

**CRITICAL SUCCESS FACTORS INFLUENCING PROJECT SUCCESS IN
THE DURBAN CONSTRUCTION INDUSTRY**

BY

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**Dissertation submitted in compliance with the requirements for the Masters Degree in
Technology: Business Administration in the Department of Entrepreneurial Studies and
Management, Faculty of Management Sciences at the Durban University of Technology**

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ABSTRACT

This study presents an assessment of the perceptions of project managers and contractors regarding the critical success factors influencing project success in the Durban construction industry. To achieve this aim, questionnaires were administered to 95 project managers and 61 active grade four contractors in Durban. The critical success factors are encapsulated in components, that is, comfort, competence, communication and commitment (COMs). These components make up the four COMs model which forms a basis for evaluation of the questionnaires.

An in-depth analysis review of the literature on the critical success factors in the construction industry has affirmed the four COMs model. The interpretation of this quantitative study was conducted with the use of descriptive and inferential statistics presented in a tabular format.

The findings revealed that both project managers and contractors strongly support the critical success factors as significant in achieving project success. There was no significant difference in their perception of critical success factors, given the biographic differences between them. Achieving project success has eluded the Durban construction industry to a point where it is battling to keep existing clients. The critical success factors identified in this study have provided a way forward for project managers and contractors. Hence, the results presented in this study can be used as a guideline for successful execution of construction projects in Durban. The Construction Industry Development Board (CIDB) can play a pivotal role by providing an enabling environment which will facilitate the adoption of the results of this study. For example, the CIDB can amend its legislation on contracts by making them simple to comprehend. In this way the number of lawsuits between project managers and contractors would be drastically reduced.

DECLARATION

I, Thulani Armstrong Msani, hereby declare that the work presented in this dissertation represents my own work and findings, except where indicated, and that all references, to the best of my knowledge, are accurately reported.

Thulani Armstrong Msani

Date

ACKNOWLEDGEMENTS

I would like to take this opportunity to thank God Almighty for giving me enough wisdom to accomplish this study.

This study would have not materialized without the guidance and encouragement of my supervisor, Dr H. L. Garbharran and co-supervisor, Mr A. Moorley from the Faculty of Management Sciences at Durban University of Technology (DUT).

My sincere thanks go to Mr J. M. Naidoo (statistician) from the University of KwaZulu-Natal, Westville campus, for his sterling work on data analysis for this study and the recommendations he made on the objectives. Mr Sookhlal from TBP Building and civils at Westville has been very instrumental in streamlining this study. One remains indebted to Lucky Dlamini from the S3 Level 3 BTech labs at DUT (Steve Biko campus) for giving me access to the computer, long before the Research Commons in the library were opened in 2010.

My special thanks go to my family and friends who are too many to count, for their encouragement and support.

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CHAPTER 1

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 Introduction

This chapter discusses the background of this study in detail by building a strong case for the research. Furthermore, relevant elements of the study, namely: the research problem, objectives, rationale, limitations of the study and a brief overview of subsequent chapters are discussed in this chapter.

Project success has eluded the construction industry to the point where keeping existing clients has become a battle, let alone attracting new clients (Toor and Ogunlana, 2005: 149-167). An assumption is made that if the work is finished on time, within the agreed budget and set quality (golden triangle), then the project is deemed successful. Available evidence suggests that this is far from the truth. Hence, the construction industry needs to pay special attention to critical success factors, besides the golden triangle, if it is to survive the challenges posed by globalization. Critical success factors should be carefully identified with assistance from construction consultants/project managers and contractors.

Zwikael (2009: 372-387) asserts that the work of construction companies is project-oriented (that is, it is unique and has a definite start and finish point). This requires the use of project management tools and techniques as opposed to conventional management techniques. Proper usage of project management tools within the project life cycle ensures smooth execution of activities. The project life cycle is the framework upon which the project is carried out.

The unique nature of projects dictate that critical success factors identified in one industry cannot be directly transferred to other industries. The similarities found in the construction industry in

developing countries such as South Africa makes sharing of knowledge easy. The project manager (PM) acts as a single point of contact responsible for harnessing identified critical success factors towards achieving project success (Yang, Shen and Ho, 2009: 159-175).

1.2 Research problem

The construction industry is one of the largest job creating industries in developing countries and has become highly competitive with the advent of globalization (Nguyen, Ogunlana and Lan, 2004: 404–413). Contractors and consultants/project managers in Durban are increasingly finding it difficult to attract new clients. Furthermore, it is unclear what actions need to be taken to improve project success. Essentially, a new approach is needed in the construction industry to ensure project success.

1.3 Research objectives

1.3.1 Main objective

To assess the perceptions of contractors and project managers regarding the critical success factors which lead to project success in the construction industry in Durban.

1.3.2 Sub-objectives of the study

- To identify the critical success factors;
- To assess the perceptions of contractors and project managers relating to critical success factors;
- To determine whether there is a significant difference in the perceptions of contractors and project managers on the critical success factors;
- To examine the influence of the biographic variables on the critical success factors for project managers and contractors.

1.4 Rationale for study

This study is crucial in ensuring that contractors and consultants/project managers are able to achieve project success consistently in their future projects. Similar players (that is, the developers/clients) in the construction industry would also benefit from this study. Project success has continued to elude many players in the industry and this has made it difficult to attract new clients. Clients are becoming more knowledgeable which leads to more complaining. Complaining should be viewed as a channel for clients to highlight existing problems.

Achieving project success is increasingly becoming more important in this highly competitive construction industry. Identifying critical success factors which influence project success within the construction industry in Durban would lead towards establishing a competitive advantage. Large and complex construction projects are becoming more difficult to complete successfully in developing countries (Swan and Khalfan, 2007: 119-130).

The high level of competition in the construction industry has contributed to its transition towards a service industry (Karna, Junnonen and Sorvala, 2009:111-127). Clients are becoming more demanding and require more flexibility. Contractors and consultants/project managers need to recognize and harness these new developments, thus creating a competitive advantage. Essentially, a new approach is needed in the construction industry to ensure project success.

1.5 Limitations

This study covers the greater Durban area. The findings of the study cannot be generalized to other cities. Other cities, like Cape Town and Johannesburg, have a different lifestyle and culture. For example, Johannesburg is the economic hub of South Africa. Therefore, its industry players (consultants/project managers and contractors) have a different perception of what constitutes project success. On the other hand, Cape Town is known for its laid-back lifestyle. Moreover, different cities will have a varying mix of construction clients. That is, some build to

own, to sell and to accommodate employees and rent out some space. Therefore, the influence on the quality level required, amount of money to be utilized and level of urgency in executing the project varies. This study is confined to business projects only in the greater Durban area. It does not cover the residential projects.

1.6 Overview of chapters

Chapter One: Introduction

Chapter one is an introduction and highlights the motivation for the study. This chapter also focuses on the purpose and rationale for the study, research objectives and the problem area. The chapter will also outline the limitations of the study.

Chapter Two: Literature Review

Chapter two will consist of a review of the literature on critical success factors in relation to project success in the construction industry. This chapter will review the industry players' (clients/developers, consultants and contractors) perceptions concerning a successful project (that is, critical success factors). It will also present a review of the literature on the skills that should be possessed by the project manager.

Chapter Three: Research Methodology

Chapter three will explain the research methodology used and, in particular, the data collection method, the questionnaire design, the sampling method and data analysis.

Chapter Four: Analysis and Presentation of Results

Chapter four will present the results of the survey. The explanation of the results will start with a discussion of the demographic information using frequencies and percentages. This discussion will be followed by a comparison between the level of project success achieved and the presence of critical success factors in the project environment. Variations resulting from the presence and non-presence of the critical success factors in the project environment will be presented.

Chapter Five: Conclusions and Recommendations

Chapter five will contain a summary of the previous chapters, and will present conclusions and recommendations based on the empirical findings. Recommendations will be made for future research.

1.7 Conclusion

In this chapter, a strong case was made for this study by presenting a background on the research problem. Furthermore, relevant elements of the study, namely: the research problem, objectives, rationale, limitations of the study and a brief overview of subsequent chapters were discussed in this chapter.

The next chapter provides the literature review on critical success factors influencing project success in the building construction industry.

CHAPTER 2

LITERATURE REVIEW

CRITICAL PROJECT SUCCESS FACTORS IN THE CONSTRUCTION INDUSTRY

2.1 Introduction

Chapter one outlined the background for this study. Relevant elements of the study, namely: the research problem, objectives, rationale, limitations of the study and a brief overview of subsequent chapters were discussed. This chapter reviews the literature on the critical success factors influencing project success in the building construction industry. It highlights the need to look beyond the golden triangle of time, cost and quality in a quest to achieve project success. In a bid to streamline the discussion, critical success factors are grouped into four categories, namely: comfort, competence, communication and commitment (COMs). The project managers and contractors are positioned as the major role players in the construction industry. Thus, an in-depth discussion on the skills that should be possessed by the project manager is also undertaken.

The aim of the literature review is to provide a context for the entire research study. It is within this context that the researcher is able to develop a solid case for undertaking the study. Reviewing existing literature, on the aspect in question, allows the researcher to identify the “gap” that exists. The researcher achieves this by performing an in-depth critique of the existing literature. An in-depth critique entails identifying shortcomings on the existing literature and making possible contributions. Furthermore, the literature review gives direction to the research methodology which has to be used in this study. Using the correct research methodology ensures that the findings are meaningful to the researcher.

2.2 The Four COMs approach

Project success in the construction industry in South Africa, and in most developing countries, is measured by the “golden triangle” parameters such as time, cost and quality (Ojiako, Johansen and Greenwood, 2008: 405-417). The high number of project failures suggests the existence of underlying critical success factors which have not been identified. Critical success factors are

those inputs to the project management system that directly increase the likelihood of achieving project success. Nguyen, Ogunlana and Lan (2004: 404-413) identified and grouped success factors under four categories which are entitled the four COMs: comfort, competence, commitment and communication.

2.3 Comfort

2.3.1 Involvement of Stakeholders

Swan and Khalfan (2007: 119-130) advise that management of external stakeholders, such as the public, are crucial for successful project delivery. The needs of stakeholders have to be managed and influenced in a manner that ensures project success. Stakeholders can be classified in two categories: primary and secondary. Primary stakeholders have a legal contractual relationship to the project. For example, an electrical engineering subcontractor is appointed to provide wiring for the building to be constructed. Secondary stakeholders do not form part of the daily discussions and decisions but can influence the project positively or negatively. For instance, the public is gaining significant bargaining power nowadays.

Periodic reassessment of stakeholders should be performed by the project manager (PM) at various stages of the project (Assudani and Kloppenborg, 2010: 67-80). This would enable the PM to address any concerns from stakeholders before they impact negatively on the project. Public projects have a varied mix of secondary stakeholders. For example, the community, politicians and the municipality's views may change as the project receives more publicity. The community is most likely to change their stance if the environmental impact of the project possesses danger to their long-term health. For instance, the building of an oil refinery would, in the long-term, put the lives of the community nearby at risk, due to its emissions. Nowadays, secondary stakeholders are becoming more knowledgeable about their rights and the advent of the internet has made it possible to source information from far afield places. Hence, the bargaining power of secondary stakeholders is growing from strength to strength.

Politicians' views on the project are motivated by different interests, namely: to score political points; to boost one's political career and to be genuinely concerned of the well-being of the community. Projects at municipality level may result in residents' rates being increased in order to finance and maintain the structure afterwards. Politicians would capitalize on this in a bid to score political points, more especially if local municipality elections are around the corner. It's difficult for unsuspecting communities to discern whether the politicians are raising concerns on the project in a bid to boost their political career or are genuinely concerned about the community. Hence, the project manager (PM) should keep a close watch on politicians as they can easily mobilize communities to act against the project or make demands that would delay the project.

Municipalities are headed by leaders who subscribe to certain political parties. The executive committee of the leading political party can influence the municipality to reduce funding for the project. Reducing funding will require significant changes to the scope and the project plan. Thus, it is more difficult for the PM to handle public sector projects. Successful management of stakeholders is dependent largely on the PM developing a well-defined communication plan (Rowlinson and Cheung, 2008: 611-623).

2.3.2 Competent Project Manager

The project manager has to possess both technical and "soft" skills in order to be deemed competent. The technical skills that should be possessed by the PM in the building construction industry include being a subject matter-expert (SME). That is, s/he must have an in-depth knowledge of the structural design of buildings. Hence, PM's have a degree or a national diploma in architecture. Having such knowledge enables the PM to provide leadership in the manner in which the construction must be conducted. Contractors develop respect for a PM who is able to give direction on technical challenges of construction.

Soft skills complement technical skills of the PM and require constant development. These skills include: team management, emotional intelligence, transformational leadership and conflict

management. One of the crucial primary tasks of the PM is to carefully define roles and responsibilities of the project team members (Anantatmula, 2010: 13-22). Defining roles for team members has to consider individual strengths and weaknesses. In this way, the PM won't have to micromanage team members, thereby allowing him/her ample time to attend to pressing matters.

The building construction industry is an emotionally demanding environment. Hence, the PM has to develop sufficient capacity to solve problems by carefully utilizing his/her emotions (Corona, 2010: 22-34). The careful use of emotions (emotional intelligence) by the PM can contribute immensely towards achieving project success. Careful analysis of all the stakeholders' emotions allows the PM to respond with a strategy that will be embraced by all concerned. For example, community members would be emotional about demolishing a memorial building in order to make way for a new environmentally friendly building and lobby against such a development. The PM has to carefully grasp the extent of the community's emotional state and devise a strategy that would highlight the importance of constructing an environmentally friendly building. This strategy would also entail showing empathy to emotional attachment that the community has developed towards the building.

By and large, projects bring about change in organizations. Thus, the PM's level of emotional intelligence will determine how he/she responds to the change (Clarke, 2010: 604-624). The rate of change within the construction industry is fast and the PM needs to be decisive at all times. Nurturing the skill of emotional intelligence will prove useful for the PM in facilitating project success.

Malach-Pines, Dvir and Sadech (2009: 268-291) assert that project managers achieve a high degree of project success when they manage projects which match their personality. Moreover, the size and complexity of the project calls for varying degrees of technical and personal skills. A subject-matter-expert (SME) project manager should avoid the temptation of micromanaging in a highly technical project. Limsila and Ogunlana (2008: 164-184) suggest that a

transformational leadership style ensures high work performance and organizational commitment of subordinates. Transformational leaders are able to inspire subordinates to transcend their own interests for the benefit of the project. Moreover, they are able to leave a profound effect on everyone that they interact with at any organizational level.

Achieving project success within the construction industry would also require a comprehensive overhaul of quality management. Lack of clear quality benchmarks has made it difficult to achieve project success within the construction industry. Transformational leadership is crucial in implementing a comprehensive total quality management programme (Rui, Emerson and Luis, 2010: 7-18). As a transformational leader, the PM would be able to gain the needed trust from project team members and stakeholders alike. The trust gained would allow the PM to make the necessary quality adjustments which will facilitate project success.

Projects, by their nature, require individuals from different backgrounds, cultures and expertise to work towards a common goal. This is a breeding ground for conflicts as individuals with strong egos are likely to clash. Thus, it is increasingly becoming important for the PM to develop conflict management skills. Resolving conflicts would require the PM to determine the most appropriate attitude to have during negotiations to facilitate the desired outcome. Attitudes that would not facilitate the desired outcome would then be avoided (Yousefi, Hipel and Hegazy, 2010: 99-107). For instance, the PM should maintain a concerted effort to listen attentively to clashing parties and remain impartial at all times. Essentially, the PM must seek win-win outcomes for parties concerned. This would entail nudging the parties to take the “middle road” by encountering short-term losses in order to gain in the long-term.

Furthermore, successful project managers have exhibited seven traits which facilitate project success, besides technical and soft skills. These traits include taking an initiative, being enthusiastic, being finance /business inclined, wanting to lead, being analytical, handling autonomy and wanting challenges. Successful project managers are all self-starters. They are not

afraid to take the initiative by taking a plunge into the deep end. Taking an initiative in projects signals a high level of confidence by the PM and commitment to the organization. Enthusiastic project managers find it easy to motivate those around them. Project team members need to be constantly motivated through the challenges they encounter in the project. Having a natural touch for business enables the PM to solve complex problems, respond to change faster and even anticipate change beforehand. Scenario planning has elevated successful PM's head and shoulders above their peers (Wideman, 2010: 7).

Successful project managers naturally want to lead (Wideman, 2010: 7). This demystifies the belief that project managers get into the profession by accident. Project managers, that want to lead, naturally are more than willing to learn new skills and embrace challenges that are inherent in projects. Avoiding the trap of "paralysis by analysis", when making business decisions, comes naturally to successful project managers. Hence, successful PM's are decisive when dealing with change. Handling autonomy comes naturally to successful project managers. For example, successful PM's don't have to be told what to do, when to do it and how it should be done. The organization develops immense respect and trust towards the project manager. Wanting new challenges is synonymous with successful project managers. The abovementioned traits clearly form a foundation or a template for choosing project managers that are intrinsically positioned to facilitate project success.

2.3.3 Availability of Resources

Projects, within organizations, often involve different departments and make it difficult for the PM to gain control over resources. The PM is often left at the mercy of functional managers since he/she has no positional power within the organization. This can easily create unnecessary conflict between the PM and functional managers. Therefore, the PM has to formulate a resource management plan in conjunction with relevant stakeholders to ensure that resources are available when needed. This plan has to be adequately developed and distributed to every section that is involved in the project (Newton, 2005: 110).

A resource management plan is not foolproof. Unforeseen uncertainties can still hamper the availability of resources. For example, the sharp rise in the demand of cement can adversely affect its availability. In the run-up towards the Federation of International Football Association (FIFA) Soccer World Cup in South Africa (SA), there was a significant shortage of cement. Cement had to be sourced from far afield places as the demand had increased sharply throughout the country due to large scale construction projects that had to be completed before kick-off. The usage of a feeding buffer at an insert point is helpful in dealing with uncertainties (Zhen Yu, Wei Yang and Jian, 2010: 1056-1060). Figure 1 illustrates clearly how a feeding buffer can be introduced to the existing network diagram. A network diagram is a schematic representation of the sequence of planned events for the entire projects' activities. The size of the feeding buffer would be inferred by assessing the level of risk associated with the project. Risk assessment takes place during the feasibility study in the initiation phase of the project life-cycle.

The PM exerts control over the project by dividing the feeding buffer into three zones of equal size, as seen in Figure 1 (Steyn, 2004: 132).

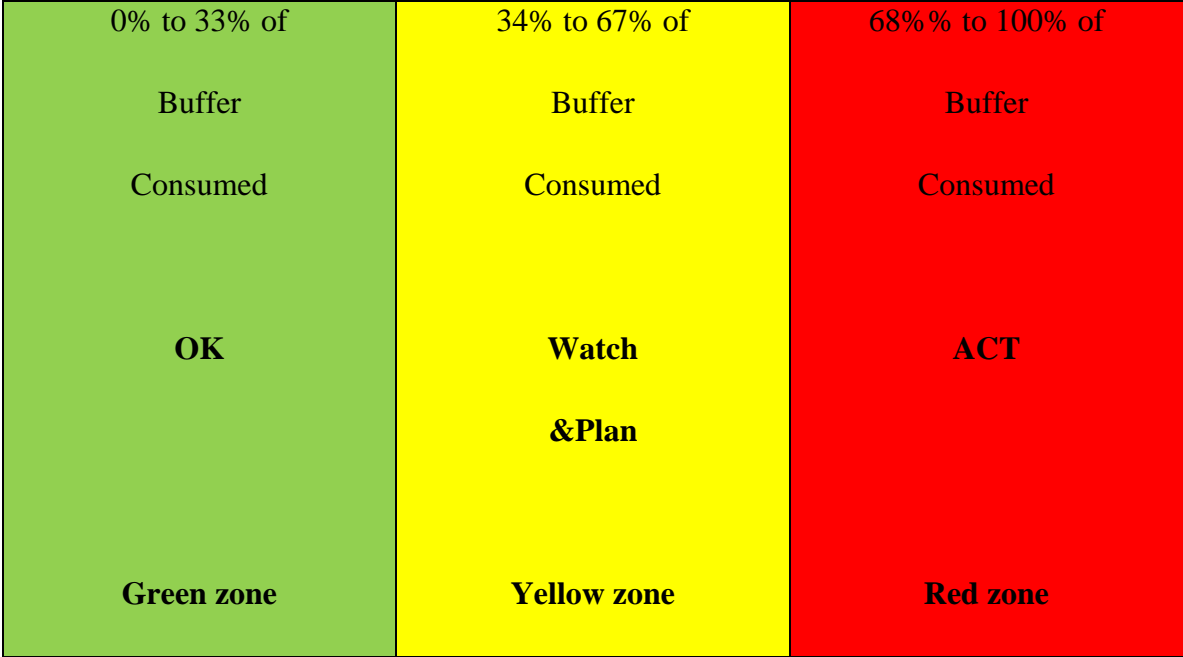


Figure 1: Monitoring of buffers (Steyn, 2004: 132).

The first zone (green) in Figure 1 represents one third of the buffer. Thus, the PM should not resort to any form of action when this first zone is consumed. Gradual consumption of the second zone (yellow) should prompt the PM to begin to watch carefully the project progress and plan for alternative action. Alternative action should be implemented by the PM as soon as the third zone (red) is consumed in order to avoid the entire project duration to be prolonged.

2.3.4 Adequate funding through the project

Project funding is the main driver of all project activities. Without funding, the necessary materials cannot be purchased in time for the project to commence. The PM needs to create a comprehensive financial plan for the entire project. The financial plan has to take into consideration the project activity schedule plan. This will ensure that no activity is hampered by the unavailability of funds to pay for overtime work and the like (Johnson, Scholes and Whittington, 2006: 305). Research has shown that public sector projects experience funding

problems more than private projects (Zwelisha, 2010). This is due to several problems, namely: structural issues, political issues, financial management capacity and change of leadership.

The organizational structure of government makes it difficult for funds to be channelled through it smoothly. For instance, in national projects, funds come all the way from the national sphere of government through the provincial sphere before they reach the local municipality level. The amount of red tape in between the spheres delays funds for projects in most cases. Political support has proved crucial in public sector projects. Projects that would be most beneficial to the citizenry are most likely to get funding with immediate effect. This phenomenon is mostly prevalent at local municipality level and is fueled by the benefit-cost analysis approach (Samuelson and Marks, 2006: 17). Councillors of local municipalities find it difficult to deliver community projects within the stipulated date due to the availability of funds. Local municipalities are mostly inundated with a range of projects which calls for prudent financial management. A change of leadership, especially at a local municipality level, can signal a change of priorities. Hence, funding for projects can easily be minimized or even cancelled and channelled elsewhere.

2.3.5 Comprehensive Contract documentation

All relevant stakeholders have to enter into contractual agreements regarding the activities to be performed in the project. The PM has to ensure that even internal stakeholders, such as functional managers, have signed performance contracts. The contracts must clearly stipulate the quality, time and cost parameters to be met. If no contract is signed by parties, it would be difficult to implement any project goals (Kerzner, 2006: 826). The growing number of lawsuits, nowadays, between contractors and project managers, is not encouraging (Sookhalal, 2010). This calls for the simplification of the contract documents and involvement of a mediator before a lawsuit is considered. The mediator should have in-depth knowledge of the building construction industry.

2.4 Competence

2.4.1 Utilization of up-to-date technology

The construction industry has seen immense technological developments over the past ten years in developed countries. Developing countries, like South Africa, are experiencing problems of selecting the right technology. This problem is further complicated by the incompetence of the project team. Adopting new technology and utilizing it to its full potential has become critical in achieving a competitive advantage in the construction industry. The PM has to identify all technology needs for the project during the briefing (scope formulation) stage (Nguyen, Ogunlana and Lan, 2004: 404-413).

The usage of technology in hi-tech work functions has been associated with project cost successes (Yang, 2007: 1041-1051). The project manager needs to bear in mind that time and costs are inseparable (Kerzner, 2006: 597). Thus, any technology that would save time during the execution phase of the project should be carefully considered. Ideally, the technology chosen should require minimal maintenance and training for employees. The PM should also realize that the cost savings may only be realized in the long-term when all employees are fully trained. Thus, the payback period for the new technology should be carefully calculated. The payback period is the duration (months or years) it would take for the technology to cover the initial capital outlay.

2.4.2 Proper emphasis on past experience

Tacit knowledge plays a vital role in enhancing organizational performance and achievement of competitive advantage in the construction industry (Pathirage, Amaratunga and Haigh, 2007: 115-126). Tacit knowledge is gained over the years by trial and error and is mostly not documented. The inclusion of the competent PM during scope formulation will enable him/her to ascertain the level of tacit knowledge needed for the project. Harrison (2007: 15) points out that a competent PM would then look within the organization and assess if adequate levels of tacit

knowledge exist and if a suitable person may be required to ensure the smooth execution of the project. Chan, Wong and Lam (2006: 909-927) point out that the PM should have previous experience in public housing in order to increase the likelihood of achieving project success in this sector.

The PM should encourage project members to document tacit knowledge gained from the project. A project information management system (PIMS), that gives common access to relevant parties, should be utilized (Steyn, 2004: 51). This would ensure that mistakes made in current projects are not carried forward to new projects. Experience gained in executing public sector projects is often lost when the PM leaves the organization. Execution of public sector projects is particularly difficult, due to the number of stakeholders involved. Up-and coming project managers can learn a lot from experienced PM's if their experiences are documented in systems such as the PIMS. A socially cohesive environment needs to be created in order to encourage tacit knowledge to be communicated (Subashini, 2010: 36-39). This is due to the fact that tacit knowledge is elusive and embedded in the individual. The individual would be reluctant to share such knowledge if trust and mutual commitment is not present.

2.4.3 Competent team

The PM has to assemble the most competent team and take into consideration cultural differences. Muller, Spang and Ozcan (2009: 70-93) advise that project team members from different cultural backgrounds will have varying decision – making styles. For instance, Swedish teams are more transparent, whilst German teams are willing to accept unpopular decisions. Cultural differences can cause unnecessary tension amongst team members, if not addressed appropriately. A thorough skills gap analysis has to be conducted by the PM and relevant functional managers. Additional training should be provided to team members that get to do the actual work in the project. Furthermore, London, Chen and Bavinton (2005: 295-318) propose that a positive and continual response to change is the best way of addressing cross-cultural communication difficulties within teams.

Project management teams can achieve a competitive advantage by being engaged in a steady flow of hi-return projects (Melkonian and Picq, 2010: 79-90). This calls for top management to be active in lining up projects with a view of avoiding to keep the project team idle for extended periods. No amount of training can compare to on-the job training that is achieved by trial and error. Hence, engaging the project team on a steady flow of hi-return projects offers an excellent opportunity to learn new skills.

2.4.4 Awarding bids to the right designer/contractor

The process of awarding of bids to the right project manager/contractor has increased the level of competition in the construction industry, especially in the public sector. Most governments in the developing countries, like South Africa, have limited financial resources. Therefore, governments tend to award bids to contractors that have a proven track record and hold the most cost-effective proposal. A benefit-cost analysis should be carried out prior to the awarding process (Samuelson and Marks, 2006: 17). This provides clarity on the amount to be spent on the project.

The best method to use when selecting contractors is the multiple criteria (Phillips, Martin, Dainty and Price, 2008: 307-320). The multiple criteria method considers the following issues: understanding of client's objectives, construction practices, successful track record, quality management procedures, transparency of cost data and understanding of partnering. Moreover, the method also considers existence of established health and safety policy, understanding of best value and technical ability. The ability of contractors to clearly comprehend the client's objectives in the project scope document is crucial in achieving project success (Harrison, 2007: 13). Clients nowadays are becoming more knowledgeable about the building construction industry (Toor and Ogunlana, 2009: 149-167). Project objectives should ideally be specific, measurable, assignable, realistic and time related (SMART). The prospective contractor should be able to implement the latest construction practices stipulated by the governing authority, i.e., the Construction Industry Development Board (CIDB) in South Africa (SA).

A successful track record of previous projects bodes well for the prospective contractor. This track record will go a long way in proving that the contractor is not a fly-by-night case and can be trusted. Adherence to quality management procedures proves the credibility of the contractor. For example, the contractor should be listed as an “active” member on the CIDB list of contractors. The contractor should clearly illustrate in the bid proposal how cost data was derived. This would ensure that only realistic costing of the project is undertaken and under costing is discouraged. Under costing, with a view of increasing chances of being chosen, undermines the bidding process.

2.5 Commitment

2.5.1 Top management support

Projects come about due to a strategic objective that the firm has to achieve (Johnson, Scholes and Whittington, 2006: 504). Therefore, top management support has to be unwavering throughout the project. Top management support goes beyond the provision of funds and making resources available. It includes aspects such as providing clarity on the project objectives and reassuring project team members that they will be valuable after the project. Changes that would come about due to the project can cause team members to be highly skeptical of their future in the organization. This will directly affect their level of performance towards the project.

2.5.2 Commitment to the Project

Changes induced by the project can even result in individualism, where each person pursues their goals which are against those of the project (Nguyen, Ogunlana and Lan, 2004: 404-413). The PM needs to avoid such situations from occurring, by conducting an open briefing session with all affected parties before the project commences and clarify project objectives with a view of getting their buy-in. Occasional visits throughout the project by top management provides encouragement to the project team. In order to avoid individualism, the PM has to draw up a

linear responsibility chart (LRC) indicating exactly the person responsible for a specific activity (Kerzner, 2006: 200).

Organizations have to create jobs that offer a clear glide path (growth plan) for project employees to give optimal commitment (Jafri, 2010: 62-68). Project employees have to perceive a strong component of professionalism about their jobs. An environment that encourages employees to consider project management as a profession is a breathing ground for innovation. Employees that feel valuable are most likely to be innovative and constantly seek better methods of improving the quality of work performed. A low level of organizational commitment from project employees is bound to translate to less than optimal performance in the project activities (Dwivedula and Bredillet, 2010: 79-88).

2.5.3 Clear objectives and scope

Project objectives have to be iterated and validated on a regular basis throughout the project life-cycle (Lindahl and Ryd, 2007: 147-156). The scope should be as simple as possible and cover all possible “grey” areas that may cause confusion. It is widely accepted that project scope (brief) changes are inevitable. This is due to the fact that reality can turn out to be different to what was expected. Othman, Hassan and Pasquire (2004: 248-258) believe that adopting a dynamic brief development (DBD) approach to the project scope will facilitate project success. However, changes made to the scope during the execution phase will cost more than if they were made at the initiation phase. It is also worth noting that costs and time are inseparable (Kerzner, 2006: 597). Research (Forsythe, 2008: 485-496) reveals that construction clients make quality judgements progressively throughout the project. This supports the DBD approach of scope management.

2.5.4 Political Support

Public projects are easily influenced by the politics of the day. For example, energy utilities have to get as much political support as possible in a bid to convince the citizenry of the need to build a nuclear power station. Opposition parties in parliament may try to influence the citizenry to go for a hydro power station with substantial cost savings. This can prove to be a nightmare for the power utility without political support from the ruling party in government. Commitment from legitimate stakeholders, like the non - governmental organizations (NGOs) and ruling party in parliament, remains crucial to the success of public projects (Jacobson and Choi, 2008: 637-657).

2.6 Communication

2.6.1 Shared Project Vision

The project manager has to identify the interests of all relevant stakeholders, and ensure that they buy-in to the project vision (Yang, Shen and Ho, 2009: 159-175). In a large project that involves more than four departments, the PM will have to get the project sponsor to assist in selling the project vision. The project sponsor has to be someone from an executive management position with considerable influence within the organization. The project vision has to be communicated with relevant parties on a continuous basis throughout the project life-cycle. A well developed and articulated vision has an immense contribution towards achieving project success (Christenson and Walker, 2008: 611-622). A vision creates a collective ideal that employees and management alike aspire to achieve. Optimal performance from employees cannot be expected in the absence of an enduring vision and supportive environment.

2.6.2 Project Plans updated regularly

Once the project objectives have been set and the scope completed, the PM has to commence with the second phase of planning. The project plan is a living document which has to be updated as the project progresses. The PM has to use tools such as the work break-down structure (WBS) to break down work into activities assignable to specific individuals. Special focus must be given

to activity definition and project plan development as these prove to be critical planning processes (Zwikael, 2009: 372-387).

2.6.2.1 Purpose of planning

The primary aim of engaging in project planning is to execute the project scope. Once top management of the organization approves the scope, the PM then has to gather all the relevant information and resources which will be useful in executing the scope. The PM and line managers should appoint project team members who will assist with the planning process and eventual execution of the project. When choosing project team members, one must bear in mind that specialists are not necessarily good planners and executors. Thus, the PM and line managers need to be cautious of this fact when selecting project team members. The project team should be encouraged to voice their opinions without fear of rejection. This will ensure that team members buy-in to the project and give their full support during execution.

Projects are time bound and temporary by nature. The expected duration is usually set during the scope formulation process in the initiation phase of the project. This is largely due to the fact that projects are strategic in nature and, in most cases, are used to gain a competitive advantage over the organization's competitors. For instance, they are used to exploit an opportunity in the market before the "window" closes after a certain time period. Furthermore, the PM should realize that time and cost management are inseparable in project management (Kerzner, 2006: 597). Thus, planning is undertaken to ensure that the set time line is satisfied, which, in turn, will ensure that costs are kept within the budget.

Project planning helps to create a benchmark for execution (Harrison, 2007). The benchmark is then used at execution to provide direction for the project team as events unfold. Events that unfold at execution may cause confusion to project team members with regard to standards that need to be adhered to. The benchmark set during planning clears any ambiguity that might exist,

thus facilitating decision making. Benchmark setting should be conducted by the PM in consultation with experienced project team members and line managers.

Organizations use projects as a tool for implementing their strategic objectives that may be aimed at changing the manner in which the organization operates. Thus, projects can be viewed as change agents. The PM needs to recognize this fact and ensure that the strategic objectives of the organization are reflected in the planning process. The strategic objectives may not be clearly stated in the scope statement, thus the need for the PM to be present during the scope formulation process (Msani, 2007: 20).

The unique nature of projects brings about an element of uncertainty when execution is considered, that is, reality may facilitate or hinder the execution of the projects. The level of uncertainty may be minimized by identifying all the possible unknown elements associated to the project. This can be examined closely by considering Figure 2 below.

Unknown	Unforeseeable 4	Unforeseen “Surprises” 3
	Foreseeable 1	Foreseen 2
	Known	

Figure 2: Minimization of unknown elements (Harrison, 2007: 8).

The PM should ideally start in the first quadrant (Foreseeable) elements which are not easily recognizable but can be identified by asking thought-provoking questions concerning the possibilities that reality can bring. This will minimize the number of unknowns and enable the PM to consider the second quadrant (Foreseen) elements which have been encountered before, perhaps in previous projects. Elements that are not covered in the first and second quadrants must then fall in the third quadrant (Unforeseen). These elements may be identified by specialists through experience and engaging in detailed planning (Harrison, 2007: 9).

Project managers should not fall in the trap of trying to identify the (Unforeseeable) elements of the project. These elements cannot easily be discovered even by engaging in detailed planning. This is largely due to the fact that the probability of occurrence of these is very low. Thus, it is irrelevant to focus on these elements. For example, a soccer player being struck by lightning during a game has a low probability of occurrence. The ratio is about 1: 10 million, for argument sake. Therefore, these elements can be classified as unmanageable risk that is closely associated with the environmental conditions where the project will be carried out (Msani, 2007: 19).

It is important to note that Figure 2 represents a dynamic model, which means that the unknown elements can change with time. This phenomenon makes planning to be one of the most difficult aspects of the project that the PM has to deal with. Research (Kerzner, 2006: 398) has shown that the PM has to spend a reasonable amount of time in dealing with this dynamic model, as this has a direct influence on the likelihood of project success. Most projects are “undercooked”, that is, not enough time is spent in planning or dealing with unknown elements and, as a result, project success is compromised. This then raises the question “At what point must one stop planning and begin with execution”. One should stop planning when the final “picture” is closely similar to that of reality, thus ensuring a smooth transition. The idea here is to be able to “hit the ground running” at execution (Burke, 2006: 180).

Planning enables the PM to identify the organization's strengths and weaknesses in terms of resources to be utilized in the project. Strengths may include the availability of skilled labour, enough financial capacity and the recognition of project management as a discipline. On the other hand, weaknesses may include a high rate of absenteeism, low morale amongst employees and lack of support from top management. An analysis of the strengths and weaknesses gives the PM a better understanding of whether the organization has what it takes to deal with the challenges that the project will raise (Kerzner, 2006: 190).

2.6.2.2 Nature of planning

Project planning is carried out at the planning (second) phase of the project life cycle. The project life cycle is a framework upon which the project is carried out. The execution phase (third phase) follows after the planning phase. The output (scope statement) from the initiation phase (first phase) is used in the planning phase (second phase). The project plan that is developed in the planning phase is then used at execution. This shows the dependent relationship between the phases with the planning phase providing a transition and a preparatory period before execution commences (Harrison, 2007: 17).

Project planning can be divided into two parts, that is, the planning process (dynamic part) and the project plan (static part). The dynamic part involves communicating planning information to the project team and stakeholders, pledging their support. Firstly, the information that is communicated includes how the scope should be broken down into manageable tasks by using the work breakdown structure (WBS). Secondly, it also includes establishing relationships between activities. Thirdly, a consensus has to be reached on the estimated project duration by using certain tools and techniques. Fourthly, goals and objectives have to be set and based on the available information in the scope statement. Lastly, information has to be communicated in order for the following sub-plans to be formulated, that is, the quality, resource and control (Burke, 2006: 180).

The outcome (project plan) of the planning process is static, as mentioned above, and represents a “picture” of what reality should be at execution. This is bound to create problems at execution as reality is not static but dynamic in nature. This would then prompt the PM to make changes from time to time in the project plan as reality unfolds. Changes made in the project plan have to be reflected in the scope statement (Msani, 2007: 21). Therefore, planning is continuous and iterative as shown by Figure 3.

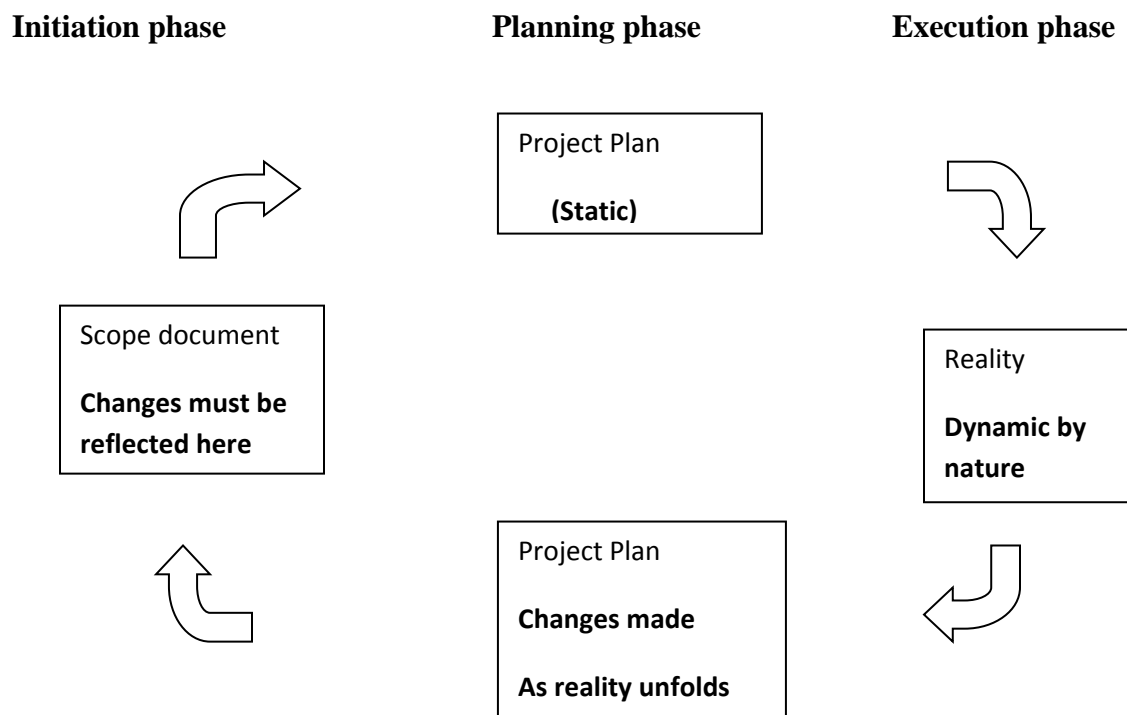


Figure 3: Continuous and iterative nature of project planning (Msani, 2007: 10).

The above figure shows that scope changes are inevitable in a project. Therefore, the scope formulation process at the initiation phase should include a scope change control system which will ensure that changes are made by authorized people in consultation with all stakeholders (Burke, 2006: 105).

2.6.2.3 Planning Process and Outcome

Goal and Objective setting

The PM, in consultation with line managers and the project team, must go through the process outlined below in order to be in a good position to execute the scope. The level of detail that will be shown will depend on the experience they have in the industry.

- (a) Outcome a consensus has to be reached on the final bottom line that the client expects regardless of the manner in which it will be achieved.

- (b) Goals targets that have to be reached so that the outcome is what the client has desired.

- (c) Objectives these are things that have to be achieved so that the scope is realized.

The objectives must meet the scope 100%.

2.6.2.4 Developing objectives

- **Time dimension**

The work breakdown structure (WBS) will be used to breakdown the scope to manageable tasks that are assignable to individuals. Breaking down the scope is crucial in ensuring that all tasks associated with the project are taken into account at an early stage.

The duration of all the individual activities identified has to be estimated by either using historical data or expert knowledge. Historical data should be used with a certain level of caution

as the conditions in previous projects could have been different. In the case where the PM is a subject-matter expert (SME), the project team members would refrain from giving unrealistic estimates. Even though the PM may be an SME, estimates still need to be negotiated with team members in order to get their support in the execution of the project.

A decision has to be made on the sequence of activities, that is, which ones would be done in series and concurrently in order to save time. The decision can be taken based on the following criteria (Kerzner, 2006: 420):

Hard-logic	These are activities that have to be done in series at all times, e.g., the foundation of a building has to be laid first before the superstructure is put in place;
Soft logic	These can be either done in series or concurrently depending on the consensus reached between the PM, line managers and project team; and
External dependencies	These dependencies may be beyond the control of the PM, e.g., government laws.

The PM can then use network analysis to join the activities in order to determine the project duration. Network analysis is one of the tools in project management that is used to give a pictorial representation of how the scope will be executed. By determining the critical path in the network, the PM is able to work out the expected duration of the project. The critical path has activities with no slack and forms the longest path. Thus, a delay on any of its activities would result in a delay of the entire project. Essentially, the PM can then control the project at execution by focusing on the critical path (Steyn, 2004: 132).

- **Cost dimension**

Setting up cost objectives is driven mainly by ‘how’ and ‘who’ is involved in the process. The ‘how’ part involves the process that will be used to execute the project. For instance, transporting raw material by railway carriages or trucks would influence the cost to be incurred. The ‘who’ part deals with the level of experience, skills and expertise possessed by the project team members who will carry out the work. The PM should bear in mind that errors made in cost estimation at the early stage of the project will be progressively more expensive to correct in later stages.

One of the widely used tools in cost estimation is the bottom-up method (Harrison, 2007: 23). This involves adding up costs for all the individual activities per level in the WBS starting from the bottom. This will give the PM a realistic overall cost of the project which should then be compared to the allocated budget. The PM may use the acquired information to request for additional funds if the allocated budget is below the calculated figure.

- **Quality dimension**

Research (Phillips *et al.*, 2008: 307-320) has shown that there are different views on what quality is. One view from operations states that quality is achieved by consistently conforming to the client’s expectations. On the other hand, quality is said to be in the eye of the beholder (client). That is, the customer’s perception of quality is all that is important. Clients’ perceptions differ,

thus making it difficult for organizations to make products or services that will suit or satisfy all their customers. One then takes the view that quality is achieved when the gap between the clients' perception and expectations, is closed.

2.6.3 Frequent Project Meetings

Meetings are a great way of communicating, but can turn out to be a waste of time, if not carefully planned. The PM has to formulate a detailed communication plan for the entire project duration. The communication plan has to stipulate the name of the person, 'how often' and 'what' information must be communicated. Essentially, the PM must communicate with the project team, legitimate stakeholders, the client and project sponsor (Newton, 2005:38). Frequent communication with relevant parties will ensure that everyone is on the same page as far as project progress is concerned.

2.6.4 Community involvement

With South Africa facing such a high unemployment problem, private and public construction projects must consider utilizing local residents in order to gain support. Communities are most likely to oppose construction projects which will not offer them meaningful employment opportunities. Providing employment opportunities to local communities would indirectly enhance the organization's brand standing as being socially responsible (Kotler and Keller, 2006: 286). The PM has to establish a single point of contact (SPOC) amongst the community members. Communities are most likely to oppose construction projects which will not offer them meaningful employment opportunities. Continuous communication must be maintained with the community SPOC during the project so that any issues can be addressed immediately when they arise.

The PM should be aware that community members often have multi interests concerning the project (Teo and Loosemore, 2010: 216-235). Hence, it is crucial for the PM to identify a SPOC

when engaging the community from the beginning. The involvement of the community is particularly important in public sector projects. For example, public facilities, like libraries and schools, are later vulnerable to vandalization. This is mainly due to the fact that a sense of ownership was not instilled in the community by allowing participation in the construction process.

2.6.5 Handover Procedures

Karna, Junnonen and Sorvala (2009: 111-127) assert that the construction industry is increasingly becoming a service industry. Therefore, industry players have to become more client-oriented. That is, a new mentality of “working with the client” instead of “working for the client” must be developed. Working with the client also entails developing a detailed handover procedure stipulating the sequence of events and the people assigned on the day. Handover procedures must be developed and communicated to all relevant parties including top management.

2.7 Conclusion

This chapter has presented an in-depth analysis of the critical success factors in the literature review. The eighteen critical success factors identified have been encapsulated in the four COMs model. The next chapter deals with the methodology used in collecting and analyzing data in this study.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter deals with the methodology used in collecting and analyzing data in this study. An indepth account on how data was collected and the research instruments utilized will be given. Special focus will be given to the target population, data collection, questionnaire design, data analysis and the justification of the approaches used.

3.2 Study Type

This cross sectional research is a quantitative study and explores the relationship between critical success factors (independent variable) present within the construction project environment and the effect they have towards achieving project success (the dependent variable). Descriptive research will describe characteristics of construction clients within the Durban area. Descriptive studies are based on some previous understanding of the nature of the research problem (Saunders, Lewis and Thornhill, 2007: 134). Inferential statistics allow one to make inferences from the sample to the population (Birley and Moreland, 2007: 351-353). In this study, they will be used to ascertain if there is a significant difference in the manner in which project managers and contractors perceive critical success factors.

3.3 Target Population

This will be a census study consisting of two target populations. According to Blumberg, Cooper and Schindler (2008: 245), a census study ensures that data is collected from all the elements in the population. The target populations of N1=95 and N2=61 were obtained from the Construction Industry Development Board (CIDB) register on its website consisting of project managers and active grade 4 contractors, respectively, within the greater Durban area (Register,

2010). According to Lee and Lings (2008: 269), the target population is the population which the researcher would ideally like to generalize the results.

3.4 Data collection

As this is a quantitative study, the survey method will be used to gather primary data (Easterby-Smith, Thorpe and Jackson, 2008: 11). Data collection forms an important part of a problem solving process to clarify the purpose of any research (Pellissier, 2007: 24). Fieldworkers were employed to administer the questionnaire on a face-to-face basis in order to facilitate a response (Nguyen, Ogunlana and Lan, 2004: 404-413). They were adequately trained to conduct the process.

3.5 Questionnaire design

The preliminary questionnaire was pilot tested with four developers, three consultants and three contractors. Adjustments were then made to the questionnaire by the statistician and the final copy distributed to the active grade four contractors and project managers in Durban. Eventually, two questionnaires emerged: one for the grade four contractors and the second one for the project managers. The literature review clearly indicated that the contractors and the project managers were the major role players in the construction industry (Barrett, 2008: 189). Thus, having two separate questionnaires allowed the researcher to assess the perceptions of contractors and project managers, respectively, towards critical success factors which lead to project success.

The questionnaires were divided into two sections, namely: the demographic section and success factors. The demographic section was included in order to assess whether data collected was not influenced by the individual differences such as gender, age, years in the industry, sector of industry, type and value of projects undertaken. The success factors' section was made up of close-ended questions with five possible responses. Close-ended questions were preferred as they reduce the respondent's bias and facilitated coding of the questionnaire (Akintoye and Main,

2007: 597-617) An open-ended question was included at the end to allow the respondent to add any factor or views.

3.6 Data analysis

Data was analysed using the SPSS Package. The following types of statistical analyses were conducted:

3.6.1 Descriptive Statistics

Descriptive statistics describe the phenomena of interest (Saunders, Lewis and Thornhill, 2007: 134). The following types of descriptive statistics were used:

- a) Frequencies and percentages to obtain a demographic profile of the contractor and project manager groups; and
- b) Measures of Central Tendency and Dispersion. These were calculated to obtain a “feel for the data”. The mean as well as the standard deviation were utilized. The mean was used to ascertain the subjects’ perceptions of the dimensions of the critical success factors and the standard deviation determined the extent of variation in the subjects’ perceptions of the dimensions of the critical success factors for both groups, respectively.

3.6.2 Inferential Statistics

Inferential statistics allows one to make inferences from the sample to the population. These statistics are used when a researcher wants to know how variables are related to one another and whether there is any difference between two or more groups (Birley and Moreland, 2007: 351-353). The following inferential statistics were used:

- a) Correlation. The Pearson Correlation Matrix established the direction, strength and significance of the relationship among the critical success factor dimensions for each group, respectively; and

b) The t- test. The t- test established whether there was a significant difference in the perceptions of the dimensions, critical success factors between the contractor and project manager groups. This test statistic was also used to determine whether there was a significant difference in the perception of the dimensions, critical success factors among the demographic variables with two groups for the contractor and project manager groups, respectively.

The analysis of variance examined whether there was a significant difference in the perception of the dimensions, critical success factors among the demographic variables with more than two groups for the contractor and project manager groups, respectively.

3.7 Reliability and validity

Reliability ensures that internal consistency amongst factors exists (Parasuraman, Grewal and Krishnan, 2007: 132-133). This questionnaire used in this study was adapted from the Vietnam study (Nguyen, Ogunlana and Lan, 2004: 404-413). They reported that the reliability coefficient was 0.675. Therefore, the Cronbach reliability coefficient for this study is acceptable.

Validity ensures that the tool (questionnaire) used is appropriate for the study undertaken (Leedy and Ormrod, 2006: 274). A pilot test was used to refine and assess the questionnaire's face validity (Leedy and Ormrod, 2006: 274). A pilot test of the questionnaire was undertaken with four developers, and six contractors. Confirmatory factor analysis was used in order to ensure the construct validity of the research (Maree, 2007: 219).

3.8 Conclusion

This chapter has provided an indepth account on the methodology used in this study. A solid background has been formed for the interpretation of the data collected in the census, as represented in the next chapter. A case for selecting a quantitative approach and selecting a

questionnaire as the appropriate research method has been made. The comprehensive design of the research and the selection of elements have been illustrated. Details regarding the collection and data analysis method to be used were given. Finally, an overview of how the reliability and construct validity of the research were established concluded the chapter. The following chapter presents the data and gives an indepth analysis on the findings thereof.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS OF FINDINGS

4.1 Introduction

Chapter three outlined the methodology for this research. This chapter discusses in detail the findings of this study. The various sections of the questionnaire are analyzed in detail and accompanied by numerical tabulations. The chapter essentially discusses the themes obtained from the questionnaires.

The questionnaire was formulated with consideration to the critical success factors, as highlighted in chapter two (in the literature review section). These factors make up the eighteen questions in section B of the questionnaire and are encapsulated in the four COMs model. The demographic profile of respondents is discussed in detail with the use of frequency distribution tables. A descriptive analysis of 95 project managers and 61 grade four contractors was conducted using the Mann-Whitney test and Kruskal – Wallis anova. This was performed with a view to ascertain if there exists a significant difference between project managers, and contractors, perception towards critical success factors.

The analysis covered is quantitative in nature. It was interesting to note that biographical variables did not have a significant influence of the perception of project managers and contractors towards the critical success factors. Biographical variables consisted of age groups ranging from 20-23 to 60 and above, tenure, public or private sector and value of projects undertaken. It was also disturbing to note the percentage of women in the construction industry is still low for both contractors and project managers.

4.2 Demographic profiles of respondents

The demographic profiles of respondents were computed with a view to ascertain whether the construction industry is representative of the country's status quo. The result of the spread in demographics of the respondents is illustrated in Table 1 below.

		Group					
		Project Manager		Contractor		Total	
		n	%	n	%	n	%
Gender	Male	76	48.7%	48	30.8%	124	79.5%
	Female	19	12.2%	13	8.3%	32	20.5%
	Total	95	60.9%	61	39.1%	156	100.0%
Age	20-39	32	20.5%	15	9.6%	47	30.1%
	40-59	45	28.8%	28	17.9%	73	46.8%
	60 and above	18	11.5%	18	11.5%	36	23.1%
	Total	95	60.9%	61	39.1%	156	100.0%

		Group					
		Project Manager		Contractor		Total	
		n	%	n	%	n	%
Years in Industry	<=5 years	0	.0%	0	.0%	0	.0%
	Between 5 an 10 years	24	15.4%	24	15.4%	48	30.8%
	10 years or more	71	45.5%	37	23.7%	108	69.2%
	Total	95	60.9%	61	39.1%	156	100.0%
Industry Sector	Public	64	41.0%	49	31.4%	113	72.4%
	Private	31	19.9%	12	7.7%	43	27.6%
	Total	95	60.9%	61	39.1%	156	100.0%
Value of projects undertaken	Up to 200 000	0	.0%	0	.0%	0	.0%
	Up to 650 000	0	.0%	0	.0%	0	.0%
	Up to 2 000 000	9	9.5%	0	.0%	9	9.5%
	Up to 4 000 000	21	22.1%	0	.0%	21	22.1%

	Group					
	Project Manager		Contractor		Total	
	n	%	n	%	n	%
Up to 6 500 000	27	28.4%	0	.0%	27	28.4%
Up to 13 000 000	10	10.5%	0	.0%	10	10.5%
Up to 40 000 000	17	17.9%	0	.0%	17	17.9%
Up to 130 000 000 or more	11	11.6%	0	.0%	11	11.6%
Total	95	100.0%	0	.0%	95	100.0%

Table 1: Frequency distribution of biographical variables

The results in Table 1 reflect the frequency distribution of the biographical variables for both contractor and project managers (PMs). Amongst the PMs, 48.7% were male, as compared to 30.8% male within the contractor sample. A total of 28.8% of PMs were in the 40-59 age group and 11.5% were 60 years or more. In comparison, 17.9% of the contractors were in the 40-59 age group and 11.5% were 60 years or more. Female project managers and contractors account for 12.2% and 20.5%, respectively. This finding clearly shows that a lot of effort needs to be directed towards encouraging women to participate in the construction industry. The CIDB can play a significant role in this regard by creating an enabling environment for women. An enabling environment includes equipping women with basic business skills and construction management skills. The Department of Public Works would have to amend legislation to ensure

that a sizable amount of its tenders are awarded to women at lower grades. In this way, women at lower grades will have sufficient time to nurture their skills and be able to grow their businesses.

A total of 31.4% of the contractors were employed in the public sector, as compared to 41% of the project managers. This is largely due to the fact that South Africa is a developing country, and the public sector offers most of the tenders. Ideally, the private sector should be issuing large numbers of tenders which, in turn, would create sustainable employment opportunities. A larger proportion of the project managers were working for 10 years or more. This is due to the fact that it takes a significant number of years to gain enough experience and a good reputation which would enable one to do consulting or undertake difficult projects.

4.3 Discussion of the four COMs

The discussion of the four COMs as the four groups of critical success factors for the business construction industry in Durban are given in the following sections.

4.3.1 Comfort

This component emphasizes that projects are executed in comfort when components such as competent project managers, continuous involvement of stakeholders, availability of resources, funding and comprehensive contract documentation. The frequency distribution of questions is illustrated in Table 2, where question 1 relates to the continuing involvement in projects of all stakeholders. Question 5 relates to the competent project manager and question 9 relates to the availability of resources throughout the project. Question 13 relates to the adequate funding until project completion and question 17 relates to comprehensive contract documentation being signed by all relevant parties before the project commences.

		Group					
		Project Manager		Contractor		Total	
		n	%	n	%	n	%
Q1	Agree	10	6.4%	5	3.2%	15	9.6%
	Strongly agree	85	54.5%	56	35.9%	141	90.4%
	Total	95	60.9%	61	39.1%	156	100.0%
Q5	Agree	14	9.0%	12	7.7%	26	16.7%
	Strongly agree	81	51.9%	49	31.4%	130	83.3%
	Total	95	60.9%	61	39.1%	156	100.0%
Q9	Agree	20	12.8%	9	5.8%	29	18.6%
	Strongly agree	75	48.1%	52	33.3%	127	81.4%
	Total	95	60.9%	61	39.1%	156	100.0%
Q13	Agree	19	12.2%	13	8.3%	32	20.5%
	Strongly agree	76	48.7%	48	30.8%	124	79.5%
	Total	95	60.9%	61	39.1%	156	100.0%
Q17	Agree	4	2.6%	13	8.3%	17	10.9%
	Strongly agree	91	58.3%	48	30.8%	139	89.1%
	Total	95	60.9%	61	39.1%	156	100.0%

Table 2: Frequency distribution of questions relating to comfort

The frequency distribution in Table 2 shows that 9.6% to 20.5% of respondents gave an “agree” response to questions 1, 5, 9, 13 and 17. On the other hand, 79.5% to 90.4% of respondents gave a “strongly agree” response to questions 1, 5, 9, 13 and 17. Thus, the majority of respondents

identify these components as critical success factors for the successful implementation of construction projects.

4.3.2 Competence

This component emphasizes that adequate competences should be available for the smooth execution of construction projects. These competences include the usage of up-to-date technology (Question 2); proper emphasis on past experience (Question 6); competent project team (Question 10) and awarding of bids to the right project manager/contractor (Question 14). The frequency distribution of all the questions relating to competence is illustrated in Table 3.

	Group						
		Project Manager		Contractor		Total	
		n	%	n	%	n	%
Q2	Agree	16	10.3%	7	4.5%	23	14.7%
	Strongly agree	79	50.6%	54	34.6%	133	85.3%
	Total	95	60.9%	61	39.1%	156	100.0%
Q6	Agree	25	16.0%	11	7.1%	36	23.1%
	Strongly agree	70	44.9%	50	32.1%	120	76.9%
	Total	95	60.9%	61	39.1%	156	100.0%
Q10	Agree	17	10.9%	15	9.6%	32	20.5%
	Strongly agree	78	50.0%	46	29.5%	124	79.5%
	Total	95	60.9%	61	39.1%	156	100.0%

	Group					
	Project Manager		Contractor		Total	
	n	%	n	%	n	%
Q14 Agree	14	9.0%	12	7.7%	26	16.7%
Strongly agree	81	51.9%	49	31.4%	130	83.3%
Total	95	60.9%	61	39.1%	156	100.0%

Table 3: Frequency distribution of questions relating to competence

The frequency distribution in Table 3 shows that 14.7% to 16.7% of respondents gave an “agree” response to questions 2, 6, 10, and 14. On the other hand, 76.9% to 85.3% of respondents gave a “strongly agree” response to questions 2, 6, 10, and 14. Thus, the majority of respondents identify these components as critical success factors for the successful implementation of construction projects.

4.3.3 Commitment

This component of the four COMs model emphasizes that all relevant stakeholders must display strong commitment throughout the entire project life cycle. The commitment component is made up of top management support (Question 3); commitment to the project (Question 7); clear objectives (Question 11) and political support (Question 15). The frequency distribution of the questions relating to commitment is illustrated in Table 4.

		Group					
		Project Manager		Contractor		Total	
		n	%	n	%	n	%
Q3	Agree	19	12.2%	7	4.5%	26	16.7%
	Strongly agree	76	48.7%	54	34.6%	130	83.3%
	Total	95	60.9%	61	39.1%	156	100.0%
Q7	Agree	18	11.5%	9	5.8%	27	17.3%
	Strongly agree	77	49.4%	52	33.3%	129	82.7%
	Total	95	60.9%	61	39.1%	156	100.0%
Q11	Agree	11	7.1%	11	7.1%	22	14.1%
	Strongly agree	84	53.8%	50	32.1%	134	85.9%
	Total	95	60.9%	61	39.1%	156	100.0%
Q15	Agree	11	7.1%	7	4.5%	18	11.5%
	Strongly agree	84	53.8%	54	34.6%	138	88.5%
	Total	95	60.9%	61	39.1%	156	100.0%

Table 4: Frequency distribution of questions relating to commitment

The frequency distribution in Table 4 shows that 11.5% to 17.3% of respondents gave an “agree” response to questions 3, 7, 11, and 15. On the other hand, 82.7% to 88.5% of respondents gave a “strongly agree” response to questions 3, 7, 11, and 15. Thus, the majority of respondents identify these components as critical success factors for the successful implementation of construction projects.

4.3.4 Communication

This component highlights the importance of having strong communication ties with relevant stakeholders for the successful implementation of construction projects. This component consists of shared project vision (Question 4); project plans updated regularly; frequent project meetings (Question 12); community involvement (Question 16) and handover procedures (Question 18). The frequency distribution of the questions relating to commitment is illustrated in Table 5.

		Group					
		Project Manager		Contractor		Total	
		n	%	n	%	n	%
Q4	Agree	27	17.3%	9	5.8%	36	23.1%
	Strongly agree	68	43.6%	52	33.3%	120	76.9%
	Total	95	60.9%	61	39.1%	156	100.0%
Q8	Agree	18	11.5%	13	8.3%	31	19.9%
	Strongly agree	77	49.4%	48	30.8%	125	80.1%
	Total	95	60.9%	61	39.1%	156	100.0%
Q12	Agree	11	7.1%	11	7.1%	22	14.1%
	Strongly agree	84	53.8%	50	32.1%	134	85.9%
	Total	95	60.9%	61	39.1%	156	100.0%
Q16	Agree	18	11.5%	9	5.8%	27	17.3%
	Strongly agree	77	49.4%	52	33.3%	129	82.7%
	Total	95	60.9%	61	39.1%	156	100.0%
Q18	Agree	7	4.5%	8	5.1%	15	9.6%
	Strongly agree	88	56.4%	53	34.0%	141	90.4%
	Total	95	60.9%	61	39.1%	156	100.0%

Table 5: Frequency distribution of questions relating to communication

The frequency distribution in Table 5 shows that 9.6% to 23.1% of respondents gave an “agree” response to questions 4, 8, 12, 16, and 18. On the other hand, 76.9% to 90.4% of respondents gave a “strongly agree” response to questions 4, 8, 12, 16 and 18. Thus, the majority of respondents identify these components as critical success factors for the successful implementation of construction projects.

4.4 Descriptive analysis: The Mann-Whitney test and Kruskal – Wallis anova

The Mann-Whitney test is equivalent to the t-test for normally distributed samples. The Kruskal – Wallis anova test, on the other hand, is performed to ascertain if there are any differences amongst the mean of groups.

4.4.1 Differences between Project managers and Contractors

The Mann-Whitney test was conducted to ascertain if there exist any significant differences between project managers and contractors in their responses to the questionnaire. The results are illustrated in Table 6.

	Group	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Comfort	Project Manager	95	4.8295	.17003	2816.000	-.318	.751
	Contractor	61	4.8426	.15106			
Competence	Project Manager	95	4.8658	.17030	2498.500	-1.607	.108
	Contractor	61	4.8074	.21599			
Commitment	Project Manager	95	4.8263	.16338	2618.000	-1.120	.263
	Contractor	61	4.8525	.17307			

Group	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Communication Project Manager	95	4.8342	.17719	2889.500	-.032	.974
Contractor	61	4.8320	.18664			

*significant at 95% level

Table 6: Comparison of dimensions between project managers and contractors

The results in Table 6 of the Mann-Whitney test indicate no significant differences between project managers and contractors. This finding suggests that the critical success factors in the questionnaire are equally relevant to both industry players, that is, project managers and contractors.

4.4.2 Differences between male and female perceptions

A comparison was made between male and female contractors and project managers using the Mann-Whitney test to ascertain if there are any significant differences in their perceptions of the critical success factors. The result of the test is illustrated in Table 7.

Group	Gender	N	Mean	Std. Deviation	Mann-Whitney	Z	p	
Project Manager	Comfort	Male	76	4.8289	.16877	708.500	-.134	.893
		Female	19	4.8316	.17967			
		Total	95	4.8295	.17003			

Group		Gender	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Contractor	Competence	Male	76	4.8618	.17027	671.000	-.537	.591
		Female	19	4.8816	.17417			
		Total	95	4.8658	.17030			
	Commitment	Male	76	4.8191	.17126	657.500	-.664	.507
		Female	19	4.8553	.12681			
		Total	95	4.8263	.16338			
	Communication	Male	76	4.8388	.16685	706.500	-.160	.873
		Female	19	4.8158	.21798			
		Total	95	4.8342	.17719			
	Comfort	Male	48	4.8292	.15431	242.500	-1.328	.184
		Female	13	4.8923	.13205			
		Total	61	4.8426	.15106			
	Competence	Male	48	4.8125	.21574	290.500	-.412	.680
		Female	13	4.7885	.22468			
		Total	61	4.8074	.21599			
	Commitment	Male	48	4.8438	.16810	260.500	-1.009	.313
		Female	13	4.8846	.19406			
		Total	61	4.8525	.17307			
Communication	Male	48	4.8177	.19116	250.500	1.199-	.231	
	Female	13	4.8846	.16506				
	Total	61	4.8320	.18664				

Table 7: Comparison of dimensions between male and female amongst contractors and project managers

Table 7 reflects no differences amongst male and female contractors or male and female project managers at the 95% level ($p>0.05$) in their perceptions of the critical success factors. This finding suggests that male and female project managers or contractors view the critical success factors in the same light. Put differently, critical success factors affect male and female project managers or contractors in a similar manner.

4.4.3 Effect of age between project managers and contractors

The effect of age between project managers and contractors on their perceptions of the critical success factors was determined using the Kruskal - Wallis test. The results are illustrated in Table 8.

Group		Age	N	Mean	Std. Deviation	Kruskal-Wallis	df	p
Project Manager	Comfort	20-39	32	4.8312	.18393	1.101	2	.577
		40-59	45	4.8400	.16842			
		60 and above	18	4.8000	.15339			
		Total	95	4.8295	.17003			
	Competence	20-39	32	4.8984	.12475	.891	2	.640
		40-59	45	4.8444	.19430			
		60 and above	18	4.8611	.17620			
		Total	95	4.8658	.17030			

Group	Age	N	Mean	Std. Deviation	Kruskal-Wallis	df	p	
Contractor	Commitment	20-39	32	4.8516	.16631	1.458	2	.482
		40-59	45	4.8111	.15221			
		60 and above	18	4.8194	.18798			
		Total	95	4.8263	.16338			
	Communication	20-39	32	4.7656	.21001	7.142	2	.028*
		40-59	45	4.8833	.14694			
		60 and above	18	4.8333	.14852			
		Total	95	4.8342	.17719			
	Comfort	20-39	15	4.8400	.15492	.258	2	.879
		40-59	28	4.8571	.13174			
		60 and above	18	4.8222	.18005			
		Total	61	4.8426	.15106			
	Competence	20-39	15	4.7833	.22887	.670	2	.715
		40-59	28	4.8393	.18276			
		60 and above	18	4.7778	.25565			
		Total	61	4.8074	.21599			
Commitment	20-39	15	4.8167	.19970	.684	2	.710	
	40-59	28	4.8571	.17252				
	60 and above	18	4.8750	.15459				
	Total	61	4.8525	.17307				

Group	Age	N	Mean	Std. Deviation	Kruskal-Wallis	df	p
Communication	20-39	15	4.9000	.12677	2.405	2	.300
	40-59	28	4.8304	.15296			
	60 and above	18	4.7778	.25565			
	Total	61	4.8320	.18664			

*significant at 95% level

Table 8: Comparison of dimensions between age groups amongst contractors and project managers

Table 8 reflects a significant difference in the level of communication amongst age groups in the PM sample ($p < 0.05$). The level of communication is higher amongst the 40-59 to 60 and above respondents. This is largely due to the fact that respondents who are 40-59 to 60 and above, have been in the industry, at most, for more than ten years. Hence, they value communication more than respondents below the age of 40 in integrating and providing leadership in construction projects.

4.4.4 Tenure in the construction industry

A comparison was made to ascertain if the number of years spent in the construction industry (tenure) affected the perception of respondents towards the critical success factors. The results for the Mann-Whitney test obtained are illustrated in Table 9.

Group		Years in Industry	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Project Manager	Comfort	Between 5 an 10 years	24	4.8583	.16129			
		10 years or more	71	4.8197	.17289			
		Total	95	4.8295	.17003	745.000	-.979	.328
	Competence	Between 5 an 10 years	24	4.8542	.17932			
		10 years or more	71	4.8697	.16829			
		Total	95	4.8658	.17030	815.000	-.359	.720
	Commitment	Between 5 an 10 years	24	4.8750	.12769			
		10 years or more	71	4.8099	.17147			
		Total	95	4.8263	.16338	690.000	-1.536	.125
	Communication	Between 5 an 10 years	24	4.7813	.23674			
10 years or more		71	4.8521	.14987				
Total		95	4.8342	.17719	740.000	-1.063	.288	
Contractor	Comfort	Between 5 an 10 years	24	4.8000	.15604			
		10 years or more	37	4.8703	.14311			
		Total	61	4.8426	.15106	328.500	-1.850	.064

Group	Years in Industry	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Competence	Between 5 an 10 years	24	4.7917	.21703			
	10 years or more	37	4.8176	.21770			
	Total	61	4.8074	.21599	408.500	-.571	.568
Commitment	Between 5 an 10 years	24	4.8646	.18027			
	10 years or more	37	4.8446	.17029			
	Total	61	4.8525	.17307	409.500	-.567	.571
Communication	Between 5 an 10 years	24	4.8438	.19242			
	10 years or more	37	4.8243	.18508			
	Total	61	4.8320	.18664	412.000	-.523	.601

*significant at 95% level

Table 9: Comparison of dimensions between levels of tenure amongst contractors and project managers

Table 9 reflects no significant differences between years of service amongst PMs or contractors ($p > 0.05$). This is a strong indication that, irrespective of tenure, the critical success factors have been identified with no ambiguity by major industry players, that is, project managers and contractors.

4.4.5 Effect of industry sector in contractors and project managers

A Mann-Whitney test was conducted to ascertain if there are significant differences in the perceptions of project managers and contractors from the public and private sectors towards critical success factors. The results of the Mann-Whitney test are illustrated in Table 10.

Group		Industry Sector	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Project Manager	Comfort	Public	64	4.8375	.17412			
		Private	31	4.8129	.16277			
		Total	95	4.8295	.17003	897.000	-.805	.421
	Competence	Public	64	4.8672	.17800			
		Private	31	4.8629	.15597			
		Total	95	4.8658	.17030	949.000	-.386	.699
	Commitment	Public	64	4.8164	.16810			
		Private	31	4.8468	.15380			
		Total	95	4.8263	.16338	902.500	-.786	.432
	Communication	Public	64	4.8438	.19159			
		Private	31	4.8145	.14387			
		Total	95	4.8342	.17719	845.000	-1.293	.196
Contractor	Comfort	Public	49	4.8449	.14869			
		Private	12	4.8333	.16697			
		Total	61	4.8426	.15106	283.500	-.207	.836

Group	Industry Sector	N	Mean	Std. Deviation	Mann-Whitney	Z	p
Competence	Public	49	4.8214	.21041	240.500	-1.057	.291
	Private	12	4.7500	.23837			
	Total	61	4.8074	.21599			
Commitment	Public	49	4.8520	.16862	284.000	-.202	.840
	Private	12	4.8542	.19824			
	Total	61	4.8525	.17307			
Communication	Public	49	4.8316	.17221	267.500	-.532	.595
	Private	12	4.8333	.24618			
	Total	61	4.8320	.18664			

*significant at 95% level

Table 10: Comparison of dimensions between sectors amongst Contractors and Project Managers

There are no significant differences between the public and private sectors ($p > 0.05$). Thus, the critical success factors remain relevant for both the public and private sectors. Research (Chan, Wong and Lam,* 2006: 909-927) indicates that project managers should have past experience in public housing in order to increase the likelihood of project success. This is largely due to the nature of the public sector projects. For example, the nature of stakeholders is more complex than in private sector projects. Public sector projects involve a multitude of stakeholders ranging from the local municipality to the affected community and even political parties with divergent interests. Hence, past experience would sharply increase the likelihood of the project manager succeeding in the public sector.

4.5 Conclusion

In this chapter, an indepth analysis was performed on the data collected in the study. The demographic profile of respondents indicated a drastic need for women to be encouraged to enter the construction industry. Female project managers and contractors only accounted for 12.2% and 20.5%, respectively. Furthermore, frequency distribution tests were conducted on the four components of the four COMs model which strengthened the case for the critical success factors in the questionnaire. A descriptive analysis was conducted on the data using the Mann-W hitney test and Kruskal-Wallis anova test. These tests revealed that there is no significant difference between project managers' and contractors' perception towards the critical success factors.

The next chapter focuses on the conclusions, recommendations, objectives of the study, further research and restrictions of this study.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

The previous chapter (four) has given an in-depth analysis of the data collected in this study from project managers and contractors. Thus, this chapter focuses on the conclusions drawn from the indepth data analysis. Objectives of this study are revisited in a bid to assess whether they coincide with the results from the data analysis. Limitations of the study and recommendations for further studies are made.

5.2 The objectives of the study

The aim of this study was to assess the perceptions of contractors and project managers regarding the critical success factors which lead to project success in the construction industry in Durban. The following section presents conclusions to the study based on the objectives outlined earlier in chapter one above.

5.2.1 Identifying the critical success factors

The literature review has been instrumental in outlining critical success factors which lead to project success in the construction industry. These critical success factors go beyond the “golden triangle” of time, cost and quality. Data analysis has strongly indicated that both project managers and contractors have identified the eighteen critical success factors in the questionnaire, as relevant for the successful execution of construction projects in Durban.

A small percentage of respondents gave additional factors which they viewed as critical for the successful execution of projects in Durban. The additional factors outlined by these respondents

are contained in this study. For example, respondents mentioned misunderstandings arising from contracts documents as a crucial factor which has resulted in the increase in lawsuits (Sookhalal, 2010). This factor was covered in the questionnaire under the “comprehensive contract documentation” question. A few respondents, mostly from the public sector, were disheartened by getting paid at irregular intervals. This factor is covered under the “adequate funding until project completion” question. Furthermore, respondents also pointed out their frustration at the awarding of bids especially in the public sector. Again, this factor was covered under the “awarding of bids to the right project manager/contractor” question. Essentially, project managers and contractors are confirming that correct critical factors have been identified by this study.

5.2.2 Assessing the perceptions of contractors and project managers relating to critical success factors

By and large, project managers and contractors have shown their strong support of the critical success factors in this study. This was displayed by the fact that a significant number of respondents gave scores of 4s and 5s as their answers in the questionnaire. Clearly, the major players (project managers and contractors) in the construction industry unanimously agree on the critical success factors in this study. The challenge that now remains is to sensitive all relevant stakeholders. For example, the Construction Industry Development Board (CIDB) needs to intervene, where necessary, with a view of making the environment more conducive for successful execution of projects. The CIDB has a crucial role to play in ensuring that its legislation talks to the critical success factors, if any progress is to be made.

5.2.3 Determining whether there is a significant difference in the perceptions of contractors and project managers on the critical success factors

Both project managers and contractors have shown no significant differences in the manner they perceive the critical success factors. There was no significant difference between male and female project managers in the manner they perceived critical success factors. Similarly, male

and female contractors showed no significant difference in their perception of critical success factors. This finding emphasizes that critical success factors are inherent in the construction sector environment.

5.2.4 Examining the influence of the biographic variables on the critical success factors for project managers and contractors

The respondents in this study contained different biographic variables, namely: age groups, tenure, public or private and value of projects. Therefore, it was interesting to observe how these variables would influence the results. Firstly, all age groups, ranging from 20 -39 to 60 and above, showed no significant differences in their perceptions of the critical success factors. Secondly, the number of years spent in the industry (tenure) showed no considerable impact in the manner that project managers and contractors perceived critical success factors. Thirdly, the type of industry sector (private or public) where projects were undertaken proved to have no significant influence over the perception of project managers and contractors towards success factors. However, it was noted that, in order to increase the likelihood of project success in the public sector, the project manager should possess experience in this sector (Chan, Wong and Lam, 2006: 909-927) Lastly, the value of the projects undertaken had no significant influence on the manner in which project managers and contractors perceived success factors.

5.3 Conclusions about findings of the study

This study has gone a long way into providing much needed clarity on how project managers and contractors can begin to address the issue of project success. The inability to achieve project success has resulted in a situation where industry players find it difficult to keep existing clients, let alone finding new ones. Durban contractors and project managers have reached a point where they were not sure on what steps need to be taken to address this issue. Hence, the findings of this study present, in a simplistic manner, eighteen critical success factors that project managers and contractors need to observe cautiously to increase the likelihood of project success.

5.4 Recommendations based on findings

The findings of this study have resulted in the following recommendations:

- Over and above the “golden triangle”, an enabling environment should be established which will ensure that construction projects are executed in comfort, by competent individuals, with a clear communication plan (including skills) and receive commitment from all relevant stakeholders;
- Simplification of contracts should be one of the CIDB’s key priorities as this issue has resulted in the increase of lawsuits recently (Sookhalal, 2010). This has created an atmosphere of mistrust, mainly between project managers and contractors, since, in most cases, contractors do not deal directly with the client;
- Working on several projects at the same time should be avoided at all cost as it has the potential of compromising the quality of the project. The CIDB could institute legislation that allows contractors to work on a certain number of projects at a given interval of time. This legislation will also ensure that projects are evenly spread across contractors; and
- Awarding of bids to the right project manager or contractor in the public sector must be conducted by an independent body which is not aligned to the local authorities or municipalities. This issue has caused a lot of frustration for most contractors and project managers.

5.5 Research recommendations for further research

Although several issues emerged during the course of the investigation, this study was confined to the stipulated aspects. However, there are critical aspects for further study if one adopts the view that project success is an ongoing endeavour.

For further research, the following aspects could be explored:

- Construction projects have had a fair share of casualties. This problem has posed questions on the ability of industry players to assess the risks involved per project and then plan accordingly. Therefore, risk management remains a big challenge for the construction industry;
- The role that employee ownership would have on the level of project performance as most employees who report to contractors are temporary workers with no extra benefits, besides their pay cheques;
- A wider geographical location can be chosen so that a larger number of respondents from other provinces are included; and
- The construction industry is becoming service oriented (Karna, Junnonen and Sorvala, 2009: 111-127). It will be useful to investigate to what extent does employing skills utilized in the service industry influence the likelihood of project success.

5.6 Restrictions of the study

This study covered only Durban-based project managers and active grade four contractors. Hence, the results of this study cannot be immediately applied to other cities and provinces. This is due factors like level of growth in the industry, culture and nature of clients. The level of development that the industry has reached will be reflected by the number of contractors that have reached grades 4 up to 9. Furthermore, the rate at which contractors qualify for higher grades is indicative of the progress made in the industry. The culture found in the various cities is different, thus slightly influencing the perception that project managers and contractors will have towards critical success factors. The varying mix of public and private clients from different provinces will slightly influence the perception of project managers and contractors.

5.7 Conclusion

This study has managed to identify eighteen critical success factors which will increase the likelihood of achieving project success in the Durban construction industry. It should be noted that adopting these critical success factors requires a significant change of attitudes and practices. Changing attitudes and practices is a process that can easily take up to ten years at most (Barrett, 2008: 100). Hence, industry players (project managers and contractors) need to have a long – term approach when addressing the issue of project success which has eluded the construction industry in Durban. Clients, on the other hand, are becoming more knowledgeable. This has seen the construction industry becoming more service oriented (Karna, Junnonen and Sorvala, 2009: 111-127). Industry players need to address this new development accordingly if they are to survive this highly competitive industry.

Government intervention has to be directed at ensuring that an equitable environment exists for both experienced and new players. For example, legislation has to ensure that new contractors get sufficient tenders in order to acquire the requisite skills and experience to move to higher grades. The CIDB's role is crucial in that its policies should talk to the critical success factors.

Bibliography

Akintoye, A. and Main, J. 2007. Collaborative relationships in construction: the UK contractor's perception. *Engineering, Construction and Architectural Management*, 14 (6): 597-617.

Anantatmula, V. S. 2010. Project Manager Leadership Role in Improving Project Performance. *Engineering Management Journal*, 22 (1): 13-22.

Assudani, R. and Kloppenborg, T. J. 2010. Managing stakeholders for project management success: an emergent model of stakeholders. *Journal of General Management*, 35 (3): 67-80.

Barrett, P. 2008. *Revaluing Construction*. Oxford: Blackwell Publishing.

Birley, G. and Moreland, N. 2007. *A Practical Guide to Academic Research*. 5th ed. London: Kogan Page.

Blumberg, B., Cooper, D. R. and Schindler, P. S. 2008. *Business Research Methods*. 2nd ed. Berkshire: McGraw-Hill Education.

Burke, R. 2006. *Project Management: Planning and Control Techniques*. 5th ed. New York: Burke Publishing.

Chan, A. P. C., Wong, F. K. W. and Lam, P. T. I. 2006. Assessing quality relationships in public housing. *International Journal of Quality & Reliability Management*, 23 (8): 909–927.

Christenson, D. and Walker, D. H. T. 2008. Using vision as a critical success element in project management. *International Journal of Managing Projects in Business*, 1 (4): 611-622.

Clarke, N. 2010. Emotional Intelligence and Its Relationship to Transformational Leadership and Key Project Manager Competences. *Project Management Journal*, 41 (2) : 5-20.

Corona, M. A. 2010. The Relationship Between Emotional Intelligence and Transformational Leadership: A Hispanic American Examination. *Business Journal of Hispanic Research*, 4 (1) : 22-34.

Dwivedula, R. and Bredillet, C. 2010. The Relationship Between Organizational and Professional Commitment in the Case of Project Workers: Implications for Project Management. *Project Management Journal*, 41 (4): 79-88.

Easterby-Smith, M., Thorpe, R. and Jackson, P. R. 2008. *Management Research*. 3rd ed. London: SAGE Publications Ltd.

Forsythe, P. 2008. Modelling customer perceived service quality in housing construction. *Engineering, Construction and Architectural Management*, 15 (5): 485-496.

Harrison, B. 2007. Project Planning. Paper prepared for the Specialist Project Management Programme. Durban University of Technology, 10 July 2007.

Jacobson, C. and Choi, S. O. 2008. Success factors: public works and public – private partnerships. *International Journal of Public Sector Management*, 21 (6): 637 – 657.

Jafri, M. H. 2010. Organizational Commitment and Employee's Innovative Behaviour- A Study in Retail Sector. *Journal of Management Research*, 10 (1): 62-68.

Johnson, G., Scholes, K. and Whittington, R. 2006. *Exploring Corporate Strategy. Text and Cases*. 7th ed. London: Pearson Education.

Karna, S., Junnonen, J. and Sorvala, V. 2009. Modelling structure of customer satisfaction with construction. *Journal of Facilities Management*, 7 (2): 111-127.

Kerzner, H. 2006. *Project Management: A system approach to Planning, Scheduling and Controlling*. 9th ed. New Jersey: John Wiley & Sons Publications.

Kotler, P. and Keller, K. L. 2006. *Marketing Management*. 12th ed. New Jersey: Pearson education.

Lee, N. and Lings, I. 2008. *Doing Business Research: A Guide to Theory and Practice*. London: SAGE Publication.

Leedy, P. and Ormrod, J. 2006. *Practical Research: Planning and Design*. 9th ed. New Jersey: Merrill Prentice Hall.

Limsila, K. and Ogunlana, S. O. 2008. Performance and leadership outcome correlates of leadership styles and subordinate commitment. *Construction and Architectural Management*, 15 (2): 164 – 184.

Lindahl, G. and Ryd, N. 2007. Client's goals and the construction project management process. *Facilities*, 25 (3/4): 147 – 156.

London, K., Chen, J. and Bavinton, N. 2005. Adopting reflexive capability in international briefing. *Facilities*, 23 (7/8): 295-318.

Malach-Pines, A., Dvir, D. and Sadech, A. 2009. Project manager – project (PM – P) fit and project success. *International Journal of Operations & Productions Management*, 29 (3): 268 – 291.

Maree, K. 2007. *First Steps in Research*. Pretoria: Van Schaik Publishers.

Melkonian, T. and Picq, T. 2010. Opening the “Black Box” of Collective Competence in Extreme Projects: Lessons From the French Special Forces. *Project Management Journal*, 41 (3): 79-90.

Msani, T. A. 2007. Nature and Purpose of Project Planning. Paper prepared for the Specialist Project Management Programme. Durban University of Technology, 02 June 2007.

Muller, R., Spang, K. and Ozcan, S. 2009. Cultural differences in decision making in project teams. *International Journal of Managing Projects in Business*, 2 (1): 70 – 93.

Newton, R. 2005. *The Project Manager*. London: Pearson Education.

Nguyen, L. D., Ogunlana, S. O. and Lan, D. T. X. 2004. A study on Project success factors in large construction projects in Vietnam. *Engineering, Construction and Architectural Management*, 11 (6): 404-413.

Ojiako, U., Johansen, E. and Greenwood, D. 2008. A qualitative re-construction pf project measurement criteria. *Industrial Management &Data Systems*, 108 (3): 405-417.

Othman, A. A. E., Hassan, T. M. and Pasquire, C. L. 2004. Drivers for dynamic brief development in construction. *Engineering, Construction and Architectural Management*, 11 (4): 248-258.

Parasuraman, A., Grewal, D. and Krishnan, R. 2007. *Marketing Research*. 2nd ed. Boston: Houghton Mifflin.

Pathirage, C. P., Amaratunga, D. G. and Haigh, R. P. 2007. Tacit knowledge and organisational performance: construction industry perspective. *Journal of Knowledge Management*, 11 (1): 115-126.

Pellissier, R. 2007. *Business Research Made Easy*. Cape Town: Juta & Co.

Phillips, S., Martin, J., Dainty, A. and Price, A. 2008. Analysis of the quality attributes used in establishing best value tenders on the UK social housing sector. *Engineering, Construction and Architectural Management*, 15 (4): 307-320.

Register of Contractors [online]. 2010. Available at:

<http://www.registers.cidb.org.za/reports/contractorlisting.asp> [Accessed 12 May 2010].

Rowlinson, S. and Cheung, Y. K. 2008. Stakeholder management through empowerment: modelling project success. *Construction Management & Economics*, 26 (6): 611-623.

Rui, C., Emerson, M. and Luis, L. 2010. Transformational Leadership and TQM Implementation. *Advances in Management*, 3 (6): 7-18.

Samuelson, W. F. and Marks, S. G. 2006. *Managerial Economics*. 5th ed. New Jersey: John Wiley & Sons.

Saunders, M., Lewis, P. and Thornhill, A. 2007. *Research Methods for Business Students*. 4th ed. Harlow: Pearson Education Limited.

Sekaran, U. and Bougie, R. 2010. *Research Methods for Business*. New York: John Wiley & Son.

Sookhlal, V. 2010. *Interview with Mr Vanil Sookhlal*, Commercial Director, tbc Building & Civils, Durban, 3 May.

Steyn, H. 2004. *Project Management: Principles and practices*. 1st ed. Pretoria: Funda Project Management (Pty) Ltd Publications.

Subashini, R. 2010. Tacit Knowledge-The Ultimate Essence of an Organization. *Advances In Management*, 3 (8): 36-39.

Swan, W. and Khalfan, M. M. A. 2007. Mutual objective setting for partnering projects in the public sector. *Engineering, Construction and Architectural Management*, 14 (2): 119-130.

Teo, M. M. M. and Loosemore, M. 2010. Community-based protest against construction projects: The social determinants of protest movement continuity. *International Journal of Managing Projects in Business*, 3 (2): 216-235.

Toor, S. And Ogunlana, S. O. 2009. Construction professionals' perception of critical success factors for large – scale construction projects. *Construction Innovation*, 9 (2): 149-167.

Wideman, M. 2010. *Behavior Profiles* [online] 2010. Available at:

http://www.maxwideman.com/guests/behavior_profiles/intro.htm [Accessed 04 June 2010].

Yang, J., Shen, Q. and Ho, M. 2009. An overview of previous studies in stakeholder management and its implications for the construction industry. *Journal of Facilities Management*, 7 (2): 159 – 175.

Yang, L. 2007. Exploring the links between technology usage and project outcomes.

Construction Management and Economics, 25 (10): 1041-1051.

Yousefi, S., Hipel, K. W. and Hegazy, T. 2010. Attitude-based strategic negotiation for conflict management in construction projects. *Project Management Journal*, 41 (4): 99-107.

Zhen Yu, Z., Wei Yang, Y. and Jian, Z. 2010. Application of Innovative Critical Chain Method for Project Planning and Control under Resource Constraints and Uncertainty. *Journal of Construction Engineering & Management*, 136 (9): 1056-1060.

Zwelisha, M. 2010. *Interview with Mr Musa Zwelisha*, Director, Zwelisha Contractors and Cleaning Services, Durban, 10 June.

Zwikaël, O. 2009. Critical planning processes in construction projects. *Construction Innovation*, 9 (4): 372 – 387.

APPENDICES

Appendix One: Letter of consent

12 Khan Lane

Unit 4 Fatima Heights

Isipingo Rail

4133

Dear Respondent

I am studying towards my Master of Technology Degree in Business Administration at the Durban University of Technology (DUT). The title of my research project is Critical Success Factors influencing Project Success in the Durban Construction industry. I would appreciate your co-operation in completing this questionnaire.

The completion of the questionnaire should not take longer than 10 minutes of your time. I want to thank you in advance for your time. Please be assured that your identity will remain anonymous and your responses will be kept confidential.

Participation in this research study is voluntary and you may withdraw from the study at any time without providing a reason.

Your participation in this research is greatly appreciated.

Yours faithfully

Thulani Armstrong Msani

Appendix Two: Questionnaire

Section A: Demographics

1. Please indicate your gender by making a cross in the appropriate box.

Male	
Female	

2. Please indicate your age by making a cross in the appropriate box.

20 to 39	
40 to 59	
60 and above	

3. Indicate the number of years involved in the Durban construction industry.

Less than or equal to 5 years	
Between 5 years and 10 years	
10 years or more	

4. In most projects you have worked as:

Project Manager	
Contractor	

5. Most of the projects you have undertaken have been in the:

Public sector	
Private sector	

6. Please classify the type of projects you have mostly undertaken.

General building	
Industrial	
Road	
Other (water drainage, water supply, electrical..)	

7. Most of the projects undertaken were valued:

Up to 200 000	
Up to 650 000	
Up to 2 000 000	
Up to 4 000 000	
Up to 6 500 000	
Up to 13 000 000	
Up to 40 000 000	
Up to 130 000 000 or more	

Section B: Success factors

Please use the rating in the following table to answer all the statements below.

1	NOT SIGNIFICANT
2	SLIGHTLY SIGNIFICANT
3	MODERATELY SIGNIFICANT
4	VERY SIGNIFICANT
5	EXTREMELY SIGNIFICANT

Kindly indicate (cross) the degree of significance of the following factors that you deem necessary for the successful execution of your projects.

Perceptions

Questionnaire						
1	Continuing involvement in projects of all stakeholders	1	2	3	4	5
2	Up-to-date technology utilization	1	2	3	4	5
3	Top management support	1	2	3	4	5
4	Shared project vision	1	2	3	4	5
5	Competent project manager	1	2	3	4	5

6	Proper emphasis on past experience	1	2	3	4	5
7	Commitment to the project	1	2	3	4	5
8	Project plans updated regularly	1	2	3	4	5
9	Availability of resources	1	2	3	4	5
10	Multidisciplinary/competent project team	1	2	3	4	5
11	Clear objectives	1	2	3	4	5
12	Frequent progress meetings	1	2	3	4	5
13	Adequate funding until project completion	1	2	3	4	5
14	Awarding bids to the right project manager/contractor	1	2	3	4	5
15	Political support	1	2	3	4	5
16	Community involvement	1	2	3	4	5
17	Comprehensive contract documentation	1	2	3	4	5
18	Handover procedures	1	2	3	4	5

19. Other factors, please specify:

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Thank you for participating in this research project.