socio-economic challenges. These include, *inter alia*, poverty, lack of housing, unemployment, lack of infrastructure, massive disparities between the poor and the rich, etc. These challenges have an impact on the South African construction industry.

South Africa's re-admittance into the global economy has resulted in the exposure of South African companies to international competition. This has also had an impact on the construction industry as clients require their projects completed faster, meeting the best quality standards and at the lowest cost. This has, to a certain extent, resulted in the use of alternative building procurement systems and the more widespread use of project managers, as principal agents, on construction projects as these initiatives have been seen to improve the attainment of client and project objectives.

Due to the socio-economic challenges facing the country and through government legislation (such as the Preferential Procurement Policy

Framework Act, No.5 of 2000 and the Employment Equity Act, No. 55 of 1998), project objectives are no longer being determined in terms of time, cost and quality only. Other factors such as employment creation, transfer of skills, use of small medium and micro enterprises (SMME's) and community empowerment now play a role in determining project objectives and success. Is project management, used in conjunction with the traditional building procurement system, the best method to achieve these unique project objectives ?

A number of international companies that have recently started operating in South Africa have introduced the use of construction management as a building procurement system. In the United Kingdom (UK), this building procurement system already accounts for 15% of construction turnover and has been adopted as a preferred construction procurement method by a number of large clients (Property Reporter, 1997:15). Some have argued that construction management, as a building procurement system, could be the most suitable method to use in the South African situation considering the unique project objectives described above.

1.2 The Problem

This research proposes to determine whether the use of construction management, as a building procurement system, can improve the achievement of client objectives in the South African construction industry.

1.3 The Subproblems

1.3.1 The first subproblem is to determine whether the choice of a building procurement system influences project success or failure. (Does the choice of a building procurement system influence project success or failure ?)

1.3.2 The second subproblem is to determine whether construction management can improve the attainment of client objectives on projects. (Can construction management improve the attainment of client objectives on projects ?)

1.3.3 The third subproblem is to determine whether the use of construction management in the South African construction industry has succeeded or not. (Has the use of construction management in the South African construction industry succeeded or not ?)

1.3.4 The fourth subproblem is to determine the best framework for achieving success on construction management projects. (What is the best framework for achieving success on construction management projects ?)

1.4 The Hypothesis

The use of construction management as a building procurement system on construction projects with a strong focus on the empowerment of previously disadvantaged individuals (PDI's) and affirmable business enterprises (ABE's) leads to an improved attainment of project and client objectives.

1.4.1 The choice of a building procurement system does influence project success or failure.

1.4.2 Construction management can improve the attainment of client objectives on certain projects.

1.4.3 Construction management in South Africa has not been widely used and understood hence may have failed in its use thus far.

1.4.4 Construction management can be applied successfully on certain projects by following international best practices.

1.5 Delimitations

1.5.1 In achieving the precise purpose of the investigation it is realised that there are financial and time constraints hence no thorough national survey can be done. Gauteng, KwaZulu Natal and the Western Cape provinces will be the main target areas for the gathering of data and analysis, however, a limited sample of projects and industry role players from outside these provinces will also be consulted.

1.5.2 Furthermore, not much detail will be explored on the creation of a best practices framework on the application of construction management as a building procurement system.

1.5.2 There will be a strong focus on building projects (as opposed to other types of projects in the construction industry, such as civil engineering and infrastractural projects).

1.6 Assumptions

1.6.1 It is assumed that, at the inception stage of each construction project, the principal agent / project manager takes into account various unique project factors in order to choose the most suitable building procurement system for the project. He / she then advises the client accordingly.

1.6.2 It is assumed that the South African Construction Industry is familiar with the advantages and disadvantages of construction management as a building procurement system and also has the capacity, knowledge and experience required to undertake construction projects using this system.

1.6.3 It is assumed that most construction projects undertaken in South Africa require to have, as a client requirement, some form of emerging contractor empowerment.

1.7 Importance of and need for the study

1.7.1 The results of this investigation could be of importance to:

1.7.1.1 Assist in promoting the consideration of other building procurement systems besides the traditional system in the attainment of goals.

1.7.1.2 Assist those engaged in construction management projects to be knowledgeable about best practices in construction management in order to achieve project success.

1.7.1.3 Promote construction management, as an additional service that professional consultants, contractors and developers could offer to their clients.

1.8 Research Methodology

The information on which this treatise will be based will be gathered through various methodologies, as follows:

Firstly, extensive use of books, journals and professional magazines will be made. The information obtained from these will not be limited to South Africa but will include projects and opinions from the United Kingdom, Australia, the United States of America and some newly industrialised countries such as Singapore.

Secondly, this will be done through questionnaires and structured interviews with representatives of prime contractors, emerging contractors, practising project managers, architects, civil and / or structural engineers and clients involved on projects where construction management has been used as a building procurement system.

1.9 Conclusion

In this chapter a brief background of how client and project objectives, particularly on public sector projects in the South African construction industry, are changing as one of the mechanisms used to address some of the socio-economic challenges facing the country. The apparent failure of

the traditional building procurement system to adequately deal with these changing client objectives was also highlighted. It was stated that some international companies operating in South Africa were starting to introduce construction management as a building procurement system to the South African construction industry. This was in response to its success in countries such as the United Kingdom, but also as one of the measures that can be used to satisfy the changing client needs in construction.

CHAPTER 2

CLIENT OBJECTIVES, PROJECT SUCCESS AND BUILDING PROCUREMENT SYSTEMS

2.1 Introduction

From the preceding chapter, it is clear that the understanding of client objectives, project constraints, project success and building procurement systems is critical in order to adequately assess the sub-problems identified and prove or disprove the hypothesis stated. This chapter examines, in more detail, client objectives or constraints, project success and building procurement systems. The final section combines the knowledge obtained from the preceding sections to determine whether, based on literature, alternative building procurement systems, rather than the traditional one, can be used to address some of the unique and dynamic client and project objectives identified. This will be important to determine prior to a more in-depth literature analysis of construction management as a building procurement system.

2.2 Client Objectives and Constraints

Kerzner (2001: 2) defines a project as any series of activities and tasks that have a specific objective to be completed within certain specifications, have defined start and end dates, have funding limitations and consume resources (i.e. money, people, equipment).

The process of construction (from inception, design, production and final handover to the client) fits Kerzner's definition of a project. Clients require the construction of various structures (such as buildings, dams, roads etc) for different reasons. What is common to all clients, however, is that they require specific structures to be completed within a specified period of time, within a specified budget and specific quality standards need to be met in order for the completed structure to be acceptable or fit for use by the client or intended end user. All of this needs to be achieved with limited resources. Time, cost and quality or performance are the constraints on the project (Kerzner, 2001: 6).

Latham (1995: 11) states that clients' wishes on construction projects contribute to their wider objectives. These wishes will normally be the following:

i) value for money

ii) pleasing to look at

iii) free from defects on completion

iv) fit for purpose

v) supported by worthwhile guarantees

vi) reasonable running costs

vii) satisfactory durability

A closer look at these indicates that the wishes mentioned by Latham (1995) can be classified in terms of cost and quality objectives. Value for

money and reasonable running costs refer to cost as an objective, whereas, pleasing to look at, free from defects on completion, fit for purpose and supported by worthwhile guarantees refer to quality as an objective. Bowen *et al* (2001: 40), Kerzner (2001: 6) and others all concur that client objectives on projects (especially construction projects) can mainly be classified in terms of time, cost and quality or performance.

Construction projects differ in nature, size and complexity. As a result, projects may attach different levels of importance to each of the three key client objectives mentioned above. Cost, for example, may need to be traded off on a project that requires very high standards of quality. Time, on such a project, may also be traded off in order to ensure that the high quality levels expected from the project are indeed achieved.

Projects may also have other secondary objectives that also vary from project to project. Latham (1995: 4) states that the public sector should deliberately set out to use their spending power to assist the productivity and competitiveness of the construction industry and thereby obtain value for money generally in the longer term. Some of these may include: construction with minimum disruption, empowerment, training and/or transfer of skills, public relations, with acceptance by the customer, with minimum or mutually agreed upon scope changes, without disturbing the main flow of the organisation, without changing the corporate culture, etc.

Empowerment, training and transfer of skills have become very fundamental project objectives on public sector projects in South Africa. Mbanjwa (1996) outlines the current government's rationale on empowerment, training and transfer of skills becoming more important project objectives on construction projects. Emerging contractors, affirmable business enterprises (ABEs) and affirmable professional service providers (APSPs) are identified as role players that could previously not enter formal construction markets due to certain barriers to entry (such as general level of education, level of technology, lack of entrepreneurial skills, access to information, track record or experience, access to finance and credit, etc). The participation of emerging contractors, ABEs and APSPs in the formal construction markets, however, is seen as important in order to meet increasing demands for construction in the new South Africa.

On typical South African public sector projects, therefore, project objectives are now defined mainly in terms of:

i) time

ii) cost

iii) quality / performance and

iv) empowerment / training/ skills transfer

2.3 Project Success

In any business, it is of paramount importance that the client or customer is kept satisfied with the product and / or service that the client or customer

receives from the manufacturer, seller or service provider. The construction industry does not differ in terms of this requirement. It was outlined earlier that on typical South African projects, especially public sector projects, project objectives may be defined in terms of time, cost, quality or performance and empowerment, training and / or skills transfer. It follows, therefore, that in order to establish project success or failure, project performance needs to be measured in terms of these four original project constraints. Meeting or exceeding project expectations, as determined by the customer or client, should indicate project success and *visa versa*.

As elaborated upon below, literature indicates that project success or failure may result from many sources. Some of the reasons given for the failure of projects include, *inter alia*, the following:

i) Inaccurate briefing by the client

ii) Unrealistic project objectives

iii) Incorrect project team selection

iv) Excessive client involvement

v) Difficult project characteristics e.g. complexity, site location.

In a survey of successful and unsuccessful projects in the USA and the UK, Nahapiet and Nahapiet (1985) found that one of the major contributions to good performance (“faster” and ”lower cost”) were contractual arrangements. On construction management projects, for example, contracts were seen to provide clients with regular and detailed

information on the cost implications of decisions, some times though value engineering, and to create the flexibility to implement changes without delay or difficulty.

Bennet and Grice (1992) state that there are three most important aspects for attaining success on building projects. These are said to be:

i) building procurement system

ii) establishment of the client's objectives

iii) deciding on the nature of the product

The same authors state that the procurement system and establishing client objectives are the most important aspects for achieving project success.

In most literature, there seems to be consensus that procurement systems, contractual arrangements and building procurement systems have a major impact on the success or failure of a construction project.

Latham (1994: 14) states that, after the client is satisfied with the brief and the feasibility of the project, a typical client's instinctive reaction is to get into a "ring up an architect or engineer syndrome." He argues that this is too big a step to take as it closes off other potential procurement options i.e. building procurement systems. He argues that the next step should be the use of, *inter alia*, risk assessment, to devise a contract strategy. This

implies that there should be no automatic allocation of a specific building procurement system to a project.

This argument is echoed by Bennet and Grice (1992: 243) when they state that each project needs to be evaluated to determine the type of building procurement system to use prior to finally selecting the leader of the project, as well as the rest of the professional or design team to be utilised on the project. The choice of an appropriate procurement system is crucial to the success of building projects. This also comes across very strongly from Holtzhausen (1998).

2.4 Building Procurement Systems

A building procurement system:

(i) Establishes the roles and relationships which make up the project organization.

(ii) Establishes the overall management structure and systems.

(iii) Helps shape the overall values and style of the project.

(iv) Considers the amount of risk the client is prepared to accept. A client that accepts little or no risk, for example, should not choose or select a system that will be selected by a client who prefers to get involved in detail and wants hands-on control.

According to Bennet and Brice (1992) some of the factors, prevailing in the UK construction industry, that influence the choice of building procurement systems are as follows:

i) The building industry is fragmented. There are a number of designers and contractors involved and all work for different organizations. They are, however, temporarily welded together to form a temporary organization with an objective of completing a specific product (building, bridge, road, etc). Furthermore, Franks (1990) argues that the design and production or construction processes are also fragmented.

ii) The selection of specialists (contractors and consultants) is done on a competitive basis and the contracts tend to be adversarial rather than co-operative between the client and specialists. This “them” and “us” attitude reduces team spirit and chances of attaining project success diminish.

iii) The role of specialists is changing. Greater responsibility for detailed design and on site supervision is given to specialist contractors, therefore, most procurement systems now include some form of contractual link between the client and at least, the key specialists.

iv) Architects, normally, have a contractual right to get involved in all aspects of detail design, but this can be difficult when most of the specialist knowledge on certain design aspects resides outside the architects’ own firms.

v) Management has emerged alongside design and construction as a basic and fundamental responsibility within projects.

vi) Expert and experienced clients now play a more active role in building projects than in earlier times. Clients now challenge all aspects of the building industry's performance in search for better value, faster construction and higher profits.

The points discussed above make building procurement system selection both difficult and very important. This difficult but important decision needs to be made after considering various types of building procurement systems that exist today. Literature indicates that there are various ways of not only classifying these, but also of referring to each of them.

Benett and Grice (1992) identify the following four building procurement system categories:

i) Traditional

ii) Design and build

iii) Management

iv) Design and Manage

Rawlinson (1987) on the other hand identifies only three categories namely, traditional, design and build, and management or other.

It is interesting to note that some describe project management as a separate building procurement system. This classification, however, is incorrect as project management can be applied to any building procurement system.

Each category, as outlined by Bennet and Grice (1992), will be discussed below:

2.4.1 Traditional System

The traditional system has been in existence since the inception of the main contractor and the architectural and quantity surveying professions. This was at the end of the 18th century and beginning of the 19th century. Since then, clients have relied on the architect and/or consulting engineers (depending on the type of construction project) to design and supervise construction. The project is designed and detailed up to a point where the various elements of the design can be taken off and worked up into a bill of quantities. A main contractor is invited to bid for the work and, if successful, starts on site as soon as possible. Main contractors, in turn, use domestic, nominated and/or selected subcontractors.

Since inception, this system has generally worked satisfactory, however, in recent years, large projects such as power stations, airports, oil refineries and similar complex utilities have proved difficult to manage in total. This could be attributed to various factors but in essence the expertise of the

design orientated professions has proved insufficient to manage; as opposed to merely supervise, the numerous specialized and technically sophisticated contractors during construction. Rowlinson(1987) states that the traditional system has been criticised for its slowness, due to the sequential nature of the work and the incidence of time and cost overruns attributed, in part, to the lack of input from the main contractor during the design phase. Variants of this system include the use of a project manager but still utilising a main contractor to carry out the work.

2.4.2 Design and Build systems

With this type of system the client gives responsibility for design and construction of a building to one entity. It is suitable on a project where the client's needs are clearly defined. In some instances, clients also require this entity to completely equip, provide staff and commissioning of a building. This is called a “turnkey” contract. Three variants of this system exist, namely:

1) *Direct* : The selection of the entity is based on some appraisal but not competition.
2) *Competitive* : The selection of the entity is based on competitive designs and prices.
3) *Develop and construct* : Consultants are appointed to design the building to a partial stage, then contractors complete and guarantee the design in competition, either using the client's consultants or their own designs.

Most authors concur that design and build methods offer a single point of responsibility for clients, in other words, one organisation is contracting to fulfill the design and construction responsibilities for the project. This approach has, however, been criticised on two counts:

Firstly, private architects question the architectural quality of buildings produced thus. Secondly, the quantity surveying profession has cast doubts on the value for money obtained by entering into such contracts which are commonly assumed to be let by negotiation. (Rowlinson, 1987:57). These claims are, however, countered by design and build contractors who claim to build more quickly and efficiently.

2.4.3 Management Systems

On this type of building procurement system the client appoints the design team for the project as well as a separate entity (consultant or contractor) to focus on the management of the construction process in return for a certain fee. Specialists or trade contractors are appointed to undertake construction work and are selected by negotiation or through competitive pricing. The appointment of such an entity is made during the appointment of the rest of the design team, therefore, this management approach allows the contractor to have an input into the design phase without disturbing the principle of divided responsibility. They are believed to lead to rapid and efficient construction and may reduce price competition or add an extra consultant to the team and so additional fees, to the bill. This

building procurement system category has two variants namely, management contracting and construction management.

(i) Management Contracting

Where management contracting is utilised, a management contractor is appointed (contracts directly with the client) earlier and deliver the project to the agreed price and on time. This appointment taken place as soon as the scope of works and the bill of quantities have been developed to a reasonable level in order to allow a management contractor to tender for management. The management contractor, in turn, appoints his own specialist contractors and subcontractors to undertake the physical work on site. The management contractor merely provides on site supervision and management but does not physically undertake any work on site. The difference between this system and other management building procurement systems is that, in this case, the contractor takes some contractual, time and price risks.

(ii) Construction Management

Where construction management is utilised, a professional firm (construction manager) is paid a fee to provide a management service throughout the project (design and construction phase). Work is then broken down into various specialist and trade contracts and is carried out by trade contractors. These trade contractors enter into direct contracts with the client, who retains the time and price risks. (Bennet and Grice, 1987). Bovis has used this system in Britian for over forty years

(Franks,1990). This system, the subject of this treatise, is elaborated upon in the following chapter.

2.4.4 Design and Manage Systems

The client appoints a single firm to design and deliver the project but specialist contractors are appointed to undertake the construction work by negotiation or in competition. The project design and manage firm may either take a contractual risk to deliver the project to an agreed price and on time (contractor) or may act as the client's agent only and other contractors enter into direct contracts with the client, who takes the time and price risks (consultant).

Variants of this system include the Build Operate and Transfer (BOT) contracts. BOT and other similar arrangements such as Build Operate Own (BOO), Build Operate Own and Transfer (BOOT) and Design Build Finance and Own (DBFO) are increasingly being used on large infrastructure projects (traditional only financed by government) in South Africa. Examples of projects that have been executed in this manner include the Empangeni Maximum Security Prison and the Department of Trade and Industry Campus in Pretoria.

2.5 Building Procurement Selection to Attain Client Objectives and Project Success

The building procurement systems discussed above are all suitable for different types of projects in different types of scenarios. According to

Holtzhausen (1998: 67), citing Franks (1984: 29), states that no single building procurement system can be applied universally on all construction projects. As a guideline, a table indicating the suitability of various building procurement systems to different types of scenarios is depicted in table 2.1 below (1 indicates low performance and 5 indicates high performance):

	Clients' Performance Requirements or Expectations	Conventional	Design and Build	Management / Other
1	Technical complexity	4	4	5
2	High aesthetic or prestige requirements	5	3	3
3	Economy / minimum cost	3	4	4
4	Time is of essence	2	5	4
5	Exceptional size and/or administrative complexity	2	4	4
6	Price certainty required as soon as possible	4	4	2
7	Facility for variation control by the client during progress	5	1	5

Table 2.1 : Rating of various procurement models (adapted from Holtzhausen, 1998: 67)

Holtzhausen (1998: 67) states that there is no "best buy" among procurement systems. Three golden rules of thumb can be applied to the selection of procurement models:

(i) The traditional system and its variants will enable a project to be implemented efficiently, provided that complete project documentation based upon tried and trusted construction methods is available at tender stage.

(ii) Where design documentation is not sufficiently complete to allow the project to be effected in accordance with the client's timing requirements, it will be necessary to implement the works by non-conventional procurement systems.

(iii) Non-conventional methods of procurement produce better performances, in terms of speed, in both the design and construction phases of projects.

The application of the above rules of thumb would, however, have to be applied with caution in the South African context. This is due to the country's unique client needs that also need to be taken into account when procurement systems are selected.

2.6 Conclusion

This chapter highlighted that client objectives may mainly be classified in terms of time, cost and quality performance, however, in the South African context other factors such as skills transfer to SMMEs, ABEs, APSPs and PDI’s on projects (particularly public sector projects) also play a role.

Project success has been defined as the attainment of client objectives mainly with respect to time, cost and quality. Amongst other things, the selection of an appropriate building procurement system contributes to the attainment of client objectives with respect to time, cost and quality for construction projects. Building procurement systems that fall under the management category, for example, were found to perform better in terms of reducing time overruns. Theoretically, therefore, it can be concluded that these systems can improve client satisfaction on construction projects.

CHAPTER 3

CONSTRUCTION MANAGEMENT:

THEORY AND PRACTICE

3.1 Introduction

In the first chapter a brief background on construction management and the manner in which it is perceived locally and internationally was given. It was found that construction management was becoming more prominent in the South African construction industry. In a study of the extent to which South African construction companies affiliated to the MBA (Master Builders' Association) were using subcontractors to carry out work, Shor *et al* (1998) concluded that there was a shift by main contractors from the traditional building procurement systems towards construction management.

Chapter two explored important objectives, constraints and factors that contribute towards successful projects. Building procurement systems were identified as one of the most important factors that determined the outcome of a project. A review of various systems currently in practice internationally concluded that less traditional systems, such as construction management, offered certain benefits to the client when compared against the traditional system.

This chapter examines construction management, as a building procurement system in more detail, as found in literature reviewed. It begins with a definition of construction management, followed by a look at key parties involved when utilising this system. Benefits of the use of this system are then given, followed by a few international and local case studies outlining successes and failures of the system. Final sections identify shortcomings of construction management, recipes for success and thereafter, conclusions are drawn.

3.2 Definition of Construction Management and Contractual Relationships

3.2.1 Definition

Construction management may refer to many different aspects within the construction industry. Furthermore, it means different things to different people. As an example, it mainly refers to the management of construction activities by a main contractor, subcontractor, etc.

Construction management may also refer to the profession that managers of construction activities on site are engaged in. New legislation that recognises the construction management profession, namely the *Project and Construction Management Professions Act, 2000 (Act No. 48 of 2000)* and *the Council for the Built Environment Act, 2000 (Act No. 43 of 2000)*, have been promulgated in South Africa.

Construction management may also refer to a specific type of building procurement system and this is the focus of this dissertation. In this context, Kweku *et al* (1987: 5) define construction management as "*a fusion of old established construction practices with current technological advances and latest management methods into one completely integrated working system to control time, cost and quality in the design and construction process.*"

According to the same authors, it unites a three party team of an owner (client), an Engineer/Architect (including quantity surveyor) and a professional construction manager into a non-adversary, cohesive contractual relationship, all with the common goal to best serve the owner's needs.

3.2.2 Contractual Relationship

This is a procurement system whereby the client enters into direct contracts with various trades or works contractors that are directly accountable to a construction manager for all construction works. This is in lieu of the client entering into a direct contract with the main contractor only, whilst subcontractors enter into contracts with the main contractor.

A typical contractual relationship in construction management, as a building procurement system, is outlined below:

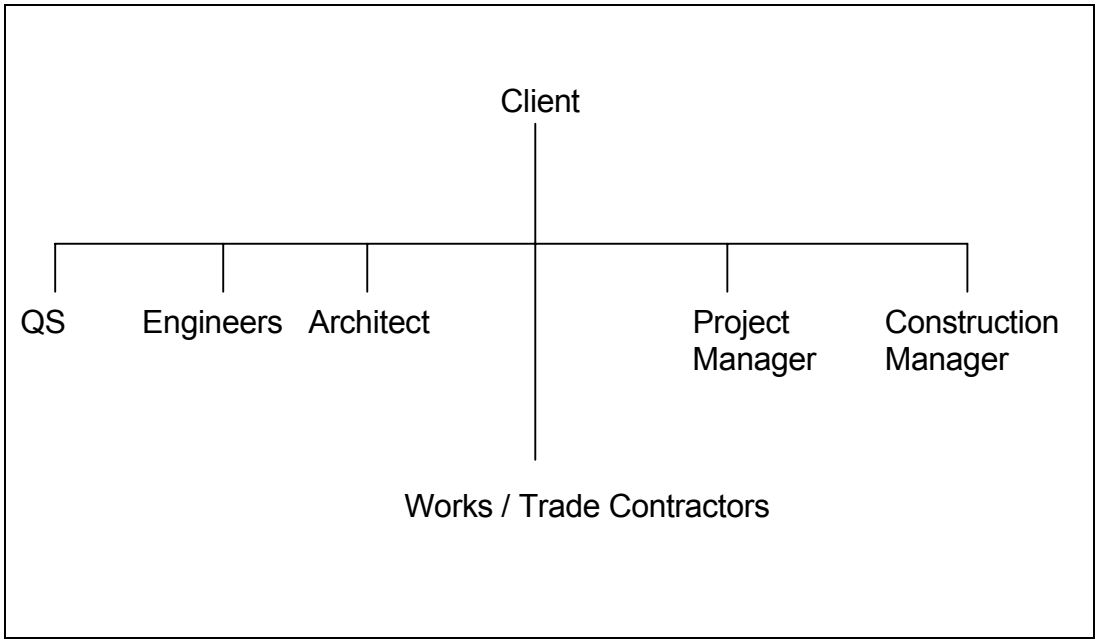

Figure 3.1: Contractual relationships using construction management

Unlike other systems, a construction manager is appointed early to act as the client's advisor to provide planning, management and co-ordination of construction. A fee is charged for the service and since all the actual orders with the various works contractors are with the client, the construction manager carries virtually no risk (Harris & McCaffer, 1989: 180).

It is important to note that construction management differs from project management. Shor *et al* (1998) *citing* Kwakwe (1991) state that project management is the arrangement where the client appoints a professional consultant or advisor to assume the role of project leader and is responsible for the management of the design and construction functions. A project manager, may, therefore, be appointed to act as leader of the project, on

behalf of the client on a project using construction management as a building procurement system (see contractual relationship in figure 3.1 and organisational relationship in figure 3.2).

3.3 Forms of Construction Management

Construction management has been implemented in various forms internationally. Some forms are more prevalent in certain areas such as the USA whilst some are more prevalent in the UK. According to Kenig (2001: 2) these forms may be broadly categorised into two forms, namely:

- Purest Form - Construction Management "Not at Risk"
- Guaranteed Maximum Price Form - Construction Management "At Risk"

There may be further variants of these two construction management categories. According to Kleunker (2001: 3) there was initially just one form of construction management. This was construction management "not at risk" and clients did not have a problem with any conflict of interest with their construction managers.

The construction manager was selected on the basis of qualifications and the fee was negotiated; the same process was used to select architects, engineers and quantity surveyors. All tenders were at the trade contractor level. According to Kluenker (2001: 3), this process was largely successful as clients reaped the benefits of having the construction entity on their side of the table, managing and co-ordinating the trade contractors in the best interest of clients with minimal conflict of interest.

The variants of the above-mentioned tried and tested system came about when some clients felt that placing the construction manager at some type of financial risk would help ensure top performance and better results on the project. Kluenker (2001: 3) warns that this shift in risk, from clients to the construction manager, pushes the construction manager away from their side of the table.

Due to this shortcoming in construction management "at risk" the Construction Management Association of America (CMAA) wrote their initial "Guidelines for Construction Management Practice (Standards) Pure Agency Construction Management Services," with the construction manager in the professional services relationship with the owner. Advantages with this system were that :

- It created the least conflict of interest between the client and the construction manager
- It was the most client-oriented approach to construction management.

Some of the various construction management contractual relationships (from pure agency to various forms of "at risk" construction management) as described by Kluenker (2001: 4) are as follows:

i) Pure agency construction management (CM) with general contracting and hourly CM fee.

ii) Pure agency CM with general contracting and lump sum CM fee.

iii) Pure agency CM with phased construction (construction by various contractors, at element level, and tendering starts before design ends).

iv) Pure agency CM with multi prime contracts (construction manager co-ordinates various contractors, at trade level, and contracts directly with the client).

v) Pure agency CM with multi prime contracts and a "soft" cost guarantee

vi) Pure agency CM multi prime contracts, construction manager guarantees the price at tender stage and holds trade contracts.

vii) The construction manager bonds the project (guarantees full performance of the project).

The focus of this treatise is on the purest form of construction management but with multiple contracts at prime contract level. As discussed above, the above variants of construction management have come about purely through the need to satisfy the client. It is the owner's choice whether to have the construction manager completely on his side of the table and expect a professional services relationship or place a carefully considered amount of risk upon the construction manager. It is, however, important to note that increasing risk pushes the construction manager toward the other side of the table and this means that the client needs to get more heavily involved in managing the project. As an example, the client will need to be

sure that the architect is not causing delays, that the construction manager's guaranteed maximum price is not inflated, that subcontractors are being handled properly, that subcontractors are being paid and that the client is not creating real or potential delays on the project. Ultimately, the client needs to make those fundamental decisions of shifting risk versus creating conflict of interest before the construction manager is under contract. According to Kluenker (2001: 16) there are many construction management firms that are comfortable with and will do a good job in any of the risk environments described. The same is, however, doubtful in South Africa, especially amongst those practicing as professional construction project managers.

3.4 Key Players in Construction Management

The key role players in a construction management procurement system include the client, the construction manager, the architect, engineer and work package contractors. As the construction manager plays a more critical and central role in this building procurement system, it will be dealt with in more detail below.

3.4.1 The Construction Manager

It is critical that, prior to construction management being implemented, a suitable construction manager is selected. To select a suitable construction manager, it is necessary to pose certain critical questions such as the following:

- Which member of the project team (from designers to contractors), is most suited to play the role of a construction manager ?

- What kind of training does one need to undergo to become a successful construction manager ?
- How should a construction manager be selected ?

An attempt will be made to answer some of these questions.

According to Harris and McCaffer (1989: 180), whilst in principle all types of firms competent to manage construction projects are acceptable, actual practice has generally demonstrated that large, experienced, national contractors are the favoured choice of clients.

Shor *et al* (1998) conclude that professional project management firms also have the skills required to act as construction managers, therefore, they could play a role by offering the service themselves or by lending their services to main contractors. The same authors also state that a combination of construction management and project management services could be a possibility, however, some studies have shown that clients feel that this combination of services is specifically suitable for refurbishments.

According to Shor *et al* (1998), the most suitable form of training for construction managers is the BSc (Building) or BSc (Construction Management) degree offered at various universities in South Africa. The same authors express concern about the decreasing numbers of students that enroll for this degree at various universities in South Africa. They state that while there is an apparent increase in construction management skills

required in the industry, there is unfortunately a decrease in the number of construction management graduates.

According to Kluenker (2001: 16) construction managers need to be chosen based on the following criteria:

- Past performance
- Reputation
- Capabilities and qualifications of the construction manager' office and field staff
- Level of professional liability insurance

3.5 Duties of the Construction Manager

The firm or person appointed to act as construction manager on a project is not allowed to undertake any construction work. Such a firm or person is required to play a role that is similar to the architect and consulting engineer but with the omission of any design responsibility (Harris & McCaffer (1989: 180). Advice is given to the designer on buildability, including drawing up suitable work package contracts, arranging procurement contracts and managing the bidding or tender phases of the works contracts. Considerable expertise is needed during construction to bring all the elements together, with a view to minimizing variations, time delays and general inefficiencies.

The figure below shows the organisational arrangements where construction management is used as a building procurement system.

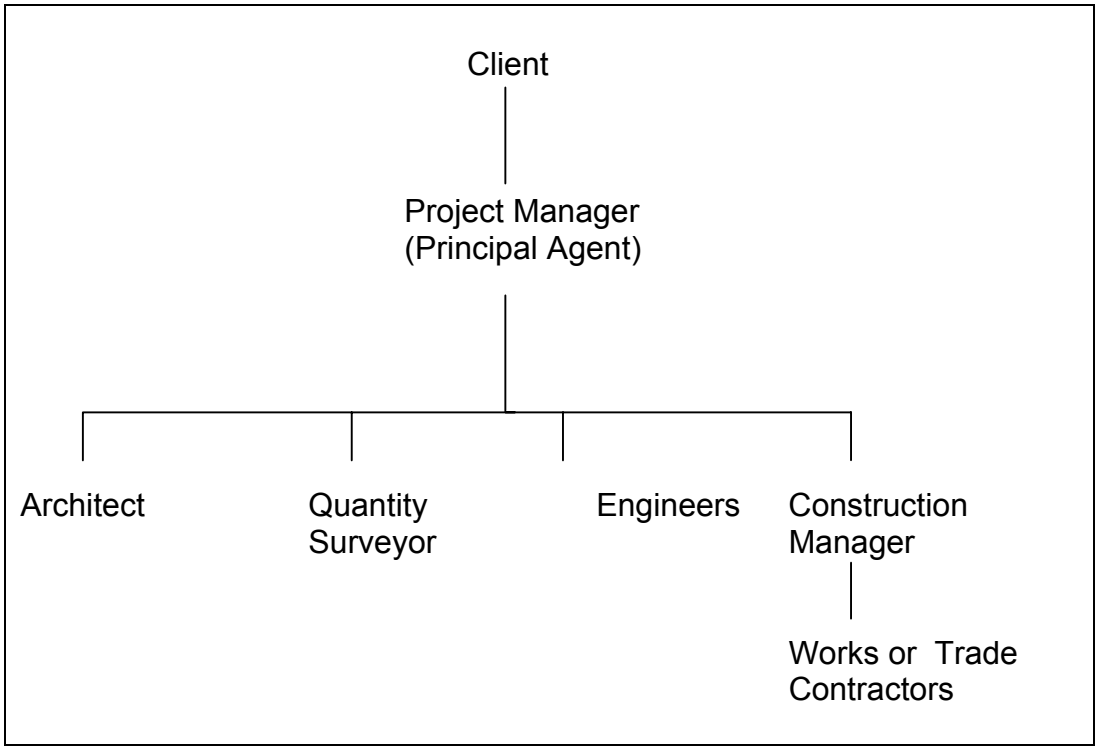

Figure 3.2 : Organisational relationships using construction management

Figure 3.2 above, indicates that the client communicates directly with a project manger, construction manager or principal agent, if appointed separately. The project manager or principal agent then has to liase directly with the design team and the construction manager. The construction manager has a direct line of communication with the project manager or principal agent and the designers. He is directly responsible for all trades or works contractors.

Where no separate project manager or principal agent has been appointed, a construction manager normally plays the role of principal agent. In such instances the construction manager is also responsible for the performance of the design team.

To avoid confusion regarding responsibilities with other parties of the project team, it is critical that the roles and functions of a construction manager are clearly defined for each phase of the project. These duties must be stated in the Client: Construction Manager Agreement. A typical agreement used by one of the most successful international construction managers is attached as Appendix D.

In the absence of guidelines that define the roles and responsibilities of a construction manager, an association of construction managers whose mandate includes the establishment of standards and best practices was established in the USA as the Construction Management Association of America (CCMA) in 1981 (Kweku, 1987) This body's standard roles and responsibilities for a construction manager are outlined in Appendix A.

3.6 An Argument for Construction Management

Literature reviewed indicates that construction management has been widely used on many large and complex construction projects in the United States of America and the United Kingdom. Various authors give various reasons for the prominent use of this system, instead of more traditional procurement systems.

3.6.1 General Benefits of Construction Management

Shor *et al* (1998) *citing* McKinney (1983) and Moore (1984) outline the following advantages of construction management over other building procurement systems:

- The construction manager as a professional agent of the client retained on a fee basis, works in the client's interest. This overcomes the contrast barrier and removes the traditional adversarial relationship that often exists between the contractor and other members of the team.

- The involvement of an experienced contractor in the role of a construction manager at the design and planning stages of the project provides the client and designers with a source of information on matters concerning cost, buildability, productivity, programmes, schedules, market conditions, labour and materials availability; thus designers can design to suit the prevailing conditions.

- Competitive tenders can be obtained for one hundred percent of the work, because the construction manager, from his own training and experience, knows how to subcontract work on a secure basis. From this experience and list of works or trades contractors, he will be able to select on the basis of quality as well as price.

- The construction manager is in a position to control the tendering for work elements, thus obtaining maximum price benefit by recognising market conditions and influences. There is also no unwanted mark-ups on subcontractors who constitute a large portion of the work on traditional contracts.

- There may be savings in the overall time, from the initial brief to completion, due to the omission of time spent on preparing design/tender documentation and long tendering periods. It is argued that such reductions in time also reduce total costs, while the client has the use of the facility sooner. Application of critical chain techniques by the construction manager will result in even shorter project durations.

Kweku *et al* (1987) provides a comparative analysis between construction management and the traditional building procurement system (see Table 3.1 below):

No	**Construction Management**	**Traditional Procurement System**
1	Several prime contractors contract directly with owner	One Main Contractor contracts with owner
2	Design and construction are handled as one single effort	Design and construction are two separate efforts – no continuity
3	Cohesive team effort between professional design team and the construction manager	Adversarial relationship between professional design team and the main contractor
4	Reduces layering of bonding (surety)	Layering occurs: Main contractor furnishes surety to client and subcontractors to main contractor
5	Value management and cost control during design	Usually none during design
6	No guaranteed costs at onset of project	Usually a guaranteed lump sum bid at the beginning of the project.
7	Integrated system but permits phased construction	Fragmented and sequential approach
8	Construction manager has incentive to reduce costs through value management	Main contractor has no incentive to reduce costs
9	Client retains control of budget	Owner has little or no control
	At planning and design phases construction manager provides client with source of independent information about probable costs and schedules.	Owner depends solely on the professional design team

Table 3.1 : A comparative analysis between construction management and the traditional building procurement system

In summary, construction management may have the following benefits when implemented on a project:

i) An attitude of mind geared to protecting the interests of the client

ii) High quality standards maintained by defined control methods and quality assurance systems

iii) Superior performance from all work package contractors due to cohesive management style

iv) Flexibility, allowing the client to make his own business decisions with confidence

v) Direct control through client's agent, the construction manager, of costs, design, procurement and construction

vi) No conflict of interest as the construction manager works on behalf of the client. Any cost savings achieved are passed directly to the client.

vii) Fast tracking (design running in tandem with construction) is easier to achieve, therefore, the project duration is reduced thereby reducing total project costs whilst also providing potential income from the facility being completed earlier.

viii) Cost variations and budget estimates can be adjusted quickly and accurately, with improved cash management, thereby bringing financial benefits.

ix) Shorter chains of command and clear contractual arrangements increase scope for value engineering to be successful.

x) Empowerment of emerging contractors by packaging the works into discreet elements

xi) Saving of main contractor's mark-up on subcontractors

xii) Saving of main contractor's settlement discounts on subcontractors

xiii) Saving on main contractor's preliminary and general costs. The cost of Construction Manager's project team, the site office and running costs and any shared services are normally half the cost of the main contractor's preliminary and general costs.

xiv) Flexibility in dealing with unforeseen changes

Based on the above literature review, the most important benefits of construction management include:

i) Cost reduction:

ii) Design flexibility

iii) Full control of the construction process

iv) Fast tracking

v) Affirmative procurement

The previous chapter outlined that the three major objectives for clients regarding their construction projects are to have them completed on time,

within budget and in accordance with quality parameters. According to literature analysed above, construction management can offer cost and time savings. These are two of the three major client objectives. It can, therefore, be concluded that, where adequately implemented and managed, construction management can lead to the improvement of client satisfaction levels.

3.6.2 Affirmative Procurement Benefits

In chapter 2, it was pointed out that clients (particularly public sector clients) do not only view time, cost and quality as the important parameters that determine success on a construction project. Other parameters such as provision of opportunities and development of PDIs, SMMEs, emerging contractors, local communities, etc., also play an important part in determining project success.

International organisations that are implementing construction management argue that this system can be of benefit in affirmative procurement. Bovis South Africa (Pty) Ltd, for example, has termed this "affirmative construction." The manner in which this is achieved is as follows:

- Work is broken down into smaller, more manageable work packages. All work package contractors are then managed by a suitably qualified and experienced construction manager. This technique provides smaller or emerging contractors with opportunities to participate in contracts they would not have been able to participate in had the traditional "main

contractor" route been utilised. When properly implemented, this is clearly a powerful empowerment tool that public sector clients should have an interest in.

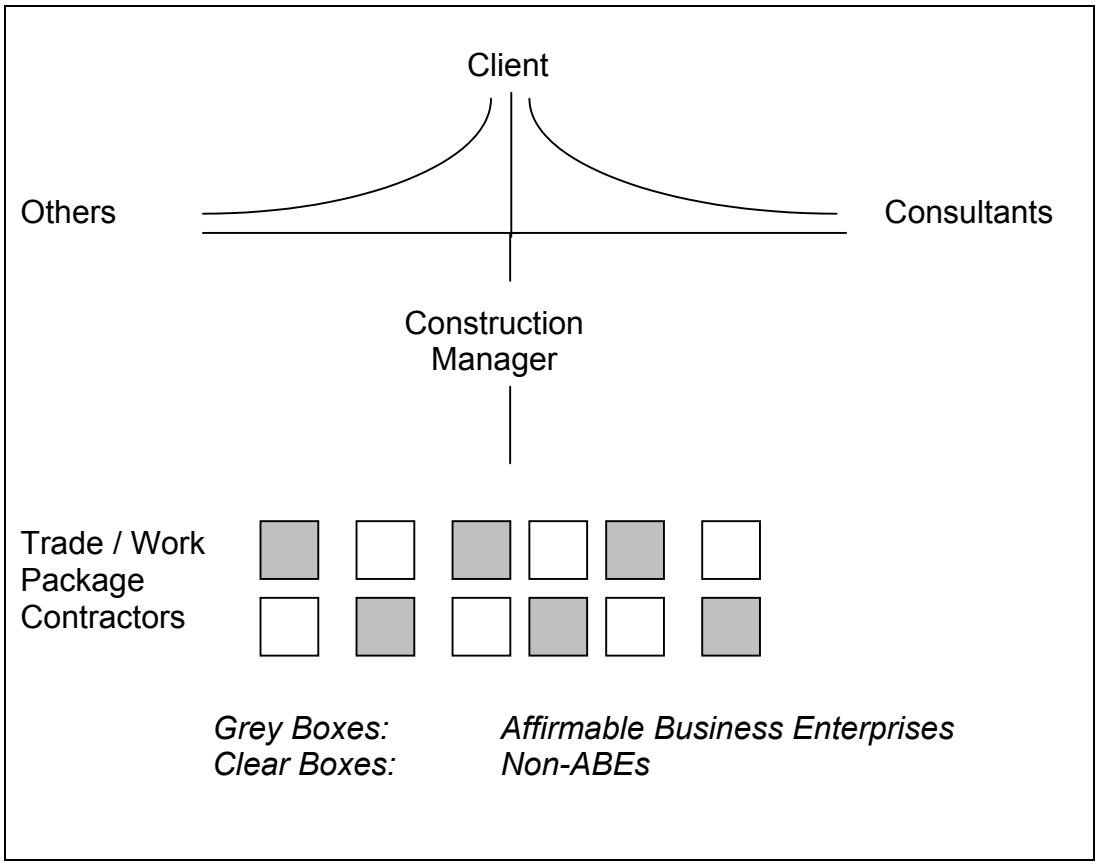

Figure 3.3 : Affirmative construction in action
(Source: Bovis South Africa (Pty) Ltd)

The manner in which this takes place is illustrated in figure 3.3. As shown above, ABE's as well as non-ABE's can be utilised on any given project.

Other measures that can be implemented on a construction management project in order to assist ABEs and SMMEs could include, *inter alia*, the following:

- The community can get involved in construction projects. Smaller work packages also allow labour only trade contractors with little or no resources to be formed, however, according to Thebe Bovis (Pty) Ltd it is critical that responsibility for material procurement and management is assumed as soon as possible. The construction manager can be very useful in ensuring that training and transfer of skills in this regard takes place during construction.

- According to Mbanjwa (1996) one of the major barriers to entry into the formal construction markets for emerging contractors (ABE's) is performance guarantees or sureties. Contract or performance guarantees could be waived in certain circumstances. This would be possible because of smaller work packages involved and the reduced risk to the client.

Affirmative construction, using construction management, has been successfully implemented on a number of projects in the United Kingdom and the United States of America. An example of such a project is the Waltham Forest Housing Action Trust (WFHAT) project. This was a government housing project worth about $ 250 million that began in 1993. Its aim was to house 6500 people from system built flats into traditional homes over a 10 year period.

3.7 Shortcomings of construction management

Although construction management is seen by many that have applied it as the most suitable system to use where time and budget constraints are tight and critical to the success of the project, some authors have been critical of the system.

According to Harris & McCaffer (1989: 180) one of the main disadvantages of construction management to the client is the lack of a firm tender price at the selection stage, other than an approximate overall scheme estimate or budget. The potential cost only becomes known as tenders submitted by works contractors are accepted.

Another disadvantage of using this system is the amount of risk that the client has to bear due to the large number of works contractors that are needed on a large or complex project. Ordinarily, large, well established contractors are responsible for the entire construction works therefore the risk to the client is reduced as the main contractor has to bear risks associated with subcontractors.

3.8 Case Studies of Some Construction Management Projects

According to Kweku *et al* (1987: 6), the construction management concept has had both successes and failures in the past. Some of the successes, internationally, include projects such as the World Trade Centre Twin Towers in New York, whilst locally it includes projects such as the New Taxi Rank at the Park Station for Intersite in Johannesburg.

3.8.1 World Trade Centre, New York

In the United States of America, General Services Administration (GSA) was the federal agency to repeatedly adopt the construction management concept. Before GSA's involvement in construction management, probably the most publicised successful construction management project was the New York Port Authority's 110 storey Twin Tower World Trade Centre on which Tishman Realty and Construction Company was the construction manager under a negotiated contract. Tishman began working in 1966 under a consulting contract through the design phase. This was later extended to include bidding and construction phases. Tishman, during the design and pre-bid phase, prepared cost estimates and recommended bid packaging that required 40 prime contracts. It also assisted in the drafting of bid documents, bidding and award of prime contracts. During the construction phase Tishman prepared and monitored construction schedules (using the critical path method), co-ordinated construction work, furnished monthly computerised cost reports to the owner, reviewed and approved prime contractors' invoices (approximately $ 10 million per month) and made recommendations that resulted in savings of "hundred of thousands of dollars." It should be noted that this project was started with a design / constructability consultant who later turned into a construction manager.

3.8.2 The Federal Reserve Bank of San Francisco

According to Kweku et al (1987), one of the projects where construction management has failed is the Federal Reserve Bank of San Francisco. This

was a 635 000 square foot, 12 storey fast track project. It was started in January 1980 and was scheduled to be completed in December 1981. It was only completed in February 1983.

The construction manager had initially (in 1977) given the owner a budget of $ 85.00 per square foot, thereby making it a $ 53 975 000 contract based on 635 000 square feet in area. In 1980, when construction commenced, this estimate was revised to $ 110.00, making it a $ 69 850 000 project (29.4% increase). The client then filed a lawsuit against the construction manager for negligence due to repeated failure to meet schedules and deadlines, inadequate management and poor co-ordination of the project.

Clearly, this project did not meet its objectives in terms of time and budget. Although many blamed the failure of this project on fast tracking, according to Kweku *et al* (1987), failure of the project could be attributable to an improperly prepared budget, an unrealistic schedule and unqualified personnel. The same authors argue that in many cases contracts are awarded based on design development drawings, therefore, the construction manager must establish a contingency to cover changes due to design professional activities.

3.8.3 Implementation on Local Projects

Locally, a number of companies offering construction management services boast that client organisations such as Telkom, Eskom, South African Reserve Bank, Intersite, Old Mutual Properties, Airports Company of South

Africa, Goldman Sachs and the Department of Public Works have successfully implemented and/or have adopted construction management as a preferred building procurement system on certain types of projects (e.g. refurbishments). Some of the projects on which this system has been successfully implemented include the following:

Client	Project	Project Type	Value
Telkom	Space Saver Project	Office fit out & refurbishment	R 43 million
SA Reserve Bank	Church Square Building Upgrade	Refurbishment	R 38 million
SA Reserve Bank	Additions to Durban Branch	Additions and Refurbishment	R 20 million
Old Mutual Properties	Cavendish Square Upgrade	Refurbishment	R 200 million
Intersite	New Park Station Taxi Rank	New building	R 25 million

Table 3.2 : A Selection of Successful South African Construction Management Projects

3.9 Recipes of Success

Many authors argue that when properly implemented, construction management can be successful. A number of important considerations, however, are required in order to achieve best results. Herein these are referred to as "recipes of success". These may be briefly outlined as follows:

(i) Construction Manager Selection

- Done early i.e. prior to appointment of Architect/Engineer
- Selecting the right construction manager

(ii) Managing interfaces from one works contractor to the next

- This can be done by surveying and signing off before the next construction package starts.

(iii) Cost control and value engineering during design

(iv) Develop a realistic budget:

- More time to be spent on budget development than the norm.
- Include realistic contingency amounts to cater for possible design changes or other contingencies

(v) Develop a realistic schedule

(vi) Develop adequate contracts for consultants and work package contractors

(vii) Apply construction management in its purest form

(viii) Client to understand his/her role in the project team:

- Define responsibilities
- Maintain professional relationship with construction manager and architects or engineer
- Make timely decisions

(ix) Clearly define relationships and responsibilities between various project team members such as the architect, project manager and construction manager

(x) Cost sharing to be limited to value engineering only, to prevent unethical behaviour and conflict of interest for the construction manager.

3.10 Conclusion

This chapter provided some insight into the theory and practice of construction management as a building procurement system. Construction management, in this context, was defined as a procurement system whereby the client contracts directly with various trade or works contractors that are directly accountable to a construction manager for all construction works. The construction manager is responsible for the overall co-ordination of work package contractors

Literature reviewed, indicates that this procurement system leads to cost savings and shorter project duration, thereby, resulting in improved client satisfaction levels. Furthermore, it can also be of benefit as it allows affirmative construction to take place. This may be of particular interest to public sector clients.

Construction management has been widely used in the United States of America and the United Kingdom. In certain instances, it had good results (such as in the World Trade Centre, New York, example), whereas in other instances the results have been disastrous (such as in the Federal Reserve Bank of San Francisco example). Authors, such as Kweku *et al* (1987), argue that this is due to poor implementation. In light of this, it is important to

note that this method has its shortcomings and can be poorly implemented resulting in unsuccessful projects. Ensuring that “recipes of success” identified herein are applied, can go a long way to ensuring that the system is properly applied and that favourable results are achieved. In theory, therefore, construction management can lead to better satisfied clients as it can achieve better results in terms of their objectives, when properly implemented.

CHAPTER 4

EMPIRICAL SURVEY

4.1 Introduction

Literature reviewed indicates that there is a correlation between the selection of a particular type of building procurement system and the outcome of a project. The outcome of a project (success or failure) was defined in terms of the attainment of client objectives i.e. time, quality, time and other client requirements such as empowerment, etc. It was found that no single building procurement system is, automatically, suitable for all projects but that, at the beginning of each project, various project characteristics have to be taken into account before arriving at a suitable building procurement system. Such selection of a building procurement system has a major influence on the success or failure of a project.

Literature reviewed also found that construction management has improved the attainment of certain client objectives, particularly in terms of time and cost. As these are major client objectives, it was concluded that construction management can generally improve the attainment of client objectives on projects. It is, however, important to note that the literature clearly showed that construction management was suitable on all projects. Certain projects were found to be more suitable than others.

It was also shown that construction management, as applied locally and particularly internationally, can be of benefit in affirmative procurement. Organisations, such as Bovis Southern Africa, have, as a result, termed this "affirmative construction." This has been achieved by breaking work down into smaller, more manageable work packages, managed by suitably qualified and experienced construction managers. This has provided smaller or emerging contractors with opportunities to participate in contracts they would not normally have had an opportunity to participate in.

Based on the above and the literature reviewed, the hypothesis *that " the use of construction management as a building procurement system on construction projects with a strong focus on the empowerment of PDIs and ABEs leads to an improved attainment of project / client objectives"* is proven. It is, however, important that the literature review findings are tested against findings from clients and built environment professionals that have actually applied construction management in South Africa, as well as those that have not done so.

This chapter will determine whether the use of construction management in the South African construction industry has succeeded or not. Guidelines on the best framework for achieving success on construction management projects will also be determined. Findings from the survey will then test the hypothesis further.

4.2 Research Methodology

In order to test the findings of the literature survey and hypothesis stated above, an empirical survey was conducted. This survey was in the form of a questionnaire. A copy of the questionnaire used, is attached as Appendix B. Appendix C contains a summarised analysis of the survey results.

The survey was sent out electronically (by electronic mail) and issued by hand to clients and built environment professionals (practising as project and/or construction managers). Clients were chosen because they initiate projects and are directly affected by the outcome of projects. Construction project managers were chosen because they are the most accountable to the client in terms of the outcome of projects. Furthermore, in the literature reviewed, they were found to have the most appropriate training and experience to offer construction management services.

A balance had to be obtained by distinguishing between opinions of clients and construction project managers that had attempted construction management and those that had not done so. This was to ensure that the results are not biased towards any one of the two groups.

Some of the limitations of this survey were as follows:

(i) Due to time and financial constraints, a national survey could not be undertaken. In order to obtain a reasonably representative sample of the population being surveyed, three of the largest provinces in terms of

population, resources and construction activity were targeted, namely, Gauteng, KwaZulu Natal and the Western Province.

(ii) Most voluntary organisations or associations representing the targeted population (construction industry clients, construction managers and construction project managers) approached, were unwilling to share their list of members with the researcher. This made the creation of a representative and large enough sample difficult.

To locate construction project managers and clients that could respond to the survey, the following sources were used: South African Property Owners Association (SAPOA), Chartered Institute of Building (CIOB), Association of Construction Project Managers (ACPM), the Professions and Projects Register (2001) and word of mouth.

4.3 Questionnaire Design

A questionnaire was chosen instead of other research methods as it allowed structured questions to be posed to respondents. This ensures focus in answers received. Due to time constraints, structured interviews could not be conducted.

The objectives of the questionnaire were to:

(i) Gather general biographical data about the respondents (i.e. occupation, professional background, province based in, etc.)

(ii) Establish respondents' level of usage of various building procurement system and reasons for doing so.

(iii) Establish ways in which construction management has been implemented in South Africa.

(iv) Establish what the most utilised form of construction management in South Africa is.

(v) Establish the most suitable built environment professionals and organisations to offer construction management services.

(vi) Establish whether construction management is a better suited building procurement system on projects on which the empowerment of PDIs and ABEs is of paramount importance.

(vii) To establish recipes for success, i.e. how to best implement construction management on future projects in South Africa.

It was stated in the literature review that construction management can mean different things to different people. Due to this, on the first page of the questionnaire, key abbreviations and definitions relating to construction management, as applicable in this treatise, were explained.

The questionnaire comprised of two main sections i.e. sections A and B. Section A had to be completed by all respondents. Section B was to be completed by respondents that have been involved in construction management projects.

Section A was further divided into three parts, namely:

- Biographical details
- Client objectives, project success and building procurement systems
- Construction management

Section B was divided into four parts, namely:

- Form of construction management
- Role players in construction management
- An argument for and against construction management
- Recipes for success

The data obtained from questionnaires distributed was analysed manually with the assistance of a spreadsheet.

The types of questions asked varied. In most instances, respondents were requested to choose between pre-determined answers. Most of these answers were derived from the literature survey. This was done in order to focus answers amongst options that are available. Where other answers were possible, an opportunity for respondents to add their own answers and insight was also given. In some instances (minority of cases) respondents had to elaborate or provide reasons for their answers e.g. why they had decided to use construction management, problems encountered on construction management projects, how problems were resolved, etc. This was to ensure that there was balance in the questionnaire, i.e. that answers

were not only pre-determined but respondents could fully express themselves where relevant.

4.4 Distribution of Questionnaire

As stated above, the respondents targeted for this survey were clients or developers and project managers. A total of 112 questionnaires were successfully sent out electronically or delivered by hand to respondents. Out of this total, 56 questionnaires were issued to clients or developers and 56 issued to project managers.

As the questionnaire was issued as well, it was found that a number of e-mail addresses (approximately 10% of questionnaires distributed) were either not correct or were no longer valid (due to changes in jobs, service providers, etc). This reduced the potential number of respondents that could respond to the survey.

A number of respondents responded but stated that they were not in a position to fill in the questionnaire, for various reasons. These were mostly clients.

4.5 Analysis of Survey Results

As stated above, a total of 112 questionnaires were successfully distributed. A total of 23 questionnaires were returned on time, resulting in a 21% response rate. Full results of the survey are shown in Appendix C. These results are analysed below:

4.5.1 Biographical Details

The occupation of respondents, relative to the construction industry were as follows:

- 48% practicing built environment professionals
- 44 % client / developers, and
- 8% of the respondents did not fall into any of these categories.

The latter respondents were either academics or former academics. This distribution of respondents confirms the evenly distributed questionnaires between built environment professionals and clients.

The professional background of respondents revealed that all of the respondents had construction industry experience. The breakdown indicated that over half of the respondents either had construction management or a project management background with 9 % of the respondents having construction management background and 48% having a construction project management background. 15% of the respondents were architects, 15% civil and structural engineers and 12%

quantity surveyors. None of the respondents had electrical or mechanical engineering background.

Of all respondents that were practicing as construction managers and/or construction project managers, 65 % of them had not applied for registration with the SA Council for Construction and Project Management Professions (SACCPMP). Only 27% of these had applied for registration whilst 9% of them indicated that this was not applicable to them. The low application rate may be an indication that only a small percentage of the construction managers or construction project managers are aware of the new requirement to register, should they wish to continue practicing in their current capacity.

Of all respondents, 78% of them were from Gauteng, 17% from Western Cape and 4% from KwaZulu Natal.

Based on the above respondent profile, the respondents were representative of the targeted population.

4.5.2 Client objectives, project success and building procurement systems

4.5.2.1 Respondents' level of knowledge of building procurement systems

One of the questions in the questionnaire was aimed at determining the respondent's level of knowledge of building procurement systems. The results obtained from this question were as outlined in the table below:

Traditional System (with or without project management)	5
Construction Management	4
Management Contracting	3
Design & Build (including turnkey)	2
Design and Manage (including Build, Operate & Transfer etc)	1

Table 4.1: Knowledge of Building Procurement Systems [on a scale of 1 (no knowledge) to 5 (excellent knowledge)]

Table 4.1 above, confirms that the traditional system is still the best known and applied system in the South African construction industry. It is

interesting to note that construction management comes in second after the traditional system, followed by management contracting. This indicates that there is a reasonable level of knowledge of construction management, however, not all respondents were familiar with the system. It is also interesting to note that design and manage, a system that has been used on some large public sector prison projects recently, is the least known system out of the five, coming in after design and build.

4.5.2.2 Respondents that consider all possible building procurement systems at start of new construction projects

Figure 4.1 outlines the results found when determining whether respondents consider all building procurement systems when a new projects starts or not.

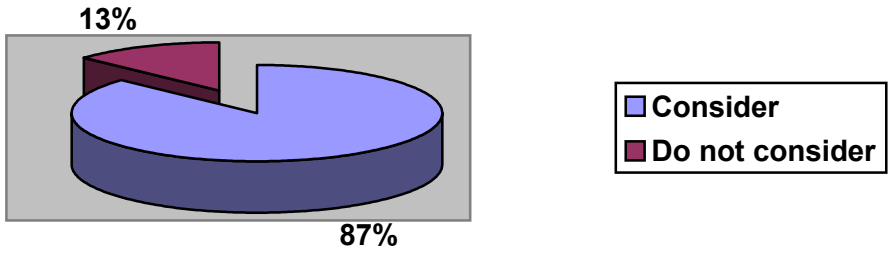

Figure 4.1 : Respondents that consider all possible building procurement systems at start of new construction projects

As shown above, 87% of respondents stated that they consider all possible building procurement systems at the start of new construction projects whereas 13% stated that they do not. This indicates that most respondents do consider other systems besides the traditional system. Based on table 4.1 above, however, most respondents tend to choose the traditional system because they are more familiar with it.

4.5.2.3 Belief in relationship between building procurement selection and the attainment of client objectives (project success):

Figure 4.2 outlines the results found when determining whether respondents believed that that there is a correlation between building procurement selection and project success or not.

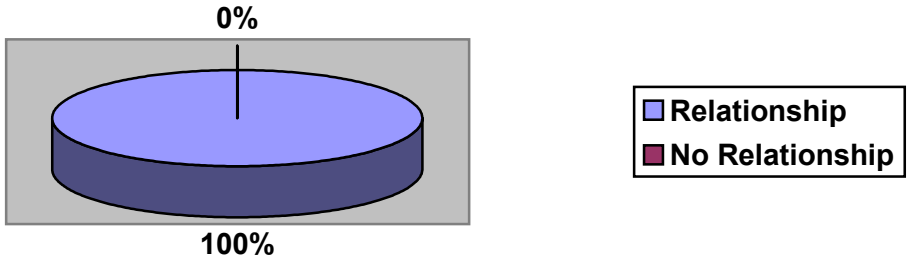

Figure 4.2: Belief in relationship between building procurement selection and the attainment of client objectives (project success)

As shown in figure 4.2 above, all respondents felt that there was a relationship between building procurement selection and project outcome. This confirms what was discussed in 4.5.2.2, i.e. that most respondents considered all possible building procurement systems on commencement of construction projects. This clearly indicates that clients and built environment professionals (particularly construction project managers) are aware that there is a correlation between building procurement systems selection and the attainment of client and project objectives i.e. project outcome.

4.5.3 Construction Management:

4.5.3.1 Involvement in South African construction projects where construction management was used as a building procurement system:

The figure below outlines the results of a question that sought to determine the proportion of respondents that had been involved in construction management projects in South Africa, in the past 10 years.

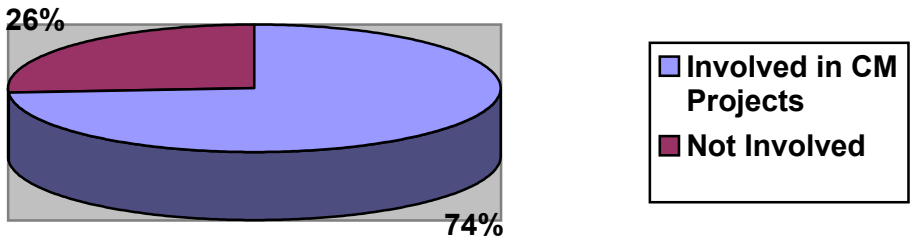

Figure 4.3: Involvement in South African construction projects where construction management was used as a building procurement system

As indicated in figure 4.1, a large percentage of respondents indicated that they had used construction management in South Africa in the past 10 years. This is a relatively larger percentage than originally expected. It is, however, also possible that a larger percentage of those that had not attempted construction management did not respond to the survey. The high level of usage of construction management confirms the finding in Table 4.1 that construction management is the second most popular building procurement system in South Africa.

4.5.3.2 Reasons for not utilising construction management:

Table 4.2 outlines the most prominent reasons given for not utilising construction management. Only those respondents without construction management experience were asked this question:

Insufficient knowledge of the system	60%
Suitable project has not come up yet	40%
Client preferred not to use CM	0%
Principal agent did not prefer to use CM	0%
Other project team members did not prefer use of CM	0%

Table 4.2 : Reasons for not utilising construction management

Table 4.2 above clearly shows that those that have not used construction management (26 % of respondents) have not done so mainly due to lack of knowledge of the system. This raises a question about whether these systems are taught to built environment professionals as part of undergraduate studies or continuing professional development. 40% of these respondents also felt that a suitable project had not come up yet. It is encouraging to note that the client, the principal agent and other project team members were not the major reasons preventing the use of construction management.

4.5.3.3 Built environment professionals best suited to offer construction management services:

Table 4.3, below, indicates the results of a question that sought to determine which built environment professionals are best suited to offer construction management services. As shown in table below, an overwhelming number of respondents (69%) felt that construction project managers or construction managers are the best suited built environment professionals to offer construction management services.

Construction Project Manager	42%
Construction Manager	27%
Quantity Surveyor	13%
Architect	8%
Civil and/or Structural Engineer	6%
Electrical and/or Mechanical Engineer	2%
Other	2%

Table 4.3: Built environment professionals best suited to offer construction management services

This could be attributable to their training and experience, as outlined in the literature review. This result, therefore, confirms what was found in the literature survey.

4.5.3.4 Organisations best suited to offer construction management services

Table 4.4 below, indicates the results of a question that sought to determine which organisation is best suited to offer construction management services.

Building and/or Civil Engineering Contractors	31%
Professional / Specialist Project Management Firms	39%
Quantity Surveyor Firms	12%
Architectural Firms	6%
Civil and/or Structural Engineers	6%
Electrical and/or Mechanical Engineers	2%
Others	2%

Table 4.4: Built environment professionals best suited to offer construction management services

Table 4.4 above, is closely related to table 4.3 as it indicates that the best suited organisations to offer construction management services are building or civil engineering contractors and professional / specialist project management firms. Again, this can be attributed to the type of training and experience of individuals working for these firms possess.

Section B, of the questionnaire, was to be completed by respondents with construction management experience. The rest of this chapter will focus on the results from this section.

4.5.4 Forms of construction management

4.5.4.1 Forms of construction management used on SA projects

Figure 4.4 below shows the results of a question that sought to determine the forms of construction that are predominantly utilised in South Africa.

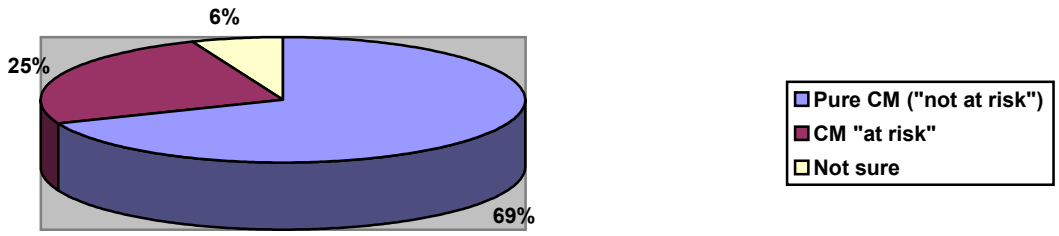

Figure 4.4 : Forms of construction management used on SA projects

Figure 4.4 above indicates that pure construction management ("not at risk") is the predominantly used form of construction management in South Africa. This indicates that clients have not influenced construction management service providers to start carrying some of the risk. Perhaps this is because an alternative to construction management "not at risk" is seen to be the traditional system in South Africa.

4.5.4.2 Familiarity and use of variants of the two forms of CM

The table below indicates how familiar respondents are with different type of variants of the two major forms of construction management.

Variant of Construction Management	**Familiar With**	**Used Previously**
Pure agency CM with general contracting and hourly cm fee	4	4
Pure agency CM with general contracting and a lump sum cm fee	1	1
Pure agency CM with phased construction	3	2
Pure agency – multi *prime*	2	3
Pure agency – multi prime with a "soft" cost guarantee	7	7
Pure agency – multi prime, CM guarantees price and holds trade contracts	5	5
The construction manager bonds the project	6	6

Table 4.5: Familiarity and use of variants of the two forms of construction management

Note: Numbers next to each option indicate ranking from 1 (most used or familiar) to 7 (least familiar or used).

Table 4.5 confirms what was depicted in figure 4.4, i.e. that construction management “not at risk” is predominantly used in South Africa. Pure agency with general contracting and a lump sum fee seems to be the most popular variant, and closely followed by pure agency with phased construction and multi prime. Generally, however, work at element level and construction is phased with design. This could be due to the fast tracking nature of construction projects nowadays.

4.5.5 Role players in construction management

4.5.5.1 Members of professional team appointed as the client's principal agent, in most instances on construction management projects

Figure 4.5 below, shows results from a question that sought to determine the built environment professionals that have been appointed as principal agents the most on construction management projects in South Africa. This would give a good indication of the built environment professionals clients have the most confidence in to play a leadership role on construction management projects.

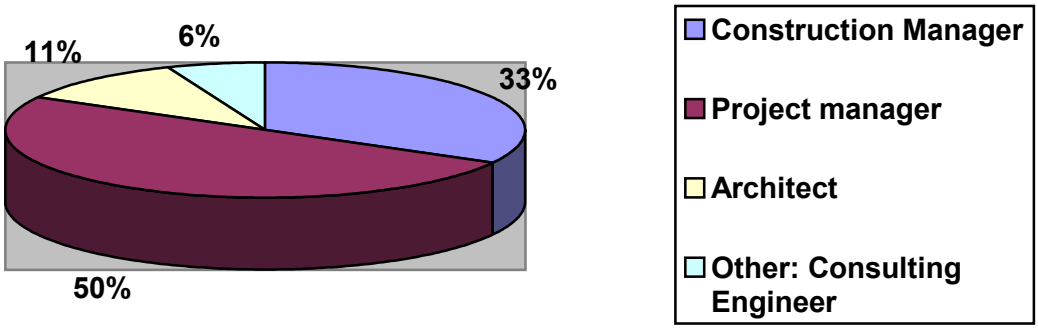

Figure 4.5: Members of professional team appointed as the client's principal agent, in most instances on construction management projects

Note: Some respondents indicated that the same organisation performed construction management and project management functions.

Figure 4.5 shows that construction project managers are mostly principal agents on construction management projects in South Africa, followed by construction managers. Architects are only principal agents on 11% of the cases. This is in line with earlier findings that indicated that construction project managers were the best suited to offer these services, probably due to their training and experience. As construction project managers are mainly professional consultants that are required to take out professional indemnity as opposed to contractor's all works insurance and public liability insurance, it follows that they would prefer to use construction management "not at risk" as shown in figure 4.4 and table 4.5.

4.5.5.2 Client's level of involvement on construction management projects

The questionnaire also sought to determine what the client's level of involvement is on construction management. The results of this question could assist in determining the types of clients this system could be most suited to.

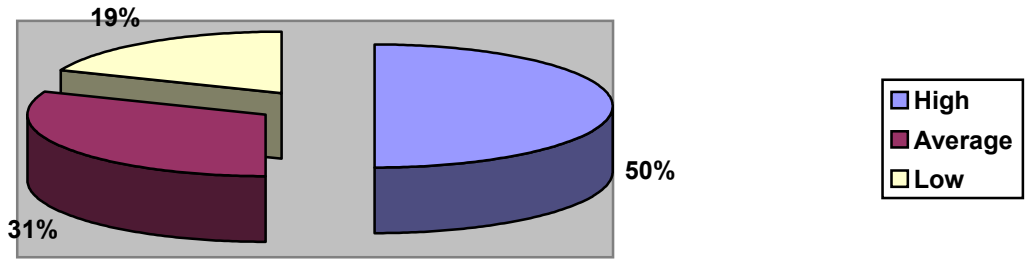

Figure 4.6 : Client's level of involvement on construction management projects

As shown in figure 4.6, half of the respondents indicated that there was a high level (above average) of client involvement on construction management projects. This may be due to the larger number of contractors that have to contract with the client, monitored, paid, etc.. This requires the client to be more hands-on. This may be more suitable to what some call "sophisticated clients," i.e. clients that have sufficient knowledge of the construction industry and capacity to manage large construction projects. Some clients, however, prefer to be less involved with such issues, therefore, delegate most responsibilities to the

construction manager or the construction project manager. Figure 4.6, however, signals that this system may not be suitable to clients that do not have the time, desire and capacity to get involved on their construction projects.

4.5.5.3 Level of inter-organisational conflict on construction management projects

The questionnaire also sought to determine whether there was any correlation between the outcome of construction management projects and the level of conflict on such projects.

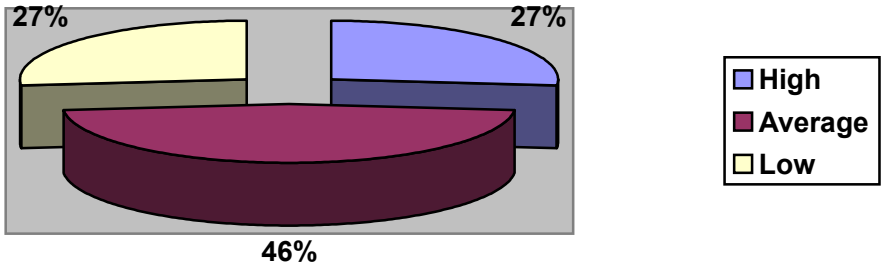

Figure 4.7 : Level of inter-organisational conflict on construction management projects

When the questionnaire was compared, it was assumed that the level of conflict on projects where the traditional building procurement system is utilised is average. If the results had indicated that there was below average conflict, this could indicate that the use of construction

management could lead to lower levels of conflict amongst project team members when compared against the traditional system.

Figure 4.7 shows that there was no difference between the level of conflict on conventional projects and construction management projects since the majority of the respondents indicated that there was average conflict amongst project team members.

4.5.6 An argument for and against construction management

4.5.6.1 Benefits of construction management

Benefits of construction management were ranked as follows:

BENEFIT	RANK
No conflict of interest e.g. all cost savings are passed on to client	1
Cost reduction	2
Full control of the construction process	3
Affirmative procurement / empowerment	4
Fast tracking (quicker delivery)	5
Design flexibility	6
Other: risk management, non adversarial relationships, etc.	7

Table 4.6 : Benefits of construction management (ranked from most important (1) to least important(7)).

Table 4.6 shows that out of the major benefits found in the literature review, respondents found the most important benefits to be the manner in which construction management eliminates conflict of interest between the client and the construction manager (all savings passed onto the client), the opportunity to reduce costs and the ability to control and have an influence on the full construction process. Other key benefits are also mentioned but rank lower than the three mentioned above. The top three reasons chosen by the respondents indicates that there are real benefits for even private sector clients that may not be interested in empowerment or affirmative procurement aspects of construction projects.

It is also interesting to note that time benefits are ranked lower than empowerment, indicating perhaps that reduced time benefits are not that substantial, however, this is still acknowledged as a benefit.

Design flexibility is ranked after time benefits. This could be because it is not seen to be an important factor by most respondents (construction project managers and clients), as most design decisions are expected to be already made when trade contractors are brought on board.

4.5.6.2 Suitability of construction management on empowerment projects

A question was posed to respondents to determine whether they felt that construction management was better suited on empowerment projects or not. The results from this question are outlined in figure 4.8 below:

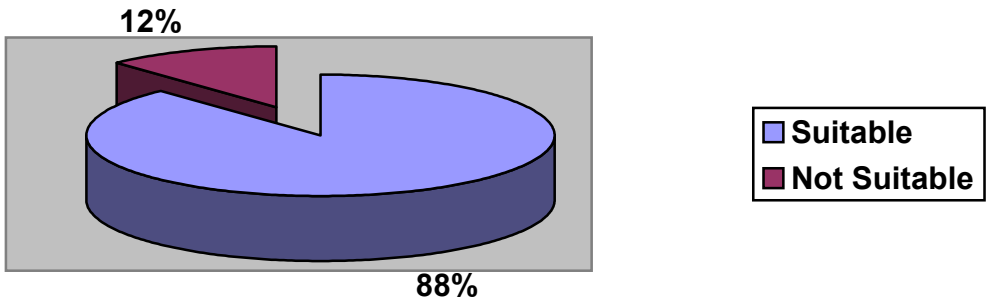

Figure 4.8 : Suitability of construction management on empowerment projects

Figure 4.8 is very critical as it, to a certain extent, focuses on the hypothesis of this treatise. As shown above, an overwhelming 88% of respondents agreed with the statement. The high level of usage of construction management, shown in figure 4.3 above, could be mainly attributed to this reason for usage i.e. empowerment of emerging contractors and SMMEs. As the attainment of this objective becomes a critical factor in the success of the project, construction management can

greatly improve the attainment of client objectives on South African construction projects.

4.5.6.3 Reasons for response given in 4.5.6.2 above:

Respondents were asked for reasons why they had given the responses they gave in the previous question. Various reasons were given. Some of the reasons given were as follows (in no order of importance):

- More opportunity to involve SMMEs, less risk to the client: spread over more entities, use only SMMEs that are experts on each package.
- Construction project manager controls the project
- Limiting risk of contract performance to a specific element or tender package
- Suited only to the extent that the client is committed to empowerment, which is hardly ever the case.
- Affirmative procurement expertise resides with the "professionals" as opposed to an out and out construction manager, therefore, it creates a knowledge gap in terms of applying affirmative procurement.
- Smaller packages allow access to smaller companies, giving additional opportunities to contract (including providing guarantees).
- Proper management function.
- Client has more direct control over appointment of trade or works contractors.
- Construction manager able to assist in the day to day management of the trade contractors and provide strong management expertise.
- Other building procurement systems can offer the same to SMMEs

- Allows mentoring of SMMEs.
- Proper assistance and empowerment can be implemented as there is no conflict of interest between construction manager and subcontractor.
- Construction manager can and will assist subcontractors in being efficient in getting the job done as quickly and painlessly as possible.
- The employment of SMMEs on contracts is not purely around time and performance risk but also about the ability to carry financial risk.
- Construction management, as a service, can reduce the risk by interrogation before award but cannot carry the risk. Unless it is a pre-requisite of the construction management appointment.
- Skills transfer to SMMEs does not get carried forward beneficially through CM appointment.
- In traditional system, main contractor takes risk of emerging contractors. In CM, client takes risk.

What is clear from most comments received is that the closer the principal agent and client get to the smaller packages of the contract, the greater the influence and control they can have on issues such as who is appointed for what packages, how, when, at what price, etc. This allows the client to get to appoint contractors that meet their own criteria. It also provides the principal agent with an opportunity to mentor some of these contractors. This level of involvement by the client and principal agent, as indicated earlier, is higher than is normally the case. It also follows that this leads to the client taking on greater amounts of risk than they would normally take on a conventional system.

4.5.6.4 Shortcomings of construction management

From a pre-determined list, respondents were asked to tick what they deemed to be shortcomings of construction management. The results to this question are outlined in Table 4.7 below:

SHORTCOMINGS OF CM	% of Respondents
Increased level of risk for the client - due to increased number of smaller contractors in contract with	50%
Lack of a Firm Price when construction commences	30%
Other: ❑ More administration for client in terms of payments, guarantees, contracts etc. ❑ Administration must be meticulous and comprehensive. ❑ Construction project manager must be an expert and control the process well. ❑ Price needs to be fixed beforehand. ❑ Lack of understanding of construction management by industry. ❑ Not suitable for projects with high aesthetic and prestige requirements ❑ Hard to implement in conditions where there are rigid tender procedures (such as state tender board) due to fluidity of prices. ❑ Client is unlikely to know whom he is dealing with.	20%

Table 4.7: Shortcomings of Construction Management

As depicted in table 4.6, half the respondents that had used construction management before felt that one of the major shortcomings of construction management is increased risk for the client, due to the increased number of smaller contractors in contract with. As indicated in 4.5.6.2 above, this could be a price some clients are willing to pay due to some of the objectives of the project. For smaller and less sophisticated construction clients, construction management would therefore not be recommended due to this finding.

It was also indicated by 30% of respondents that the lack of a firm price when construction commences is another shortcoming. This could particularly be a problem with clients that may have stringent budgetary constraints, have to obtain finance from other parties such as financial institutions or have to obtain firm price approval from a committee or agency such as a procurement committee, tender board or similar body.

Most of the other reasons, indicated by 20% of respondents, can fall into one of the reasons already mentioned. One reason that deserves mentioning, however, is “lack of understanding of construction management by the industry.” This confirms what was found in 4.5.3.1 i.e. that 80% of respondents that had not used construction management was due to the fact that they did not have sufficient knowledge of the system. From table 4.6, there could be indications that even where construction management has been applied, some project team members may have lacked sufficient knowledge and experience of the system.

4.5.7 Recipes for success or failure

4.5.7.1 Reasons for use of construction management

Respondents were asked why they had decided to use construction management on some of their previous projects. Various reasons were given by respondents. Some of these were as follows (in no order of importance):

- To accommodate empowerment of emerging contractors and SMMEs.
- Have better control over all processes.
- Could select and use specialists for each package.
- Could customise each package to suit requirements.
- If one turns sour, the rest still runs.
- Subcontractors paid directly and regularly.
- Facility for variation control.
- It was work of a fit out nature.
- Extent of project was not determined at the time of commencement.
- Independence and objectivity.
- Professional management services.
- To reduce costs, protect sub contractor, avoid conflict and contractual claims, quality.
- Was a client requirement - client based in UK. Also widely used in UK.
- The nature of the project indicates the benefits - if no benefit, why use that

system ?

- Client needed project manager but saw no benefit unless it took on construction management responsibilities. Greater involvement in procurement process by professional.
- Cost & time savings.
- I do not use it except on small projects where the goal is the promotion, mentorship & development of emerging contractors. The risks are too high on large contracts and the financial returns achieved do not justify the additional headaches and higher professional indemnity insurance premiums.
- As a project management company we often end up doing construction management on some direct contractors to save profit & attendance of main contractor and often end up stepping in to assist a weak main contractor in the interests of the project.

A closer analysis of the comments received seems to indicate that there are currently 6 main reasons for the use of construction management in the South African construction industry. They are, as follows (in no order of importance):

- Empowerment of emerging contractors and SMMEs.
- Greater control by the client over procurement and construction processes.
- Flexibility – ability to affect variations on the project, particularly where the scope of work is unclear on commencement or work is of a fit-out nature.
- Cost savings
- Time savings

- Dictated by clients – especially foreign based clients that have used the system successfully abroad.

4.5.7.2 Attainment of various client objectives on construction management projects

Respondents were asked whether they thought that the use of construction management had improved or worsened the attainment of key client objectives. The results obtained are outlined in the table below.

Client Objective	Improved	Worsened
Cost / Budget	75%	25%
Time	67%	33%
Quality	64%	36%
Affirmative Procurement / Empowerment	92%	8%
Overall Client Satisfaction	77%	23%

Table 4.8 Attainment of various client objectives on construction management projects

Some of the respondents stated that an improvement in each of these objectives only resulted from proper implementation of CM. Some clearly stated that these benefits can only result if the project is well run - if not controlled, it could be "a nightmare."

The results shown in table 4.7 are very important for this treatise. The outcome of this question, together with the outcome of the literature review, largely determine whether the hypothesis can be proven or not. Largely, it answers the problem stated in chapter 1 i.e. "*determining whether the use of construction management, as a building procurement system, can improve the achievement of client objectives in the South African construction industry or not.*"

The results shown in table 4.7 indicate that there are improvements in terms of cost / budget objectives, affirmative procurement and empowerment objectives and overall client satisfaction. Based on this, it could be said that construction management can improve the attainment of client objectives. 92% of respondents also indicated that it improves the attainment of affirmative procurement / empowerment objectives. This, therefore, confirms the hypothesis that the use of construction management on projects with a strong focus on the empowerment of PDIs and ABEs leads to an improved attainment of client and project objectives.

4.5.7.2 Outcome (success or failure) of construction management projects

Respondents were also asked a very critical question regarding the outcome of their projects, i.e. whether their previous construction management projects were successful or not. The results from this question are outlined in figure 4.9 below:

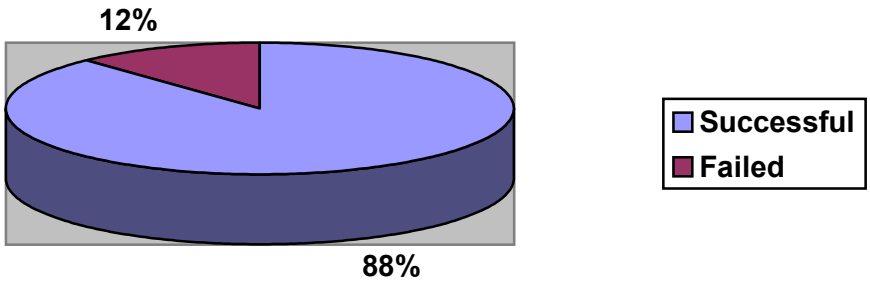

Figure 4.9: Outcome (success or failure) of construction management projects

The result of question 7.3 depicted in figure 4.9 indicates that 88% of respondents experienced successful construction management projects, whereas 12% experienced unsuccessful construction management projects. This confirms that has already been discussed in 4.5.7.2 above, i.e. that construction management can generally lead to improved attainment of client objectives.

4.5.7.3 Critical success factors on construction management projects

Respondents were asked to rank pre-determined success factors on construction management (based on literature reviewed) from 1 (most important) to 9 (least important). The results from this question are outlined in Table 4.9 below:

SUCCESS FACTOR	RANK
Early and correct selection of construction manager	1
Clarity of roles and responsibilities between client, professional team and construction manager	2
Proper management of interfaces between trade contractors	3
Development of a realistic schedule / programme	4
Cost control and value engineering during design	5
Development of a realistic budget	6
Application of critical chain techniques to further shorten project duration	7
Development of adequate contracts for consultants and trade contractors	8
Apply construction management in its purest form ("without risk")	9

Table 4.9 : Critical Success Factors on Construction Management Projects [ranked from 1 (most important) to 9 (least important).]

As shown in table 4.9, one of the most critical success factors on construction management projects, is the early and correct selection of the construction manager. This could be attributable to that there are various companies and built environment professionals that may offer these services, however, not all of them may be best suited to offer these services. This confirms that perhaps the level of knowledge and

experience on construction management is not as good as the results indicate. Clearly incorrect selection of a construction manager could result in the incorrect execution of the project.

4.5.7.4 Fees charged for construction management services

As there are currently no statutory fee scales for construction management services, respondents were asked how construction managers had charged for these services on previous projects. The results are indicated in Table 4.10 below:

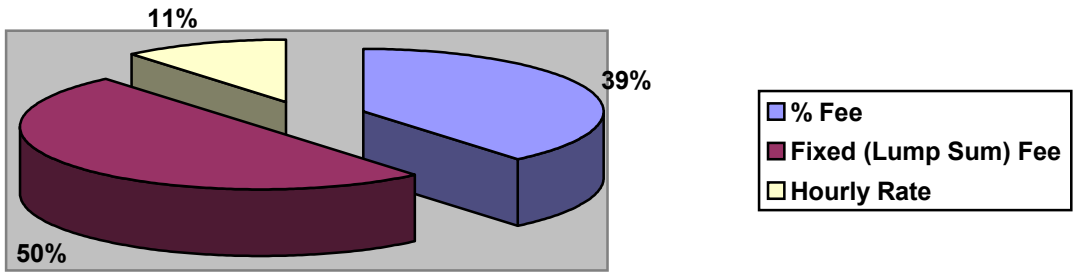

Figure 4.10: Fees Charged for Construction Management Services

As shown in figure 4.10, the most popular fee structure used on construction management projects is the fixed lump sum fee followed by the percentage fee structure. The popularity of the fixed fee structure reinforces that the construction manager is not supposed to have an incentive to increase costs but to keep them down, in the best interests of the client.

4.5.7.6 Suite / Forms of Contract Used and Best Suited on Construction Management Projects

Respondents were asked to indicate the suite or forms of contract that were used the most on their previous construction management projects. Furthermore, they were also requested to indicate which suite or forms of contract were best suited to use on construction management projects. Figure 4.10 indicates the responses to this question.

Suite / Form of Contract	**Used**	**Best Suited**
New Engineering Contract (NEC)	15%	15%
JBCC (1990) or JBCC 2000	56%	62%
General Conditions of Contract for Civil Works	15%	15%
FIDIC	7%	8%
White Form	7%	0%

Table 4.10: Suite / forms of contract used and best suited on construction management projects

Table 4.10 above, indicates that the JBCC 2000 form of contract is the most popular form of contract on these types of projects in South Africa. Furthermore, the majority of respondents also felt that it was the best suited form or suite of contracts to use on construction management projects. Based on the above mentioned findings, it could be cautiously concluded that the best suite of contracts to use on construction management projects in South Africa is the JBCC 2000 suite of contracts. Caution is required in reaching such a conclusion as this overwhelming usage of this form of contract on construction management projects could also be an indication of the general level of usage of this form of contract on projects using other building procurement systems. It is possible that reasons for not using other suites of contracts, such as, the New Engineering Contract (NEC) could be due to lack of knowledge of these types of documents.

4.5.7.7 Problems encountered on construction management projects

One of the questions in the questionnaire sought to determine problems that had been encountered by respondents on construction management projects. Various problems were given as answers to this question. Some of these were as follows (in no order of importance):

- No major problems encountered
- Clearly defined responsibilities of various contractors (cleaning, rubble removal, etc) or interface between parties.

- Additional administration with respect to payments, contracts, guarantees, etc.
- Day-to-day management of many small contractors
- No real identity of "contractor": construction project manager is a player and a referee.
- Lack of competence amongst empowerment contractors
- Highly time consuming compared to the traditional system.
- The construction methodologies adopted by the tenderers often differ from work breakdown structure prepared by the construction manager.
- Used CM “at risk” - client kept on wanting to see savings and also wanted to re-negotiate the contract often.
- Role clarification.
- Subcontractors were not able to meet all the requirements of the JBCC subcontract agreement.
- Budget, time and financial soundness of contractors
- Poor management, under resourced and poor programming
- Insolvency of contractors
- Client changes
- "Client" contractors
- Very low profit margin – benefit to client far outweighs benefit to CM.
- Client role definition required early. Ensuring entire team is familiar with project control systems being used.
- Client forgets that risk of non-performance is theirs in pure CM (“without risk”).

Based on the above mentioned comments made by respondents, it could be deduced that problems generally encountered on these types of projects could be summarised as follows:

- Additional administration for the client, i.e. in terms of payments, contracts entered into, etc.
- Lack of clarity of roles and responsibilities amongst project team members.
- Various problems normally encountered with construction management “at risk.”
- Questionable credentials, credibility and capacity of smaller contractors acting as trade or works contractors.

These problems are, to a certain extent, in line with critical success factors discussed under 4.5.7.2 above. They are also in line with “shortcomings of construction management” identified under 4.5.6.4. This therefore, indicates that in order to make construction management a success, these potential problems need to have solutions up-front i.e. in the planning stages. Necessary actions must be taken in order to mitigate or transfer some of the risks these problems may pose.

4.5.7.8 How problems were resolved and lessons learnt

Respondents were requested to state how they had resolved some of the problems mentioned above. Various solutions were used to resolve these problems. In some instances, however, no solutions were found. Some of the responses to this question were as follows:

- Not really resolved. Solution was to avoid this type of contracting.
- Problems were relatively minor and we were able to make contingency plans.
- To resolve the problem with defining responsibilities for various contractors (cleaning, rubble removal, etc), the construction manager divided costs between relevant contractors. Other respondents stated that horizontal take-overs should be effected between subcontractors and effective procedures instituted.
- On the day-to-day management of many small contractors, it was suggested that effective procedures need to be instituted and follow ups prior to “D-day” made.
- To resolve the lack of competency of smaller contractors and the fact that it was more time consuming, additional resources were obtained and the programme or schedule was continuously revised.
- To resolve role clarification problems, it was recommended that roles and responsibilities are defined at initial stages on future projects.
- The issue regarding many client changes was not resolved, but resulted in the client paying more.
- The problem with low profit margins for the construction manager was not resolved as efficiency or inefficiency of the subcontractor impacts

directly on profitability.

- To resolve the problem of the client not understanding that they have to take on greater risk in "CM without risk", it must be clearly stated and understood by the clients' representative from the outset that they have to take on greater risk, in such instances.

What comes out of these responses is that some problems can be solved, whilst others seemingly cannot be. Circumstances differ on each project, therefore, potential problems have to be weighed against potential benefits, in each case. The number of problems that can be resolved, however, outweigh those that, seemingly, cannot be resolved.

4.5.7.9 Intention to Use Construction management in Future

Respondents were finally asked whether they would use construction management in the future or not. The results are indicate below:

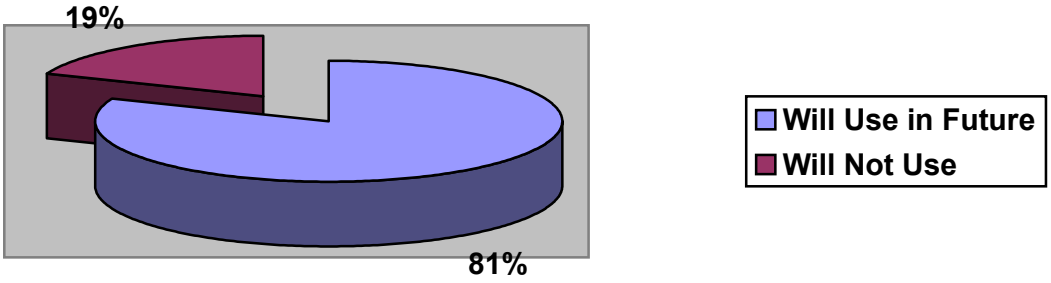

Figure 4.11: Intention to Use construction management in future

As shown in Figure 4.11 above, an overwhelming number of respondents indicated that they would use construction management in the future. This indicates that, although there could be some problems in its implementation, it could be better implemented in the future. It also indicates that construction management is a building procurement system that can best serve construction industry clients in the future, provided that it is being implemented in the appropriate circumstances and it is properly implemented.

4.6 Conclusion:

In the survey, it was found that there is a correlation between the selection of a particular type of building procurement system and the outcome of a project. It was also found that construction management can improve the attainment of certain client objectives.

The survey also found that construction management could greatly improve affirmative procurement and empowerment of smaller contractors. Based on these findings from the survey, the findings of the survey and those of the literature review will be compared in more detail in the following chapter, to determine whether the survey findings support the literature review and the hypothesis or not.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The following conclusions are based on the insights gained by the author from the literature review and the analysis of the survey results:

The literature review highlighted the following:

- The selection of an appropriate building procurement system contributes to the attainment of client objectives with respect to time, cost and quality for construction projects, therefore, project success. Building procurement systems that fall under the management category, such as construction management and management contracting, were found to perform better in terms of time (reducing time overruns), when managed efficiently. Based on this, it was concluded that these systems, can improve client satisfaction levels on construction projects.

- Construction management, specifically, has been found to offer clients cost savings and shorter project duration, thereby resulting in improved client satisfaction levels. Furthermore, it also allows easier

implementation of affirmative construction, something that may be of interest particularly to South African public sector clients.

- Construction management has been successfully implemented in countries such as the United States of America and the United Kingdom, however, it has also had disastrous results. Some authors on the subject argue that this failure has been mainly due to poor implementation.

- To avoid disastrous results and consequences, it is important to be aware of the method's shortcomings as well as its' "recipes of success," i.e. how best to implement the system. Construction management can, therefore, lead to better satisfied clients as it can achieve better results when properly implemented.

The survey was used to test the theory and conclusions developed in the literature survey. The results of the survey indicated the following:

- There is a reasonable level of knowledge of construction management when compared to other non-traditional building procurement systems. The traditional system, is by far, the best known and most implemented system in the South African construction industry.

- Most project team members and clients do consider the use of other building procurement systems when starting a new project because

most respondents also believe that there is a relationship between building procurement system selection and project success, however, the traditional system is selected most of the time.

- A surprisingly large number of project managers and clients have used construction management in South Africa. This confirms that construction management is the second most popular building procurement system in South Africa.

- The majority of those that have not used it have not done so mainly due to insufficient knowledge of the systems and because suitable projects have not come up yet.

- Construction project managers and construction managers are the best suited built environment professionals to offer construction management services. Furthermore, building or civil contractors and specialist or professional project management firms are the best suited organisations to offer these services. The same professionals are also mostly used as principal agents.

- The most popular form of construction management in South Africa is construction management " not at risk". Unlike in countries such as the United States of America, clients in South Africa have not, generally, required construction management service providers to start carrying some risk.

- Clients' level of involvement on construction management projects is higher than on projects using the traditional building procurement system. This is because of the larger number of contractors that the client needs to contract with, monitor, pay directly, etc. This system is therefore better suited for clients that are prepared to get involved in this manner.

- There was very little correlation between the use of construction management and the level of conflict on construction management projects.

- The most important benefits of using construction management were found to be the manner in which the system eliminates conflict of interest between the client and the construction manager (all savings passed on to the client), the opportunity to reduce costs and the ability to control and have an influence on the full construction process. This also indicated that there are real benefits for even private sector clients that may not be interested in the empowerment or affirmative procurement aspects of their construction projects.

- It was found that construction management is a better suited building procurement system on projects where empowerment of emerging contractors and SMME's is of paramount importance to the success of the project, as work is broken down into smaller and more manageable

packages to allow smaller businesses to participate. This was possible due to that the principal agent and the client get closer to the smaller packages (lower on the work breakdown structure), therefore, giving them greater control over what happens at that level.

5.2 Conclusions

Based on the above literature survey and the analysis of the survey results it could be concluded that the hypothesis stated thus*, "the use of construction management as a building procurement system on construction projects with a strong focus on the empowerment of PDI's and ABE's leads to an improved attainment of project and client objectives"* is proven.

5.3 Recommendations

Based on the findings of this treatise, the following general recommendations can be made:

- Public sector clients, such as the Department of Public Works, need to consider the use of construction management on some of their projects, particularly those projects with a strong empowerment component.

- Private sector clients should also consider the usage on construction management projects, as it may offer time and cost benefits.

- On commencement of construction projects, principal agents must advise their clients about other building procurement systems available. Furthermore, an established model needs to be used to assist in the selection of a suitable building procurement system.

To clients and built environment professionals contemplating the use of construction management on their projects, the following recommendations are made:

- A construction manager that is suitably qualified and experienced in construction management has to be selected. This will ensure that such a person or entity provides the necessary leadership and guidance to the rest of the professional team, that may not be experienced in the usage and application of this system.

- Clients should endevour to appoint suitably qualified and experienced organisations that are either specialist construction project managers (where construction management “not at risk” is desired or required) or building contractors (where construction management “at risk” is desired or required).

- On commencement of the project, the project team needs to be taken through a project kick-off meeting that could incorporate a team building exercise (if possible). The purpose of such an exercise and meeting, could be, *inter alia*, to provide a thorough brief on the project, explain the

construction management concept , how it works, what its pitfalls and recipes of success are, etc.

- Currently available guidelines for the implementation of construction management, such as those published by the CMAA should be utilised in the planning and implementing of this system.

- Roles and responsibilities of all role players in the project need to be clearly defined and communicated.

It is recommended that further research be done to explore the following areas:

- The role of the construction manager, as opposed to the role of the project manager, on construction management projects.

- The management of the interfaces between various trade or works contractors on construction management projects.

- A comparative analysis of emerging contractor performance on construction management projects and performance on projects utilising the traditional building procurement system.

- A case study of emerging contractors' development through various construction management projects.

- Development of guidelines for the implementation of construction management projects in South Africa.