

Project efficiency: effective contract management (New Engineering Contract 3) is a moderator to trust in project success

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ABSTRACT

The effects of failed projects from poor performance, poor quality, and cost and time overruns have a huge impact on both private and public sectors in South Africa. Contracts and contract types are some of the causes of failed projects and the degree of failure often leads to mistrust within the project environment of the country. This study examines the effectiveness of the administration of contracts with a narrow focus on the New Engineering Contract (NEC) family of contracts. The fundamentals of these contracts create a platform for clients, consultants and contractors to interact at procedural level. The study attempts to understand whether the effective administration of the contract, based on selected clauses, moderates trust between parties, which in turn leads to a satisfactory working relationship and project success. Furthermore, an attempt is made to ascertain where the degree of participation in this contract differs from the public to the private sector.

KEYWORDS

Contract administration, project management, trust, customer satisfaction, project success/efficiency

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

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11 November 2019

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1 INTRODUCTION TO THE RESEARCH PROBLEM

The global expansion of economies after the recession is on the increase. Both developed and developing countries seek to gain maximum benefit from the current economic climate. The expansion of economies takes various forms within the relative industries. The Engineering, Procurement and Construction (EPC) and the Engineering, Procurement and Construction Management (EPCM) industries play significant roles in this as they either employ human or other resources on temporary or permanent bases – normally at an exorbitant cost – depending on the size, terms and consideration of the task. These activities often take the form of projects that are generally contracted out to a second party by a client.

This globally competitive project execution and management environment is further complicated by clients looking to extract a greater value proposition from contractors. This includes not only the success of the project in terms of time, cost and quality but also the value to other stakeholders such as the community, environment and businesses within the region. The Project Management Institute (PMI) defines a project as a temporary endeavour that has a defined beginning and end, with a defined scope and resources, and that is unique (Project Management Institute, 2018).

To distinguish between project success and project management success, it is necessary to understand the definition of two terms in this study. A project can be defined as an individual or collaborative effort that combines a series of activities and tasks with the aim of achieving a specific objective. The activities and tasks consume resources. The objective has a definable purpose and has definite start and end dates making this a temporary endeavour. Projects are unique in nature and tend to cross organisational lines and link various disciplines. This defines the project in itself and the success parameters are measured at the end when the project achieves the desired outcomes for the stakeholders.

Project management can be defined as the process of controlling the achievement of the project objectives (Munns & Bjeirmi, 1996). More recent literature has taken a different view though. Serrador and Turner (2015) adopt a more current form of this terminology and use “project efficiency” rather than “project management success”.

Project efficiency relates to the golden triangle (time, cost and objective/goals/quality) and project success means meeting the wider business, strategic and enterprise goals as defined by the stakeholder. Given that project efficiency is the more modernised term for project management success, this term will be used for this study.

The Legal Dictionary defines a contract as an agreement with specific terms between two or more people or entities in which there is a promise to do something in return for a valuable benefit known as consideration (The Free Dictionary, 2018).

Within the project management function, the administration of the contract between the parties plays a key role in determining the outcome and success of the project. The base of the administration is in the form of the type of contract selected and agreed to by the employer and principal contractor. Various contract types are used worldwide but the most recommended forms (Construction Industry Development Board, 2005) are:

- FIDIC (which is the French acronym for the International Federation of Consulting Engineers)
- JBCC Series 2000 (Joint Building Contracts Committee) – only used for building contracts
- GCC 2004 (General Conditions of Contract for Construction Works)
- NEC3 (New Engineering Contract) family of standards

The choice of contract is dependent on the nature of the work to be performed based on the client's requirements and appetite for risk. The employers within the EPC as well as the EPCM industries in South Africa should be very selective in their choice of contract as each has advantages and disadvantages. Although the two terminologies (EPC and EPCM) seem similar, the difference between the two is essentially the Construction, where the contractor executes the construction work in their own capacity, and Construction Management, where the contractor is not involved in the construction work in their own capacity but administers the construction contract.

The NEC3 family of contracts is one of the contract types that are commonly used and gaining a foothold in the South African EPC and EPCM industries in both the public and the private sector and is the focus of this study.

1.1 Fundamentals of the NEC3 Contracts

To understand the selection of the NEC3 family of contracts as the mechanism for the study, it is important to know the basic content of the document. The aim of the NEC3 family of contracts is to create a governing document that is flexible, simple and clear and to provide a good stimulus for management of their contractual obligations. The roles and responsibilities of both the employer (project manager) and the contractor are defined. The main features of the contract are listed in Table 1.

Table 1: Engineering and Construction Contract (Black Book) – Main Features

Aspect	Commentary
Application	Multi-discipline and suitable for any sector or combination of sectors of the engineering and construction industry. Suitable for projects or general procurement, either <ul style="list-style-type: none"> • designed and managed by independent consulting engineers, or • designed by engineers and managed by separate project managers both of whom may or may not be independent of the employer.
Provision for different contracting strategies	Six main contracts to cover the full range of strategies <ul style="list-style-type: none"> A Activity schedule (lump sum) B Bill of quantities (re-measurement) C Target contract with activity schedule D Target contract with bill of quantities E Cost reimbursable contract F Management contract.
“Tender” vs “Contract”	“Tender” and “Contract” separated
Structure	One main document (black book) with common core clauses for all contracts. One set of main option clauses is then selected to create a contract. Further secondary option clauses may then be selected for use in any combination in any of the contracts.
Design by either party	Design by either party in any proportion to the extent stated in the Works Information. Contractor 'Provides the Works' in accordance with the Works Information; hence the obligation as to fitness for purpose or otherwise is based on what the Works Information requires.

Source: Construction Industry Development Board (2005)

The contract is designed in a manner that inspires teamwork and collaboration between parties to resolve issues raised during the project life cycle. This requires commitment and adherence to the administration of the contract. The contract design and administration easily form a platform to build trust and honesty throughout the lifetime of the project, but this is dependent on how effective the administration is and having both parties committed to the success of the project during its life cycle.

1.2 Project Management Body of Knowledge (PMBOK)

Different organisations implement various structures for the management of projects and the administration of the contract. However, in most cases the Project Manager is the key contract administrator with support from the Subject Matter Experts (SMEs) or alternatively is the Contracts Manager for the project. Given the interrelated and overlapping roles, it is important to understand how effective Contract Management links to Project Management. After all, the outcome of the project is to satisfy the various stakeholders and part of the means to ensure the desired outcome is effective contract administration.

The PMBOK is a guide to Project Management (PM) and is used and recognised globally. The guide is an effective tool for Project Managers (PMs) and assists in determining how to use their available resources. Although the book does not place emphasis on any specific areas within the nine Knowledge Areas, there are a few aspects of the book that are pertinent to this study. Figure 1 gives an overview of the nine Knowledge Areas as extracted from the PMBOK.

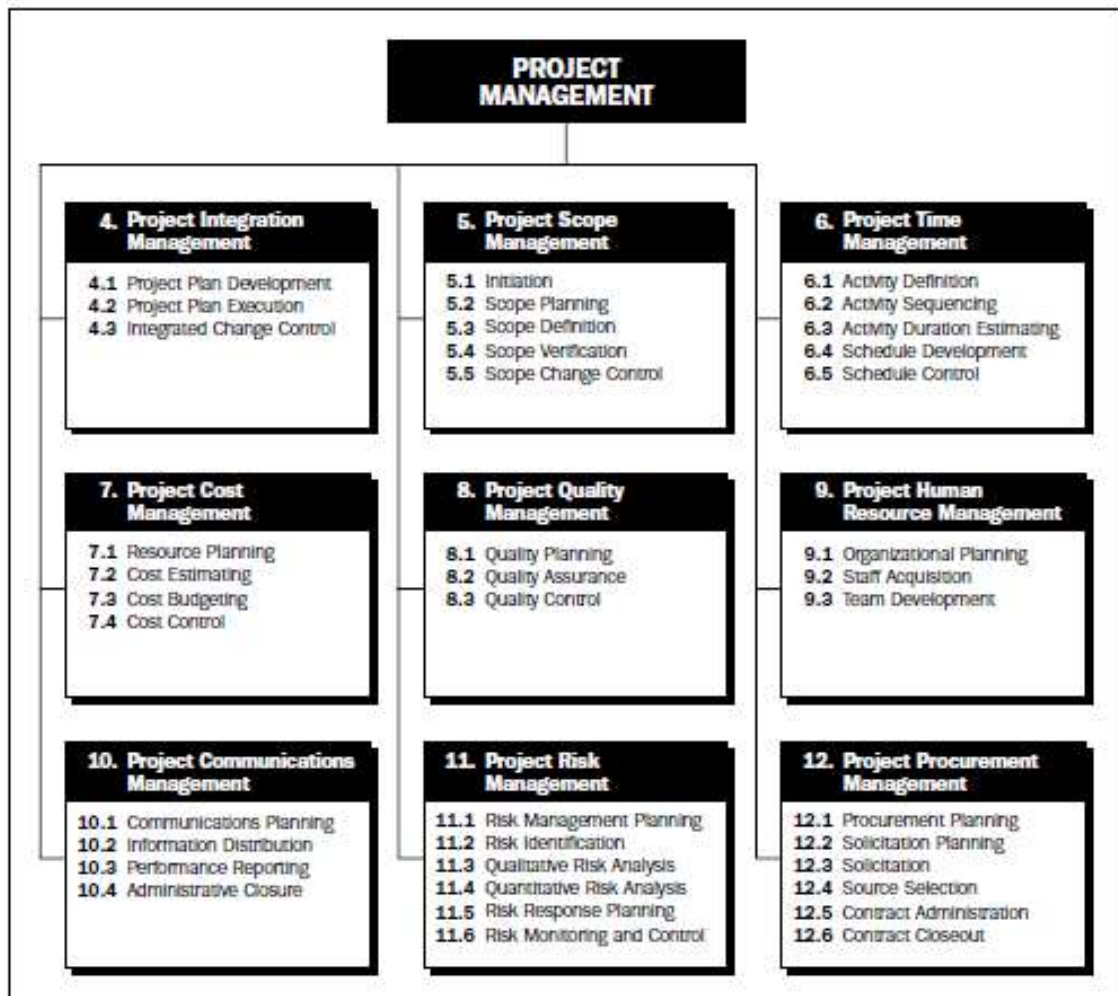


Figure 1: An overview of the project management knowledge areas and project management processes

Source: A Guide to the Project Management Body of Knowledge (PMBOK) (2008)

1.3 Key Project Stakeholders

Project stakeholders include the Project Manager who is responsible for managing the project. The customer/client is an individual, organisation or end user who will make use of the product. The performing organisation is the company whose employees are tasked with doing the work. The project team members are the group of people from various disciplines who perform the work. The sponsor is either an individual or a group, internal or external to the performing organisation, that provides the financial resources for the project (A guide to the project management body of knowledge (PMBOK), 2008). It is important to note that not all projects have sponsors. Figure 2 shows a diagrammatic representation of the relationship between stakeholders and the project and additional stakeholders.

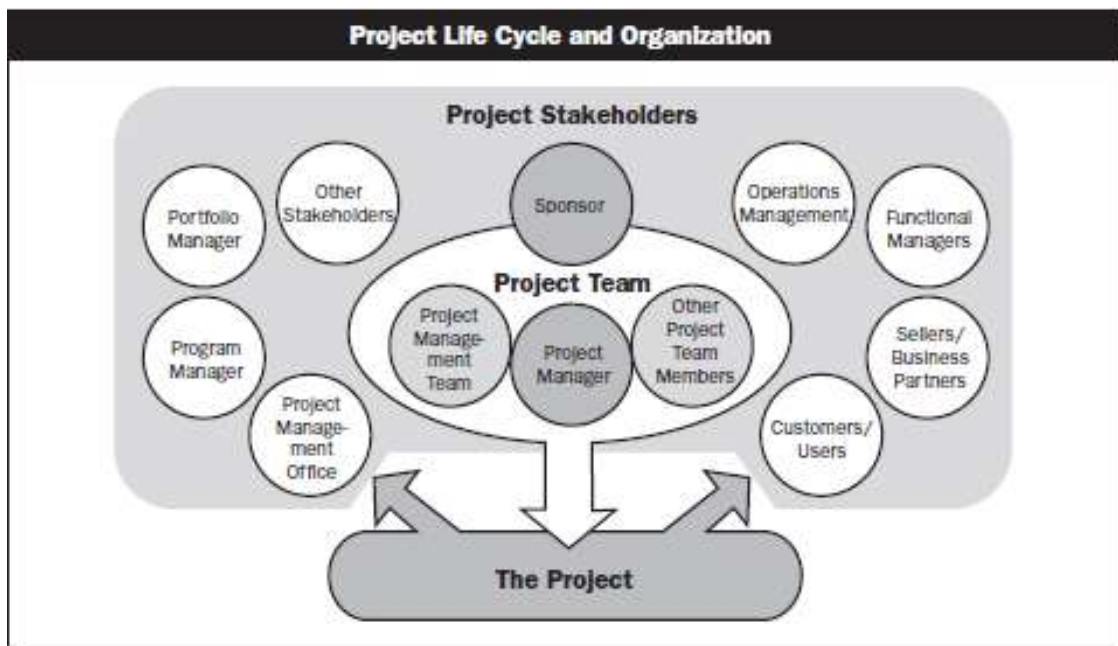


Figure 2: The relationship between stakeholders and the project

Source: A Guide to the Project Management Body of Knowledge (PMBOK) (2008)

1.4 Contract Administration

Section 12.5 of the PMBOK discusses contract administration. This section highlights that the administration of the contract, which could be in the form of a contract, an agreement, a subcontract, a purchase order or a memorandum of understanding (as described in section 12.4.3.1 of the PMBOK), is the method of ensuring that the seller meets the contractual requirements (A guide to the project management body of knowledge (PMBOK), 2008). The administration includes the application of the project management processes defined within the project and the contractual relationship. These include but are not limited to the project plan execution (section 4.2), performance reporting (section 10.3), quality control (section 8.3) and change control (section 4.3).

The success of projects is measured using various critical success factors. In general, the most basic and consistent measures of time, cost and quality – the iron triangle – have been added to by an array of scholars and institutes over the years. The construction industry, in any economy, is vital to economic growth, wealth and job creation in developing countries. As a result, the success of construction projects is of vital importance to most government users and communities (Emsley &

Alzahrani, 2013). In modern construction projects significant challenges present themselves to both the employer and the contractor to ensure the delivery of projects successfully. These projects are initiated by an employer and accepted by a contractor unless the employer does the project in-house.

The mechanism used to control, to ensure the expectations of both parties are met and to guarantee delivery on time is in the form of a contract between both parties. Contract Management within Project Management is key to both parties as comprehension, utilisation and participating roles for both employer and contractor are stipulated within the contract.

Administration of the contract is required by both the employer and contractor. However, it seems that the contractor bears most of the responsibility regarding management, implementation and administration of the contract. Nevertheless, given the level of interaction that contract administration provides between client and contractor, this can be used in a positive manner to build relationships and develop trust.

Relationships and trust, whether within organisations or inter-organisational, play a key role in project management success. Project Management Methodologies (PMM's) provide the "hard skills" for project success. Recently emphasis has been placed on the "soft skills" such as relationships and trust to facilitate an optimum result for all parties. For this to occur, a common platform is needed to initiate this type of collaboration to develop a mutual trust between parties, which in turn results in a good working relationship, and subsequently elevates the chances of project success and optimum results for both parties.

The purpose of this study is to measure if effective contract administration acts as a moderator to create trusted relationships in relation to project management success, with a special focus on the NEC contract. The NEC3 contract forms a base for the agreement between the parties with the option of adding and removing clauses, depending on the nature of the work being performed, the supply of materials, compensation events, early warnings for delays, penalties and the procedural means to communicate between the parties. For both parties to be in a win-win situation

post the project, effective contribution within the contract terms and conditions is of utmost importance and can greatly contribute to project management success.

Many organisations award projects on the NEC3 contract but fail to administer the contract correctly. Instead, informal methods of communication or administration are used which result in disagreements later and eventually the dispute resolution process. The significance of the research is to highlight the use of effective contract administration as an instrument to develop trusted relationships which lead to optimum results, mutual gain and ultimately project success.

2 LITERATURE REVIEW

2.1 Project Management Success (Project Efficiency) and Project Success

Projects end when the final deliverable has been met and accepted by the client, at which point, the *project management* aspect comes to an end. This should not be confused with *project success*.

The management and execution of a project (project efficiency) could be a success in terms of budget, scope and cost. However, the project is deemed a success if the stakeholders have been satisfied, the project generates the required return in investment and achieves the strategic goals that were set out and were the reason for the implementation and execution of the project (Serrador & Turner, 2015; Rolstadås, Tommelein, Schiefloe, & Ballard, 2014).

This is further emphasised by Patanakul and Shenhar (2011) who reviewed strategic project management as a growing trend. It is extremely important that the difference between the two concepts is well understood as project success is ultimately determined by the stakeholders and the primary sponsor.

The focus of this study relates to the project management implementation aspect, sometimes referred to as project efficiency. This is not the ultimate measure of project success but is a critical aspect to all organisations. Serrador and Turner (2015) in their study presented evidence of a moderately strong correlation between project efficiency or project management success and overall project success (correlation of 0.6 and R^2 of 0.36). However, they recommended further research into moderators or contingency factors that relate efficiency to project success.

According to Müller and Jugdev (2012) and Williams (2015), how success was perceived and its associated rank of success dimensions, also differed by individual personality, nationality, project type and contract type. As project success is multi-dimensional, it is impacted and influenced by competence and the ability to work as a team.

As projects differ in size, duration, uniqueness, complexity, cost, location and various other criteria, determining the success of the project becomes increasingly difficult

and varies from project to project (Bond-Barnard, Fletcher, & Steyn, 2018; Gudiené, Banaitis, Banaitiené, & Lopes, 2013; Rolstadås et al., 2014). There is a continuous effort and need to identify factors that improve project success as Mir and Pinnington (2014) stated. Although Project Management (PM) processes, systems and tools have evolved and improved significantly, there has been little impact on project success as the perception of project success varies from client to client.

The 'Project Management Performance Assessment' (PMPA) model (Bryde, 2003) used by Mir and Pinnington (2014) focused on five enablers for high PM performance. These were PM Leadership, PM Staff, PM Policy and Strategy, PM Partnerships and Resources and Project Lifecycle Management Processes. The measurement of these five enablers was captured in the final area which was the PM Key Performance Indicators (KPIs), where the actual performance was measured. Of interest in this case was the PM partnerships and resources where the emphasis was placed on the importance and the role of win-win partnerships between stakeholders and the effectiveness of these partnerships on the project management strategy

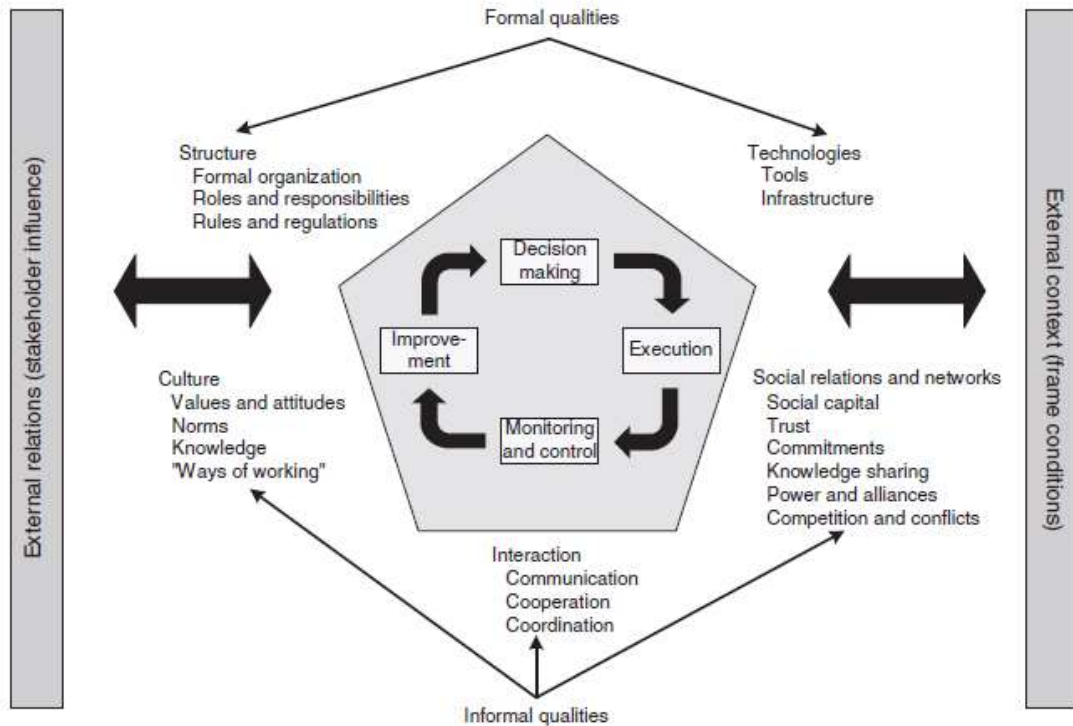
This enabler placed a different view on the win-win scenario between client and contractor within the stakeholder parameters. It suggested that a collaborative effort between a client and a contractor was one of the fundamental aspects to achieving project success. Although the correlation for PM Policy and PM Partnerships was not as high as the other four (between 0.4 and 0.5), they still had a statistical significance ($p < 0.01$). This study focused on organisations in the United Arab Emirates (UAE) and correlated PM performance to project success. By realising the impact of this and paying attention to it, greater project success could be achieved.

A notable finding from this study was the low impact of project efficiency on PM success. This could be attributed to the fact that PM success encompasses project efficiency and although measured as a separate variable, it has limited influence on the value of the project in not achieving project efficiency. Although in the overall view, the degree of success which encompasses business success and the satisfaction of the customer, it does.

This is in line with the differentiation of project success and project management as indicated by Serrador and Turner (2015). The project management approach used is also influential to the success of the project as determined by Rolstadås et al. (2014). The view presented defines that there were two different approaches to project management. A prescriptive approach which focused on the formal aspects of the project organisation and included governance and procedures and an adaptive approach which focused on the processes of improving culture, team commitment and the project organisation.

In their view, the meaning of success was ambiguous, since several objectives could be defined as success criteria such as project objectives, business objectives and social and environmental objectives. Using their version of the Pentagon model, Figure 3, they stated that the five aspects of the model can be used to analyse the factors that influenced the performance of the project organisation. In addition, they took cognisance of the external factors that affected these organisations.

Similarly, Gudiené et al. (2013) looked at a conceptual critical success factors (CSF) model for construction projects in Lithuania. These seven CSFs were external, institutional, project-related, project management/team members, project manager, client and contractor-related factors. These CSFs, when broken down into their various attributes, had striking similarities to the Rolstadås et al. (2014) Pentagon model. Although the focus of this research was only on certain aspects of the studies of both Gudiené et al. (2013) and Rolstadås et al. (2014), the relevance of the remainder of their factors should not be ignored.



Source: Based on Schiefloe (2011)

Figure 3: Adapted Pentagon model

Source: Rolstadås, Tommelein, Schiefloe, and Ballard (2014)

The success or failure of construction projects has been a topic for decades. Past research undertaken in this area was loosely divided into two streams. The first stream related to attributes and factors that were the root cause of project delays, hence causing projects to fail or be delayed. The second stream related to delay analysis.

The first stream has more relevance to this study as delays cause cost and time overruns which reflect essentially on project efficiency (Doloi, Sawhney, Iyer, & Rentala, 2012). They reported various statistics related to project efficiency such as the information that was obtained from the Ministry of Statistics Programme Implementation relating to infrastructure projects in India. Of the 951 projects at the time, 309 projects had cost overruns and 474 projects were behind schedule which resulted in a dramatic increase in costs. Various reasons for these problems were cited such as land acquisition, poor planning and budgeting and poor monitoring and coordination of projects. Furthermore, in India, failures in projects were attributed to

conflict among the project partners, non-existence of cooperation, ignorance and lack of knowledge.

In the review done by Mansfield, Ugwu, & Doran (1994), the most important items that caused delays in construction projects in Nigeria were the financing and payment of work completed, material shortages, changes in site conditions and poor management of the contracts. In the same vein, the factor analysis of Doloï et al. (2012) revealed seven factors that contributed to delays and showed the variance that each factor had. These were lack of commitment (11.61%); inefficient site management (10.97%); poor site coordination (10.90%); improper planning (10.84%); lack of clarity in project scope (10.57%); lack of communication (8.66%); and sub-standard contract (7.09%).

Of the 45 attributes listed in this study one could surmise that improper communication between parties and poor management was evident in almost all these factors. Although the seventh factor (sub-standard contract) was split into two categories – the contract and the administration thereof, both were critical to project efficiency. If the contract was not administered correctly, it led to misinterpretation, conflict and eventually arbitration and litigation.

Notably, Doloï et al. (2012) and Abd El-Razek, Bassioni, and Moborak (2008) also mentioned that the different parties involved in the contract did not always agree on the various factors that caused the delays and tended to blame each other.

Another interesting aspect in the research by Abd El-Razek et al. (2008), was that the owner/client ranked the “non-utilisation” of professional contractual management stemming from the contractor as the second-highest cause of delays. In addition, after the analysis of the delays, they concluded that a joint effort by both the contractor and the owner/client was a necessity to mitigate or avoid delays. Although this was a well-grounded conclusion, the study did not go into the contractual administration aspect of projects and how this could be utilised to ensure a better degree of project success. Doloï et al. (2012) also concluded that one of the major factors contributing to delays within Indian construction projects, was the slow response to decision making by the owner/client which had a significant impact.

Characteristics such as poor site management and supervision (Doloi et al., 2012; Abd El-Razek et al., 2008), low speed of decision making (Abd El-Razek et al., 2008) and employer-initiated variations have reportedly been identified as some of the most significant causes of cost overruns in the construction phase of projects (Doloi, 2013). In a similar study to the one conducted by Doloi et al. (2012) pertaining to cost overruns and failures in project management (Doloi, 2013), 36 attributes were distilled into eight key factors. These factors explained the variance in cost overruns in projects as follows: accurate project planning (23.9%); design efficiency (15.4%); effective site management (10.8%); communication – between all parties (9.2%); contractors efficiency (7.6%); project characteristics (7.3%); due diligence (6.9%); and market competition (4.3%).

As highlighted in the study, transparency and clarity enabled seamless and effective integration of all the roles being performed within the project. A lack thereof could easily hinder the progress and implementation of the project. Appropriate protocols for communication remained the responsibility of the parties involved, and the client had a key role to play. In addition, part of the conclusion hazarded that communication and a personal relationship between all parties could greatly reduce paperwork, reduce time and could have a positive impact on project success. The active participation and importance of the role of the client, being the key stakeholder, has also been reported in past research (Munns & Bjeirmi, 1996).

Furthermore, Doloi (2013), stated that contractors were burdened with stringent contractual terms and were more and more responsible for their own profits as the management and execution of projects was mostly within their control. However, it was the responsibility of the employer/client to facilitate effective contract management even though this was primarily associated with the responsibilities of the contractor and consultants for managing cost overruns. This arms-length approach was fast becoming one of the primary causes of project failures.

Shanmugapriya and Subramanian (2013) made a few recommendations as part of their conclusions where they advised owners/clients to have competent PMs, to be directly involved in disputes between contractors and consultants and to attempt to improve communication and coordination between the contractor and the funding agency, if applicable. In the absence of a funding institution, the client would

ultimately be the source of funding and improvement in the coordination and communication needed to be done on a formal basis to resolve financial issues.

On the other hand, Emsley and Alzahrami (2013) concluded that construction projects and their success were closely related to contractors. This is partially true in this researcher's opinion as the contractor relies heavily on the employer to achieve success on some projects.

The effects of cost overruns were studied by Mukuka, Aigbavboa, and Thwala (2015) and they highlighted the consequences to both client and contractor in the case of Gauteng Province, South Africa. Some factors mentioned such as cost overruns, loss of profit, and poor quality of work agreed with Doloji et al. (2012). However, additional effects, such as loss of reputation, bankruptcy, termination of the contract, arbitration, litigation, loss of employees and abandonment of the project, were mentioned as well (Mukuka, Aigbavboa, & Thwala, 2015; Gunduz, Nielsen, & Ozdemir, 2013). This researcher's opinion of some of these effects is that these can be coupled with the economic and political situation of the province and country at the time.

The findings by Doloji (2013) were echoed by Famiyeh, Amoatey, Adaku, and Agbenhovi (2017). Doloji (2013) used relative important weighting (RIW) and found that of the 48 attributes, delay in work approval ranked 14/48 (RIW = 2.266), lack of communication ranked 16/48 (RIW = 2.236), poor contract management ranked 21/48 (RIW = 2.114) and low speed of decision making ranked 28/48 (RIW = 2.027). The results calculated by Famiyeh, Amoatey, Adaku, & Agbenohevi (2017) on the relative important index (RII) indicated the following: client-related factors were the highest, aggregated at 0.69; consultant-related delay factors at 0.62; contractor-related factors at 0.64; government-related factors at 0.53; material-related factors at 0.62; contractual-related factors at 0.50; and external factors at 0.46. Their study highlighted poor communication as one of the delay factors for client, contractor and consultant. Of interest in their study was the assertion that one of the delay factors by the consultant was poor contract management which did not feature highly in the overall RII. This was ranked fourth out of 14 factors on the consultant-related delays, with an RII of 0.79. However, under contractual-related issues, major disputes and

negotiations (RII – 0.65), poor communication plan (RII – 0.62) and inappropriate type of contract (RII – 0.47) were the top three of the five factors.

From the client perspective, the CSFs of any project were mostly determined by the contractor. On the other hand, one of the nine clusters that Emsley and Alzahrami (2013) mentioned was management and technology. Management in the context of this study relates to contract management/administration.

The key elements stated by the various authors pertain to communication, honesty, transparency and the use of the contract in a manner that benefits both parties. Using the correct protocols within the contract administration guidelines creates the platform to mitigate or eliminate potential risks to the project and enhances elements such as communication and transparency. These elements are integral to aspects such as trust, relationship management and satisfaction of the works performed for all parties which include internal and external stakeholders in the project environment.

2.2 Trust in Projects

To define trust, the researcher looked at recent literature and a study conducted by Bond-Barnard, Fletcher, and Steyn (2018), wherein it was stated that trust was a function of expectations and predictability or the certainty in the competencies of others. In the study, the authors mentioned various aspects that trust enabled in the project environment but focused on a few factors that influenced trust. One of these was the knowledge factor, which dealt with the management and sharing of data and information between teams and stakeholders. For this to have occurred, there must have been some form of trust. To promote this, the project manager needed to ensure and had to encourage this kind of sharing across the teams by either importing the trust or at project inception making proper introductions and explaining the roles and responsibilities.

The import trust factor was based on “swift trust”, which was based on the context whereby the constituents of a global virtual team imported trust from similar or familiar settings. This factor will not be explored in this study as its relevance is more at project inception and this kind of trust is not developed over time on a relational

basis. However, initial trust was still very relevant as this would have taken place when the parties first met (Jiang & Lu, 2017).

The expectation factor related to the anticipation of future association (Bond-Barnard et al., 2018). This aspect was important as broken promises or renegeing on commitments could affect the trust relationship. The risk factor referred to unforeseen events or conditions that occurred and could have had either a positive or negative effect – in most cases negative – on the project and its deliverables. The relationship between risk and trust was said to be reciprocal in nature. Without risk, there could not be trust and the degree of risk involved ascertained the level of trust. Contrary to this aspect in their literature, their findings indicated that when risk was removed, it was inconsequential in ascertaining the degree of trust in projects. They highlighted an alternative view on the generally accepted norm that trust and risk were reciprocal; the assertion is made that a degree of risk is responsible for an increase in the level of trust.

The framework for trust in construction contracting proposed by Wong, Cheung, Yiu, and Yan (2008) and Cheung, Yiu, and Lam (2013) took a number of attributes that were grouped into three categories into consideration. System-based trust placed focus on procedural and formal arrangements and included organisational policy, communication systems and contractor agreements. Cognition-based trust was trust that had developed from the confidence built on knowledge and included communication. Affect-based trust was built on a sentimental platform and included being thoughtful and making an emotional investment.

Notably, in their discussion of their results, cognition-based trust had the highest coefficient path, followed by system-based trust and affect-based trust with the least. Nonetheless, they concluded that the three trust categories were mutually dependent and that project managers needed to develop and encourage robust systems to ensure this as a system is only as strong as its weakest link.

Cheung et al. (2013) analysed trust, communication and project performance in their study. They concluded that trust and communication were the important factors that contributed to the goal of project success and asserted that trust affected communication and consequently influenced project performance. A similar study

conducted by Pinto, Slevin, and English (2009) yielded results that could be compared to the framework used by Wong et al. (2008). Although the classification of the trust categories was different, there was a similar thread between the studies.

Pinto et al. (2009) used a model that consisted of three forms of trust (Hartman, 2002). Integrity trust alluded to the level of integrity that a contractor had in contracting, sharing information and the elimination of defensive behaviours. Competence trust related to whether the contractor could perform the task and could give assurance that the services would be provided and completed correctly. Intuitive trust was less concrete than the other two and was referred to as “gut feeling”. This construct did not load effectively for their analysis. In their discussion they highlighted that, for owners, integrity and competence trust were critical determinants in relationship building and had a positive influence on project successes. From the contractor’s perspective, integrity trust was valued as the means to satisfactory working relationships. Pinto et al. (2009) concluded that trust was one of the most significant factors of project success from a human factor perspective.

One of the characteristics of a project is that it is time-based; it is not a continuous cycle of work, and durations vary. The progressive-based model proposed by Lewicki and Bunker (1996) had the underlying assumption that the parties knew each other and could move from one form of trust to the next. Typically, parties would have started with deterrence-based trust where the parties were expected to honour agreements to avoid sanctions or penalties. The next step would have been knowledge-based trust where parties knew one another to an extent, and they could predict their behaviour towards one another. Lastly, identification-based trust was where the relationship had developed to an extent that parties could act on behalf of one another. This type of trust is typically built on long-duration contracts or multiple projects over a period between the same parties.

Given that various types of trust exist and that they occur at different stages of the relationship, the question is how and when does trust get initiated. Wong, Cheung, and Ho (2005) described this as the “prisoner’s dilemma”. Both partners expected some gain or outcome in the relationship, however, the outcome would depend on the reaction of the other party. If partner A either trusted or distrusted partner B, then partner B could either honour or abuse the trust given. Furthermore, they described

the moves that partners made as either competitive or cooperative. Being competitive alluded to the partner being focused on their own interest and being cooperative alluded to reciprocal moves and this expectant reaction was built on trust.

As trust has been proven to be a critical success factor, initiating trust has become a key aspect. The four ways suggested to create trust are writing an explicit contract, depending on rewards and punishment, repetitive interaction and emphasising honesty in the relationship. These strategies have merit, but the question remains: who should initiate the trust cycle? Using principal component factor analysis (PCFA), they analysed and identified 14 factors that affected trust. Seven of these factors related to “permeability” which reflected the partners’ openness in the sharing of information and the rest related to “performance” which related to the partners’ ability to solve problems and their competence. Once these factors were identified, their investigation suggested that the contractor should be the driver or initiator of trust and there would be a good chance that this trust would be reciprocated by the client.

Manu, Ankrah, and Chinyio (2015) conducted research on trust influencing factors in main contractor and subcontractor relationships during projects. Although the study did not focus on the main contractor and the client, parallels can be drawn from this study as it remains a dyadic relationship within the context of projects. Of the four projects mentioned in their research, it is interesting to note that two of these – Project Alpha and Project Beta – were initiated based on NEC3 contracts. Their research uncovered six influential factors: change management, economic climate, perception of future work, project-specific circumstances, job performance and payment practices.

Furthermore, aspects such as the ability to resolve problems and being honest when a problem arose were highlighted in the job performance factor by the main contractor. These aspects are literally part of the NEC3 processes and the guidelines within the clauses provide the means for both parties to cooperate to resolve risks. In their conclusion they revealed that formal control procedures can provide a platform for both parties to demonstrate trustworthiness and strengthen relationships.

Similarly, Akintan and Roy (2013) studied improving collaboration between main contractors and subcontractors with respect to traditional construction procurement. The factors that hindered collaboration were similar to those of Manu et al. (2015). These were lack of trust, delayed payments, the authoritative attitude of the main contractor/employer (Rindt & Mouzas, 2015), the selection of contractors/subcontractors, the nature and conditions of the contract, the subordinate position of the subcontractor and the perceived managerial ability of subcontractors/contractors. They further suggested that the contract of engagement could be a hindering factor as well.

The standard forms of contracts of the Joint Contracts Tribunal (JCT) and the Institution of Civil Engineers (ICE) were well known for being adversarial rather than collaborative, whereas the NEC contracts were more collaborative and could swing power amongst stakeholders. Their research found that most of the problems that were identified stemmed from the type of contract employed in traditional construction procurement. This aspect would impact heavily on contract administration and its processes with respect to the contract being the mechanism to create trust in projects.

The PMBOK is known to encompass the best practices and procedural methods in the project management field. These consist of two aspects: the technical and the human aspects. The technical aspect is self-explanatory and PMMs provided adequate guidelines in this regard. The human aspect was not always reflected in the literature. Brewer and Strahorn (2012) investigated the degree to which dimensions of trust were incorporated in the description of the project manager's role that was outlined in the PMBOK. They found that although the latest edition of the PMBOK (the fourth edition) referred to trust, this was dealt with in general terms instead of by explicit facilitators with respect to conduct within the project. Given the temporary nature of projects, trust becomes an important contributor to project success.

Developing trust within projects can be a daunting task given the time restrictions and the level of trust can impact future relationships within projects. Meng (2011) also concluded that relationship management within the project's environment was

a new focus for project management in today's practice. This shift in focus was in line with a more collaborative way of working in the industry instead of the more traditional methods. The main reason for the shift was the impact that effective relationship management had on project success.

A global survey of the Engineering and Construction industry with a focus on the project owner conducted by KPMG revealed some critical facts. Over half of the respondents indicated that they had one or more projects not perform well in the previous year. The response of larger projects was up to 61%, while the public sector, energy and natural resources figures were at 90% and 71% respectively Armstrong (2018). Figure 4 shows a graphical summary of the survey results.

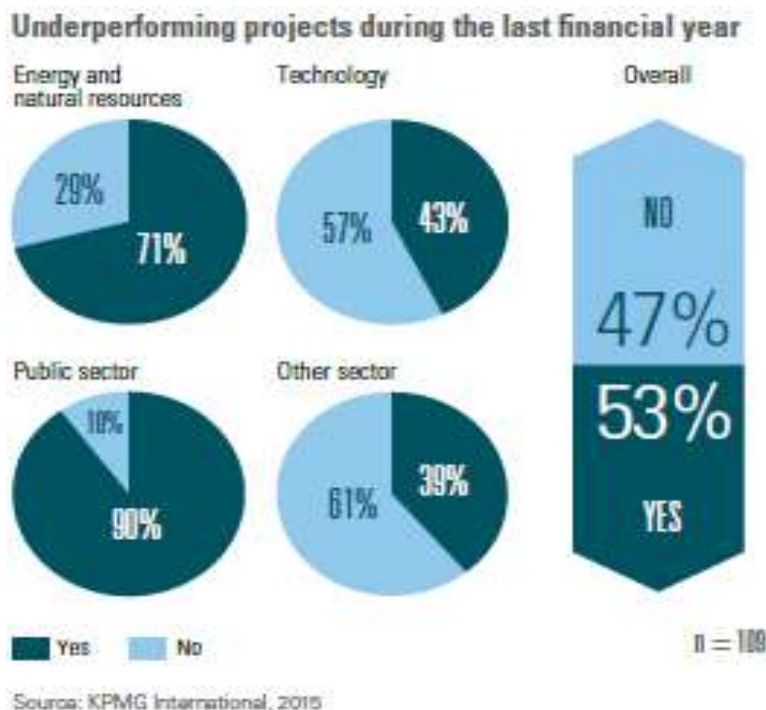


Figure 4: Underperforming projects during 2014 in various sectors

Source: Armstrong (2018)

These results stem from various failures regardless of significant investments that companies made in project controls and the level of assurance that owners had in these controls. Poor contractor performance had been raised as the single biggest contributor to the underperformance of projects, where 69% of the respondents ticked the box. This indication reflected the level of trust that owners have in their respective contractors. To improve this, owners indicated that better collaboration

between owners and contractors was required as a successful project depended on strong teamwork. In total, 82% of the respondents in the survey expected greater collaboration between owner and contractor within the next five years. Although the indication from the owners is that a greater amount of teamwork and collaboration is required between themselves and the contractors, they do not indicate how this could be initiated and how this could be achieved.

2.3 Relationship Management and Satisfaction in Projects

Relationship Management (RM) has taken on many forms over the years and is not a new concept. In Private Public Projects (PPP), this relationship becomes more complicated given that the government is involved. Zou, Kumaraswamy, Chung, and Wong (2014) mentioned three vital and fruitful ingredients for effective RM in PPP. These were commitment and participation of senior management, defining the objectives of the RM strategy and the integration of the divisions of the organisation.

Commitment and participation were the key ingredients that related to the management and communication of the PPP projects. As both the private and public sector became more dependent on each other, interacted more and were becoming more interrelated, some degree of control was lost upwards and downwards. The base for RM was the contractual agreement between the relevant parties. Although this could not be forced, the contract formed a platform for the development of proper RM provided that the commitment from all levels, especially senior management, was present. The contract had to be open and transparent to facilitate open and clear communication that supported the RM aspect. However, to create relationships to manage in the first place, there must be a base of trust and satisfaction in any working relationship.

To define relationship indicators, the study conducted by Meng (2011) regarding RM in the supply chain for construction projects was considered. The key indicators were presented in ten areas: mutual objectives, gain and pain sharing, trust, no-blame culture, joint working, communication, problem-solving, risk allocation, performance measurement and continuous improvement. The emphasis on RM was generally in line with the evolution from traditional to modernised methods of collaboration. The reason for this was the major influence of effective RM on project performance.

Yet, there were challenges in managing the relationship factor as mentioned by Bond-Barnard et al. (2018). These presented themselves in the reduction for demand in projects which increased the difficulty to form trust and commitment in project teams. Often a single project was utilised as a base for trust which was not a good measure as trust required time to develop. The uniqueness and complexity of projects also played a significant role as most projects were a once-off occurrence and repeating these endeavours was highly unlikely.

In addition, McCord and Gunderson (2014) in their study pertaining to factors that affected the relationship between general and subcontractors, touched on a key issue which was the role of the project manager. The top two categories that affected the relationship were bid shopping (using the lowest quote obtained to obtain better prices from other subcontractors) and the PM relationship factor which was divided further into two subcategories: fairness and capability. Their respondents rated the fairness factor more often than the capability factor. Their finding regarding this category was that it was the project manager's responsibility to promote teamwork and to create an environment that was conducive to cooperation. They asserted that the people management and administrative skills of the project manager had a direct effect on project success (Ahmed, Azmi, Masood, Tahir, & Ahmad, 2013; Rezvani, et al., 2016; McCord & Gunderson, 2014).

Relationships are vital in projects as they provide a base for collaboration between parties. Prior ties affected trust development. This meant that a team that had previously worked together were quicker to establish integrative work practices and create a common philosophy. Furthermore, key individuals were familiar with one another's preferences which enabled clear roles and expectations and influenced open communication early in the project (Buvik & Rolfsen, 2015). The study of Buvik and Rolfsen (2015) focused on the project team within the organisation as well as the client and subcontractors. This may not be a practical approach to most projects, however, the benefits of having key people with prior ties manage and execute a project could deliver evidence of swift trust, which is based on the presumed knowledge of the competence of others.

For RM to exist in principle there needs to be some form of collaborative effort among parties, which in turn leads to a trust-based relationship. Collaboration occurred in

various forms such as inter-personal, inter-organisational, intra- organisational or between an organisation and its client (Bond-Barnard et al., 2018). The degree of collaboration or cooperation was defined as the repetitive process where people and organisations work towards a common goal or objective by sharing knowledge, making trade-offs and obtaining consensus and clarification on relevant issues. Teams that had developed a trust base were better equipped to exploit this aspect.

In the findings of Bond et al. (2018), the coordination and relationships had the highest and second-highest correlation respectively with collaboration and emphasised the importance of teamwork and team member relationships. Lau and Rowlinson (2011) commented that bilateral relationship improvement required better communication. For trust to be developed, daily contact was required as well as faith in senior management and the client. However, a tripartite relationship was more difficult and required that trust be cultivated and even more so in a multi-party relationship such as teamwork.

With the same view, Ling, Ong, Ke, ShouQuing, and Zou (2014) looked at the relationship contracting (RC) aspect in public projects. The types of RC included: partnering on a project at strategic level, joint ventures, PPP and project and strategic alliances. Their comparison of this aspect between Beijing and Sydney brought a different view as the factors that drove RC in Beijing and Sydney were the same but the barriers (six in Beijing and one in Sydney) were different. This was explained by cultural differences and public perception as one of the barriers related to the public perception of corruption in Sydney. They did concede that open economies with low corruption were better suited to RC. They also stated that RC was more efficient and effective than legal compliance.

Mouzas and Blois (2013) stated that the grounds for RC were dubious since contract theory makes no provision for the relationship paradigm and is destined to remain out of touch with reality. However, RC had limitations and the most important limitation was that RC was not recognised as a legal category in common law countries. The researcher's view is that RC has a role within the legal compliance aspect of contract management and should be an additional management tool to achieve project success. This opinion supports the view of Mouzas and Blois (2013)

where they state that RC and formal contracts are not substitutes but function as complements.

Customer satisfaction in working relationships has been one of the key factors in determining project success and plays an important role in developing trust between stakeholders. Project success could not be limited to the traditional ‘iron triangle’ criteria: time, cost and quality (Rashvand & Abd Majid, 2014). Undoubtedly, customer and client satisfaction formed an integral part of performance management, which in turn, gauged the overall performance of either party on projects. Their analysis of past literature regarding this topic was the base of the results that the authors produced in their study as can be seen in Figure 5. This generalist approach to customer satisfaction criteria (Rashvand & Abd Majid, 2014), highlighted the weight that each party had assigned to one of the seven factors that had been identified.

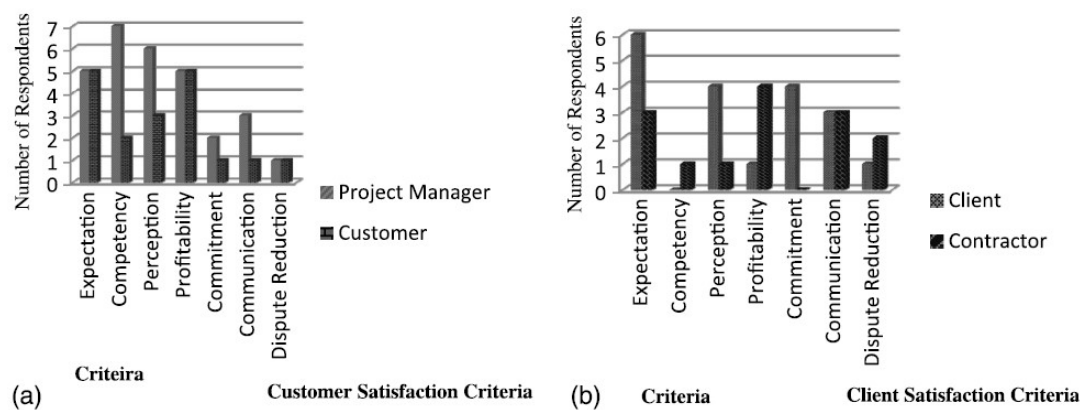


Figure 5: Respondents' perspectives on (a) customer satisfaction criteria; (b) client satisfaction criteria

Source: Rashvand and Abd Majid (2014)

As the bar charts indicated, all groups (project manager and customer; and client and contractor) have different views on customer satisfaction criteria and client satisfaction criteria. Trust and relationships played a pivotal role in managing expectations, demonstrating competence, creating and maintaining the correct perception, showing commitment and communication. These five criteria had an influence on the remaining two and could increase or maintain profitability and reduce the dispute resolution aspect, which is a corrosive element within project and contract management and contract administration.

2.4 Contract Management and Administration

Contract management and contract administration have been used interchangeably in the past. There are however technical differences between the two. Contract administration refers to the compilation, planning and implementation of a contract. The contract management aspect deals with the completed contract that has taken effect (Naughter, 2017). These phases in the contract are essential to project success as an incorrect administration process will lead to problematic contract management on the end user's side.

Given the iterative process of contract administration and management (Minnaar, Vosselman, Van Veen-Dirks, & Zahir-ul-Hassan, 2017), the view that these phases, although technically separated, were generally compiled and executed by the same individuals in a company – depending on the size of the company and project – could be taken. For this reason, this study focused on the contract management phase as the end user ultimately affects changes in the administration of a contract when contractual problems arise.

Historically, the traditional form of contracting in the construction industry has been perceived as inadequately suited for the promotion of a trusting and transparent working relationship (Chan, Chan, Lam, & Wong, 2011). Formal contracts are legally binding and by signing a contract the signatories have agreed to terms and conditions and duties and responsibilities to each other. These legally accountable promises, in the form of a contract, have enabled firms to protect themselves, to guard against opportunistic behaviour and to direct the firm's energy to achieve the required outcome on the project for both parties (Shou, Zheng, & Zhu, 2016).

Past research done in this area was primarily within the procurement and marketing space, although in more recent years focus has been placed on project management and the construction industry as well. The information, however, is still relevant and can be applied to the construction industry as the procurement aspect is directly related to project and construction management.

Various types of contracts exist in the construction industry. The main types have been mentioned previously. Dealing with contract management or administration

problems results in a heavy financial burden which is often not foreseen. Davison and Sebastian (2009) reviewed seven contract types and published results of these contract types rating them from the most problematic, with respect to administration, to the least. The following seven contract types were used in their study: commodities and small purchases, capital outlay, professional services, contracted services, software, construction, and leases.

Notably, their results indicated that of the seven contract types construction, contracted services and professional services were ranked top three respectively due to various reasons such as delays, cost, change order, poor performance, definition of acceptance, conflict, other sources, subcontractors, risk of failure and wrong product. It came as no surprise that construction contract administration problems headed up the list and were closely followed by typical contracts that were frequently used in construction, namely contracted services and professional services.

Suprpto, Bakker, and Hertogh (2016) studied how contract types and incentives affect project performance. They concluded that there was no statistical significance between partnering/alliance contracts and lump sum or cost reimbursable contracts apart from relational attitudes and teamwork quality.

Chan et al. (2011) reviewed the motives and benefits of guaranteed maximum pricing (GMP) and target cost contracts (TCC) and concluded that both contract types were used to better manage contractors with respect to cost savings and being more efficient. Furthermore, they stated that the gain/share mechanism in these contracts was conducive to developing combined objectives and creating a trustful working relationship to achieve improved overall project performance.

When identifying possible root causes of contract administration problems to create a framework for procurement professionals and managers to use, Sebastian and Davison (2011) looked at two categories: the person and the environment or situation. The person or internal factor category was further broken down into five factors: demographic characteristics, knowledge, skill and abilities (KSAs), beliefs, attitudes and values, personality and motivation. They stated that demographics (age, gender and education) could influence contract administration in ways such as

communication style, conflict resolution and problem-solving. Further explanation of the rest of the factors in the category was provided in their paper.

The second category (environment or situation) was broken down into nine factors: system or job requirements – workers' tasks and responsibilities; standards of performance – acceptable performance; the physical environment; technology and job design – how the job is done; punishment and rewards – formal (monetary) and informal (praise and recognition) rewards; structure and group dynamics; management and leadership; the culture and subculture of the organisation; and the structure of the organisation. These two categories formed the base of root causes in problematic contract administration.

Added to these, the concept of misaligned formal contracting played a role in contract administration problems as well (Sande & Haugland, 2015; Fu, Chen, Zhang, & Wang, 2015). Misaligned formal contracts referred to contracts that had been chosen by the parties but deviated from the appropriate level of contracting dependent on the given transaction attributes. This is not the same as incomplete contracts (Mouzas & Blois, 2013) where it is stated that a formal contract could not encompass every aspect of the work as contingencies exist and it could be costly and impractical, and secondly that it could make it costly to effectively manage contractual performance.

Misaligned formal contracts have basically missed the mark. These contracts did not align with the transaction attributes and although RC played a role, the parties suffered from losses in end-product enhancement and could not reduce costs. They stated that misaligned formal contracts were harmful to performance outcomes that relied on RC. Fu et al. (2015) also stated that relational governance, like cultivating and nurturing trust at an inter-organisational level, was more paramount in describing performance than the contract design.

Inter-organisational cooperation in projects was commonly based on two aspects, trust and contractual incentives (Fu et al., 2015). Drawing on studies done previously, they stated that cooperative-based behaviours fell into two categories: task behaviours, which meant doing the utmost to accomplish tasks specified in a contract and meeting the assessment standards, and relational behaviours, which were

behaviours that mutually assisted both parties such as information sharing, combined problem-solving and innovative suggestions. They specifically concluded that in the case where contractual incentive and trust coexist, the incentive directly motivated the task behaviour of the contractor and the relational behaviour of the contractor had a moderately positive effect on trust. They stated that the amount of effort the client invested in relational behaviour towards the contractor increased the role of trust in encouraging cooperation.

Contractual control included: a standard contract, contractual claims, extension of time claims, the right to audit and examine records, lawsuit options and the right to deem certain information as proprietary or confidential (Lu & Yan, 2016). They examined cognition-based trust as a mediator of the contract control-affect-based trust relationship and the propensity to trust in architect contractor project-based firms in China. They proved their hypothesis that cognition-based trust is a mediator between contractual control and affect-based trust in China. However, they did state that there is a difference between Western cultures where making business decisions based on emotions was unethical, unlike in China where personal relationships were prevalent in all areas including business.

The propensity to trust had a significant positive effect on cognition-based trust and, in their case, they showed that contractual control and the propensity to trust were substitutes. Furthermore, they stated that trust was a reciprocal process and that contracts could be a means to develop trust among partners (Lu & Yan, 2016; Lau & Rowlinson, 2011). Comparably, Weiping and Lu (2017) stated that if calculative trust, which was trust based on information obtained from credible sources or competence either through certification of reputation, was higher, the trustor would be more confident and would raise more detailed outcomes which strengthened the outcome control.

Three of the main focuses (contract management, the effect of trust and relationship management) of this literature review (Table 2) from the client and contractor perspectives encompassed the reasons why projects were delayed. Trust in the construction industry reduces conflict, creates transparency and encourages teamwork. Contracts are needed to formalise, direct and record the work being done. They, however, are not a substitute for honourable agreements. The significance

thereof highlights the mechanism and method – the contract – that could be used for management to develop trust and improve overall project performance. Effective contract management could form the foundation for this (Manu et al., 2015). The purpose of this study is to measure if effective contract management acts as a moderator to create trust relationships in relation to project management success, with a special focus on the NEC contract in South Africa.

Table 2: Summary of Literature Review

Summary of Literature Review	
Sections	Authors
Project Management and Project Success	Serrador & Turner(2015), Rolstadås, Tommelein, Schiefloe, & Ballard (2014), Patanakul & Shenhar (2011), Müller & Jugdev (2012), Williams (2015), Bond-Barnard, Fletcher, & Steyn (2018), Gudiené, Banaitis, Banaitiené, & Lopes (2013), Mir & Pinnington (2014), Bryde (2003), Doloji, Sawhney, Iyer, & Rentala (2012), Mansfield, Ugwu, & Doran (1994), Abd El-Razek, Bassioni, & Moborak (2008), Doloji H. (2013), Munns & Bjeirmi (1996), Shanmugapriya & Subramanian (2013), Emsley & Alzahrani (2013), Mukuka, Aigbavboa, & Thwala (2015), Gunduz, Nielsen, & Ozdemir (2013), Famiyeh, Amoatey, Adaku, & Agbenohevi (2017)
Trust in Projects	Bond-Barnard, Fletcher, & Steyn (2018), Jiang & Lu (2017), Wong W. K., Cheung, Yiu, & Yan (2008), Cheung, Yiu, & Lam (2013), Pinto, Slevin, & English (2009), Hartman (2002), Lewicki & Bunker (1996), Wong, Cheung, & Ho (2005), Manu, Ankrah, Chinyio, & Proverbs (2015), Akintan & Morledge (2013), Rindt & Mouzas (2015), Brewer & Strahorn (2012), Meng (2012), Armstrong (2018)
Relationship Management and Satisfaction in Projects	Zou, Kumaraswamy, Chung K H, & Wong (2014), Meng (2012), Bond-Barnard, Fletcher, & Steyn (2018), McCord & Gunderson (2014), Ahmed, Azmi, Masood, Tahir, & Ahmad (2013), Rezvani, et al. (2016), Buvik & Rolfsen (2015), Lau & Rowlinson (2011), Ling, Ong, Ke, Wang, & Zou (2014), Mouzas & Blois (2013), Rashvand & Abd Majid (2014)
Contract Management and Administration	Naughter (2017), Minnaar, Vosselman, Van Veen-Dirks, & Zahir-ul-Hassan (2017), Chan, Chan, Lam, & Wong (2011), Shou, Zheng, & Zhu (2016), Davison & Sebastian (2009), Suprpto, Bakker, Mooi, & Hertogh (2016), Sande & Haugland (2015), Fu, Chen, Zhang, & Wang (2015), Mouzas & Blois (2013), Lu & Yan (2016), Lau & Rowlinson (2011), Weiping & Lu (2017), Manu, Ankrah, Chinyio, & Proverbs (2015)

3 RESEARCH QUESTIONS AND HYPOTHESES

In formulating the hypothesis, questions need to be asked for statistical analysis and from this a hypothesis needs to be developed. The first research question is:

1. Does the level of participation in an NEC3 contract increase trust and create a better working relationship?

From this question, the hypotheses are derived:

- The Null hypothesis (H_0) – There is a relationship between the level of participation in an NEC3 contract and trust.
- The Alternate hypothesis (H_1) – There is no relationship between the level of participation in an NEC3 contract and trust.

Based on the hypotheses that have been formulated, a test for prediction will be done. This is a multiple regression. The dependent variable will be determined by the null hypothesis and the independent variables will be the critical clauses of the NEC3 contract that are deemed to affect project management success. The result will be either to fail to reject the null or to accept the alternative hypothesis.

The second research question relates to private and public sectors. The research question is:

2. Is the level of participation in an NEC3 contract greater in the public sector than in the private sector?

From this question, the hypotheses are derived:

- The Null hypothesis (H_0) – The level of participation in an NEC3 contract is greater in public sector projects than in the private sector.
- The Alternate hypothesis (H_1) – The level of participation in an NEC3 contract is less in public sector projects than in the private sector.

In this case a test for differences will be applied. The independent t-test (no measures repeated) will establish if there is a difference between the two independent groups (private and public sectors) and whether the difference is statistically significant based on a 95% confidence level. The result will be either to fail to reject the null or to accept the alternative hypothesis.

4 RESEARCH METHODOLOGY

4.1 Philosophy

The philosophy used is a pragmatic approach to the research question. This approach argues that the most important determinant of the research philosophy is research questions and objectives (Saunders & Lewis, 2012). The research study will continue with a more in-depth study of literature that is available as well as statistics relating to the project success and failure rate in South Africa.

4.2 Approach

A deductive approach will be used in this study. This approach will answer the questions defined and determine whether they support the theory or suggest that the theory needs modification. This method also allows for a structured methodology to assist in ensuring that replication can be facilitated to achieve reliability. In addition, the approach to this study will follow that of Pinto et al. (2009). As per their study, the Hartman trust model (Hartman, 2002) will be used and built on. This model was purposefully designed for a better fit for projects given the limited time in which they occur, unlike the Lewicki and Bunker (1996) model where progressive elements of trust are developed over long periods of time. However, one aspect of the Hartman model will be excluded and that is the intuitive trust aspect. This did not represent well in the Pinto et al. (2009) study.

Similarly, in the study done by Wong et al. (2008), the affect-base trust aspect had the lowest coefficient. These “emotional”-based trust factors can be skewed or biased towards certain organisations. An adaptation of the conceptual framework proposed by Pinto et al. (2009) is represented in Figure 6.

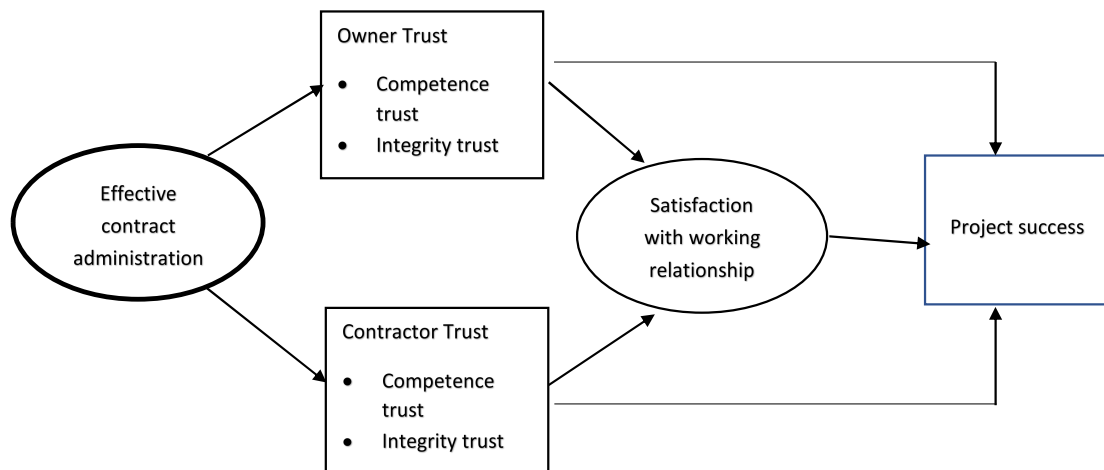


Figure 6: Adaptation of conceptual framework

Source: Pinto, Slevin, and English (2009)

4.3 Methodological Choices

The approach to the research will comprise two methods: a literature review and a self-administered survey for gathering the relevant data. The application of the method will be the use of quantitative analysis. This will enable the researcher to reach as many respondents as possible to obtain a valuable and reliable sample.

Key attributes linked directly to the cost overruns and delays will be identified. Dolo (2013) deduced that there are seven relevant attributes linked to cost overruns and delays. Of these seven, the contract related attribute will be explored further within the context of the NEC3 family of contracts. Furthermore, the survey will include three more sections relating to competence trust, integrity trust and project success.

4.4 Purpose of Research Design

The purpose of the research design is a descriptive study. The aim of the study is for respondents to accurately describe the events or situation pertaining to the research question which occurs within projects based on an NEC3 contract and to describe the level of competence and integrity trust. This information will be used to establish the link, if any, between using the contractual requirements within the NEC3 contract, trust and a satisfactory working relationship which impacts project success.

4.5 Strategy

The self-administered survey questionnaire will be phrased to ask the respondents to rate the level of employer and contractor participation with regards to their contribution in the contract administration (NEC3) of projects, the impact of the participation within the contract administration aspect, and the overall outcome of the project. The argument put forward is that the higher levels of participation within the contract terms creates trust and a good working relationship and contributes to project success.

4.6 Time Horizon

Because of time constraints, the study will be cross-sectional. This means that the data will be collected for only one period. This snapshot will be indicative of the perception that the respondents have at that time within the industry.

4.7 Techniques and Procedures

The technique to be used will be a self-completed survey questionnaire. The survey questionnaire will be designed to include five sections.

Section 1 will contain questions for collecting background information of the respondent and their projects such as the respondent's position, industry, qualifications and experience.

Section 2 will be designed specifically to answer questions regarding the employer and contractor participation, and the understanding and use of the NEC3 contract. The effectiveness level will be measured on a 7-point Likert scale, where 7 denotes always, 6 – very frequently, 5 – occasionally, 4 – neutral, 3 – rarely, 2 – very rarely and 1 – never. This scale allows respondents to rank the participation of the employers and contractors and gives the respondents an option of being neutral if they do not have an opinion regarding the question.

Sections 3 to 5 will deal with trust, the working relationship and project success in that order. These sections will employ elements that have been used by Hartman (2002) and Slevin and Pinto (1986).

The survey questionnaire link will be sent out via email to all potential respondents. The respondents will be selected using the convenience sampling method as the researcher has substantial knowledge of the industry, both private and public, and various companies. Thereafter, the snowballing method of sampling from the initial selection will be used as the researcher will request that the survey be passed on to peers across various companies and industries. No link between the respondents and their companies can and will be made as the name of the organisation is not required as part of the questionnaire. If any of the questions conflict with a respondent's non-disclosure agreement, they will be informed not to participate in the survey in the consent letter.

4.8 Population

The population will consist of PM professionals, consultants and engineers who have worked with or are currently working with employers using the NEC3 contract. The type of industry in this case will not be a major focal point as the purpose of the study is to find out the degree of participation and effectiveness of the employer regarding the use of the NEC3 contract and the level of trust and the status regarding the satisfaction of the working relationship. However, if the data collected supports further analysis of a comparison between private and public sector employer participation in NEC3 contracts in South Africa, this will become the second research question. The population targeted for the research study must have access to internet and email.

4.9 Unit of Analysis

The unit of analysis for this research will consist of the following:

- Individuals (PM professionals – registered or unregistered, consultants and engineers) involved or who were involved with projects based on the NEC3 contract. To track and have a record of everyone's consent, the consent form part of the survey document will be collected, and no participant will be allowed to proceed with the survey unless consent has been given.
- Artefacts such as books, retrospective analyses of case studies and journals will be used for the literature review.

4.10 Sampling Method and Size

Given the limited time in which the research needs to be conducted, a couple of approaches need to be considered to ensure that the maximum amount of data is collected.

4.10.1 Pilot phase

The intention is to pilot the initial questionnaire using convenience sampling; this is a variety of non-probability sampling. Although this is the least recommended and rarely used by researchers, it will enable the researcher to obtain access to respondents within the researcher's industry who are currently using the NEC3 contract in conjunction with their employers. The respondents identified will be contacted; they are relevant to the study and the research question. This will enable the researcher to gauge the quality of the questionnaire and modify as required.

4.10.2 Survey phase

The final version of the questionnaire after the pilot sample has been completed and modified, if required, will be snowball sampling. This method will allow the researcher to identify one or two individuals in various industries, make contact and gather information from them. In turn, these individuals will be asked to identify others in similar positions that can be accessed, and these newly identified individuals will do the same.

Currently, there is no sampling frame. Given the size of the country and the number of small to large projects in the public and private sector, it would be an exhausting and lengthy exercise to obtain a list of all individuals. In addition, most private and public databases are incomplete. The available databases for registered professionals in South Africa, such as the South African Council for Project and Construction Management (SACPCMP), is relatively new and access to their existing list of members could be not only a barrier but could be also a source to increase the sample size.

The size of the sample in this study will be critical to the relevancy of the results. The researcher's aim is to reach a minimum of 40 contacts. The aim is to have this number split evenly between private and public sectors. In the event of a low response rate, the survey will be analysed according to the number of respondents received. The possible inclusion of the comparison

between private and public sectors is dependent on the number of responses received. Any feedback obtained from the survey that is not related to the NEC3 contract will be discarded. Incomplete surveys will also be discarded.

4.11 Measurement Instrument

The measuring instrument will take the form of a survey questionnaire. This is a structured method of collecting data from a large population. It is easy to understand and allows for the collection of data on the same topic in a cost-effective manner.

The usability of the survey questionnaire is important. It will be designed in such a way that it will not take long to administer. Directions need to be clear and the scoring will be easy. Section 1 of the survey questionnaire will consist of nominal data, which are merely statements such as industry (private or public), qualifications, experience, position etc. The survey will be completely anonymous and links between the individual and their organisations will not be made.

Section 2 will consist of ordinal data which will be the ranking of variables using the Likert scale. The survey questionnaire will contain general core clauses from the NEC3 contract that are pertinent to cost and duration overruns:

1. Clause 10.1 Actions – The Employer, the Contractor and the Service Manager shall act as stated in this contract and in the spirit of mutual trust and cooperation (Barnes, Baird, & Weddell, www.neccontract.com/About-NEC, 2013b).
2. Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could
 - increase the total of the prices;
 - interfere with the timing of the service; or
 - impair the effectiveness of the service (Barnes et al., 2013b).
3. Clause 18.1 – Illegal and impossible requirements – The Contractor notifies the Service Manager as soon as he considers that the Service Information requires him to do anything which is illegal or impossible. If the Service Manager agrees, he gives an instruction to change the Service Information appropriately (Barnes et al., 2013b).

Reference to the clause will be made in the survey questionnaire and given that the researcher is targeting a population that has experience with the NEC3 contract, albeit as a Priced contract with price list, Target contract with price list or a Cost reimbursable contract (Barnes et al., 2013b; Chan et al., 2011).

Sections 3 and 4 will employ elements used by Hartman (Pinto et al., 2009) with respect to trust and working relationship satisfaction. The trust section comprises of 20 items and the relationship section comprise of seven items. Section 5 contains elements from the Project Implementation Profile (Slevin & Pinto, 1986) and will include the nine items used by (Pinto et al., 2009) to measure the overall performance of the projects. This part of the survey will use a 7-point Likert scale. The responses range from “strongly disagree” to “strongly agree”.

To ensure the validity of the measuring instrument, the survey questionnaire will be sent out to a small group of respondents. This will provide the researcher an opportunity to make adjustments and modifications to the survey questionnaire items so that each item will correctly measure what is intended. In addition, the researcher intends to look for other relevant evidence that supports the answers in the survey questionnaire.

The reliability of the data will be measured by requesting some of the respondents to answer the survey questionnaire twice. It may be that the respondents might be unwilling to do so, however, with the convenience of the sampling method, the researcher can easily persuade the respondents to do so. Cronbach’s alpha will be used as a measure to test reliability. This is the most commonly used method to measure internal consistency when having multiple questions on a Likert scale in a questionnaire. If need be, the sample size during the pilot survey will be increased to improve the reliability factor.

4.12 Data Gathering Process

As previously stated, the measuring instrument will be a survey questionnaire for the quantitative analysis aspect of the study. This will be administered via a survey tool. Survey Monkey, which integrates almost seamlessly into the analysis tool that will be used, has been identified as a convenient and easy-to-use tool. The survey questionnaire will be sent out to all individuals in the sample with the aim of reaching

as many as possible across the private and public sectors and who are involved or have been involved with the NEC3 contract. A specified duration for responses will be explained in detail along with the reason for the survey questionnaire. This forms the primary data aspect of the study.

The second method of gathering data will be part of the literature review. This entails reading, understanding and analysing previous work of researchers, and books, articles and journals that relate to the research question. The documents and records will be peer reviewed to ensure legitimacy, not older than five years to ensure the information is recent and will be from reliable sources based on the ABS Journal Rankings, Google Scholar and websites such as Emerald and Elsevier. This secondary data will form a good foundation for statistical analysis.

4.13 Analysis Approach

The analysis approach is twofold. The secondary data will be reviewed and links in the various documents and records will be used in the literature review to create an understanding of what has been done on the research topic and what needs to be further investigated. The literature review will also demonstrate how the researcher has derived the question being researched for the real-life problem.

The second aspect of the analysis approach is the statistical analysis of the data gathered from the survey questionnaire. For analysis, the researcher will use the IBM-SPSS analysis tool. The researcher is familiar with the programme and this fact combined with the ease of integration of the survey questionnaire tool will make the analysis of the data easier and quicker.

5 ANALYSIS OF RESULTS

5.1 Summary of Survey Data

The survey data was obtained by distributing the questionnaire by way of convenience sampling and the respondents were selected by the researcher based on the researcher's knowledge of the construction industry. Of the 56 responses received, 12 were incomplete and were discarded. The 44 complete surveys were used in the analysis. This brought the response percentage to 78.5% as presented in Table 3. Appendix 1 contains a copy of the complete questionnaire that was distributed and categorises each variable (V1–V46) into the relevant factors for the general information and the analysis.

Table 3: Survey Accumulation and Response Data

Survey parameters	Values
Questionnaires received	56
Incomplete questionnaires	12
Complete responses	44
Percentage of complete responses (%)	78.5
Percentage of valid responses for analysis (%)	78.5
Questionnaires received	56

5.2 Industry/Sector Breakdown – Completed Questionnaires Only

Table 4 shows the breakdown of the respondents into the various sectors chosen for the study. Of the 44 respondents, the majority at 38.64% were from the construction sector, 29.55% from the electricity, gas and water sector, 20.45% from engineering and consulting, 6.82% from mining and chemical, and 4.55% from transport.

Table 4: Industry/Sector Breakdown of Respondents

Industry	Frequency	Percentage (%)
Agriculture, forestry and fishing	0	0.00
Mining, chemical	3	6.82
Electricity, gas and water	13	29.55
Construction	17	38.64
Wholesale, retail	0	0.00

Industry	Frequency	Percentage (%)
Transport	2	4.55
Finance, real estate, business services	0	0.00
General government services	0	0.00
Personal services	0	0.00
Engineering, consultant	9	20.45

The respondent demographics are shown in Table 5. The data showed that 44.18% of the respondents were in a management role (Project Manager, Construction Manager and Operations Manager) and the remaining in a less senior role. All respondents, however, were actively involved in contract administration and project management. Most of the respondents (86.37%) had a formal qualification at an undergraduate to postgraduate level. The average years of experience using the NEC3 or in projects were 8.8 years. This suggested that the working knowledge in both projects and the administration of the NEC3 family of contracts was adequate.

Table 5: Respondent Demographics

Position	Frequency	Percentage (%)
Project Manager	13	30.23
Construction Manager	4	9.30
Operations Manager	2	4.65
Project Lead	1	2.33
Project Supervisor	2	4.65
Other	21	48.84
Total = 43, one respondent did not answer		
Highest level of education	Frequency	Percentage (%)
Doctorate	0	0.00
Master's degree	7	15.91
Bachelor of Science	5	11.36
Bachelor of Science Honours	5	11.36
Bachelor of Technology	13	29.55
Diploma	8	18.18
Grade 12	1	2.27
Other	5	11.36

Position	Frequency	Percentage (%)
Total = 44 respondents		
Years of experience	Frequency	Percentage (%)
0-2 years	4	9.09
3-5 years	12	27.27
6-10 years	13	29.55
11-15 years	6	13.64
16 years and more	9	20.45
Total = 44 respondents		
Private or Public	Frequency	Percentage (%)
Private	31	72.09
Public	12	27.91
Total = 43, one respondent did not answer		

5.3 Description of the Variables

The variables used in the SPSS analysis are divided into four factors, excluding the general information. As stated in the methodology, the factors with their variables are listed in Table 6. Factor 1 variables were taken from the NEC3 family of contracts and were selected to suit the intention of the study. Factors 2 to 4 variables were used in a similar study by Pinto et al. (2009).

Table 6: SPSS Analysis Factors and Variables

Variable	Description	Factor
V1	In what industry do you primarily work?	Respondent demographic
V2	Is this private or public sector?	
V3	What is your position?	
V4	What is the highest level of schooling you have completed or the highest degree you have received?	
V5	How many years of experience in project management do you have?	
V6	Clause 10.1 Actions – The Employer, the Contractor and the Service Manager shall act as stated in this contract and in the spirit of mutual trust and cooperation.	Factor 1 Analysis

Variable	Description	Factor
V7	Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could increase the total of the prices.	
V8	Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could interfere with the timing of the service.	
V9	Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could impair the effectiveness of the service.	
V10	Based on Q7, clause 16.1, were additional costs incurred?	
V11	Based on Q8. clause 16.1, was additional time granted as per the contract?	
V12	Based on Q9, clause 16.1, did the client assist in mitigating the risk/taking action?	
V13	I feel comfortable about being dependent on the other party throughout the life of the project.	
V14	I believe the other party will keep their word throughout the life of the project.	
V15	I feel confident that the other party has a high level of integrity.	
V16	I believe the other party will adhere to high ethical principles throughout the life of the project.	
V17	I am certain the other party will be fair throughout the life of the project.	
V18	I believe the other party would like to see me do well.	
V19	I can rely on the other party to not take advantage of me.	
V20	I am certain the other party has the ability to perform productively.	
V21	I believe the project engineers and other technical people are competent.	
V22	I am willing to be vulnerable to the other party.	

Analysis Factor 2 – Trust

Variable	Description	Factor
V23	I believe the other party has ulterior motives or hidden agendas.	Factor 3 – Satisfaction with working relationship
V24	My “gut feeling” tells me to be cautious when dealing with the other party on a project.	
V25	The other party would not knowingly hurt me in order to benefit themselves during the life of the project.	
V26	The other party is professional and dedicated.	
V27	Most people, even those who are not close friends of the other party, would trust and respect them if they were to execute a project with them.	
V28	Other associates who must interact with these individuals would consider them to be trustworthy if they had to execute a project.	
V29	Given the other party’s track record, I see no reason to doubt their competence and preparation for future projects.	
V30	I can rely on the other party not to make the project more difficult by careless work.	
V31	My working relationship with the other party feels right.	
V32	I enjoy associating with the other party throughout the life of the project.	
V33	I can talk freely to the other party about difficulties I am having on the project and know they will want to listen.	Factor 3 – Satisfaction with working relationship
V34	If I shared problems with the parties during the project, I know they would respond constructively and caringly.	
V35	We would feel a sense of loss if one of us was transferred and we could not complete the project together.	
V36	I would have to say that we have made a considerable emotional investment in our relationship.	
V37	We can all freely share our ideas, feelings and hopes during the project.	
V38	This project has/will come in on schedule.	Factor 4
V39	This project has/will come in on budget.	

Variable	Description	Factor
V40	The project results, or deliverables, are in line with the client/contractor objectives.	
V41	The project that has been developed performs as intended (or, if still being developed, looks as if it would work).	
V42	Given the problem for which it was developed, this project seems to do the best job of solving that problem – it was the best choice among the set of alternatives.	
V43	I am/was satisfied with the process by which this project is being/was completed.	
V44	This project will have a positive impact on those who make use of it.	
V45	The client is/will be satisfied with the project outcomes.	
V46	I am enthusiastic about the chances for success in this project.	

5.4 NEC3 (Factor 1) Summary of all Survey Responses

Factor 1 (NEC3) questions were measured on a 5-item scale. The summary of the response data for Variables 6–12 is presented in Figures 7–13.

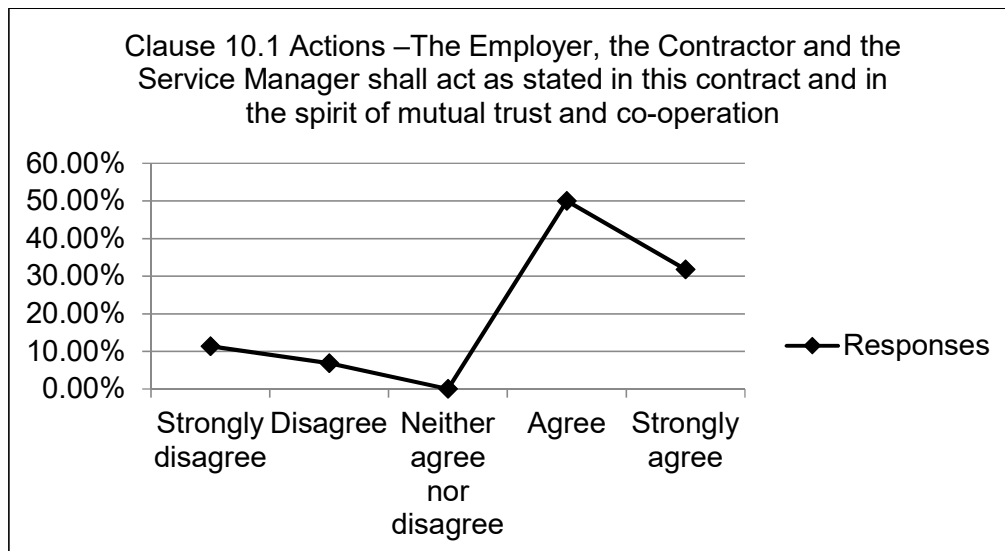


Figure 7: V6 summary of all factor NEC3 responses.

N = 44, strongly disagree = 5 (11.36%), disagree = 3 (6.82%), neither agree nor disagree = 0 (0%), agree = 22 (50%) and strongly agree = 14 (31.82%). Survey tool basic statistics: minimum = 1, maximum = 5, *Mdn* = 4, *M* = 3.84, *SD* = 1.26.

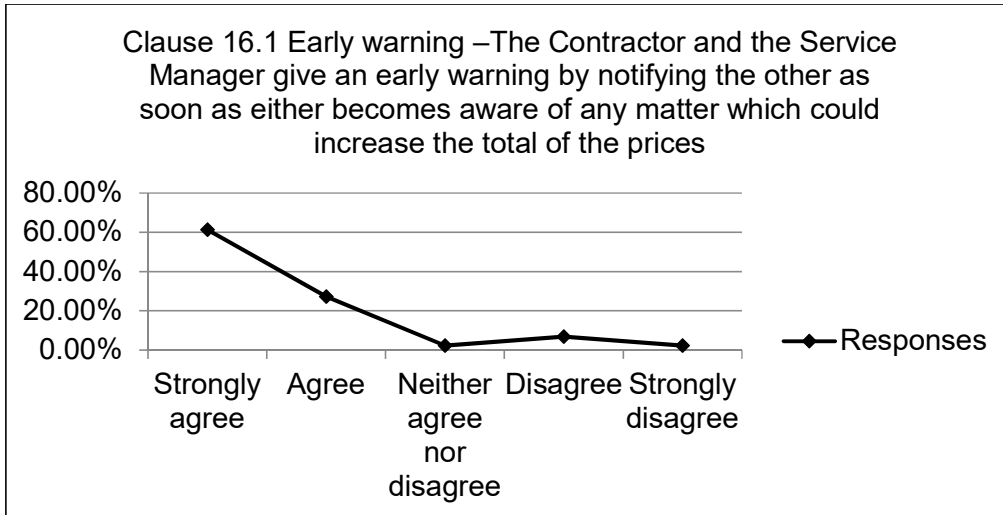


Figure 8: V7 summary of all NEC3 responses.

N = 44, strongly disagree = 1 (2.27%), disagree = 3 (6.82%), neither agree nor disagree = 1 (2.27%), agree = 12 (27.27%) and strongly agree = 27 (61.36%).

Survey tool basic statistics: minimum = 1, maximum = 5, Mdn = 1, *M* = 1.61, *SD* = 0.98.

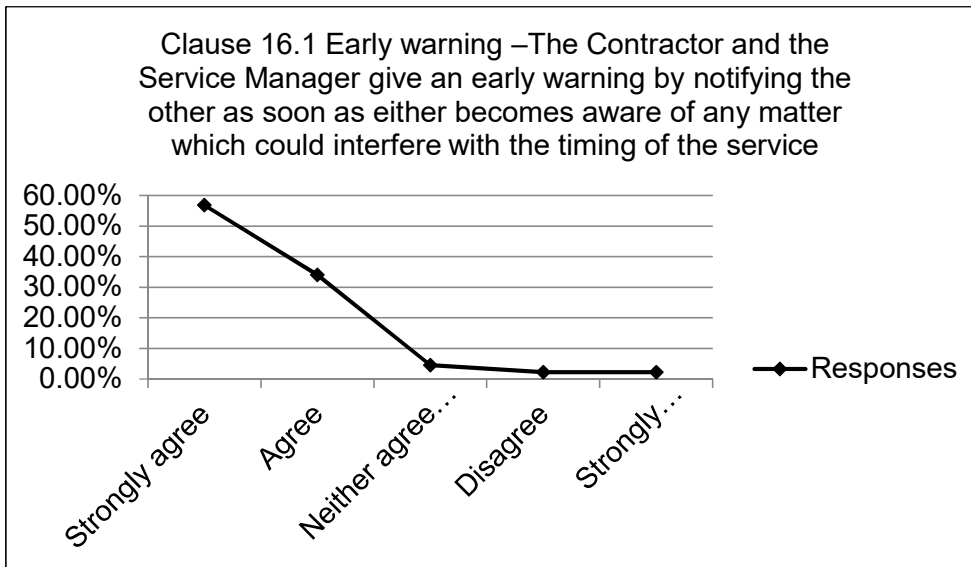


Figure 9: V8 summary of all NEC3 responses.

N = 44, strongly disagree = 1 (2.27%), disagree = 1 (2.27%), neither agree nor disagree = 2 (4.55%), agree = 15 (34.09%) and strongly agree = 25 (56.82%).

Survey tool basic statistics: minimum = 1, maximum = 5, Mdn = 1, *M* = 1.59, *SD* = 0.86.

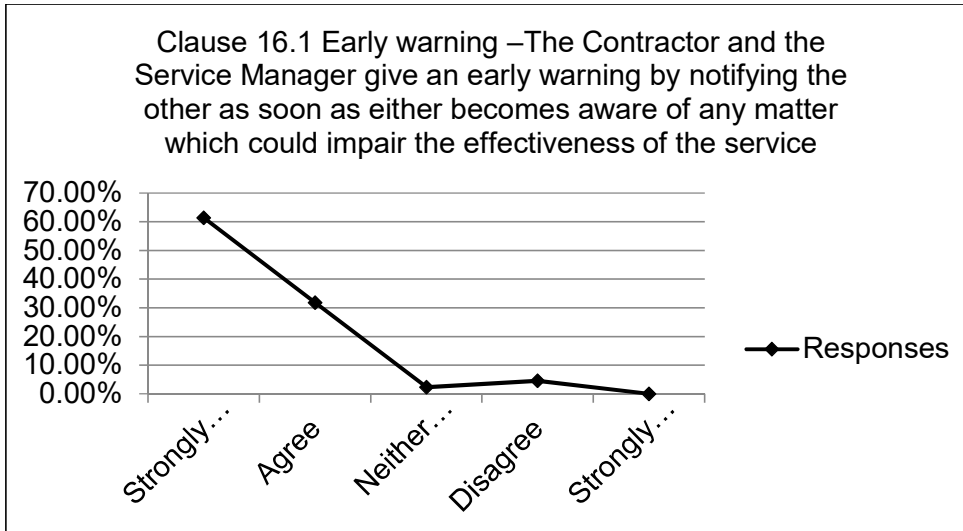


Figure 10: V9 summary of all NEC3 responses.

$N = 44$, strongly disagree = 0 (0%), disagree = 2 (4.55%), neither agree nor disagree = 1 (2.27%), agree = 14 (31.82%) and strongly agree = 27 (61.36%).

Survey tool basic statistics: minimum = 1, maximum = 4, $Mdn = 1$, $M = 1.5$, $SD = 0.75$.

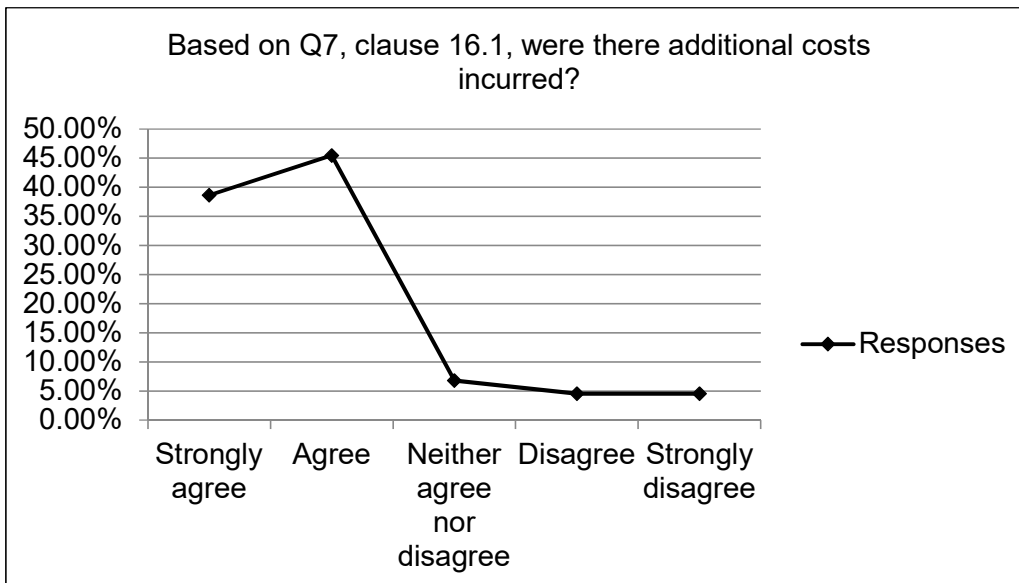


Figure 11: V10 summary of all NEC3 responses.

$N = 44$, strongly disagree = 2 (4.55%), disagree = 2 (4.55%), neither agree nor disagree = 3 (6.82%), agree = 20 (45.45%) and strongly agree = 17 (38.64%).

Survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 2$, $M = 1.91$, $SD = 1.02$.

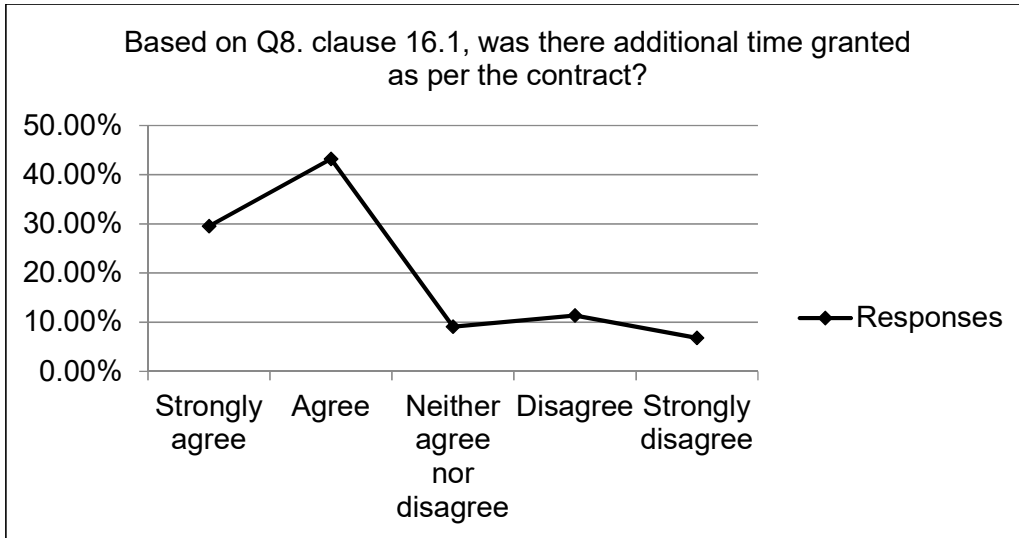


Figure 12: V11 summary of all NEC3 responses.

$N = 44$, strongly disagree = 3 (6.82%), disagree = 5 (11.36%), neither agree nor disagree = 4 (9.09%), agree = 19 (43.18%) and strongly agree = 13 (29.55%).

Survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 2$, $M = 2.23$, $SD = 1.18$.

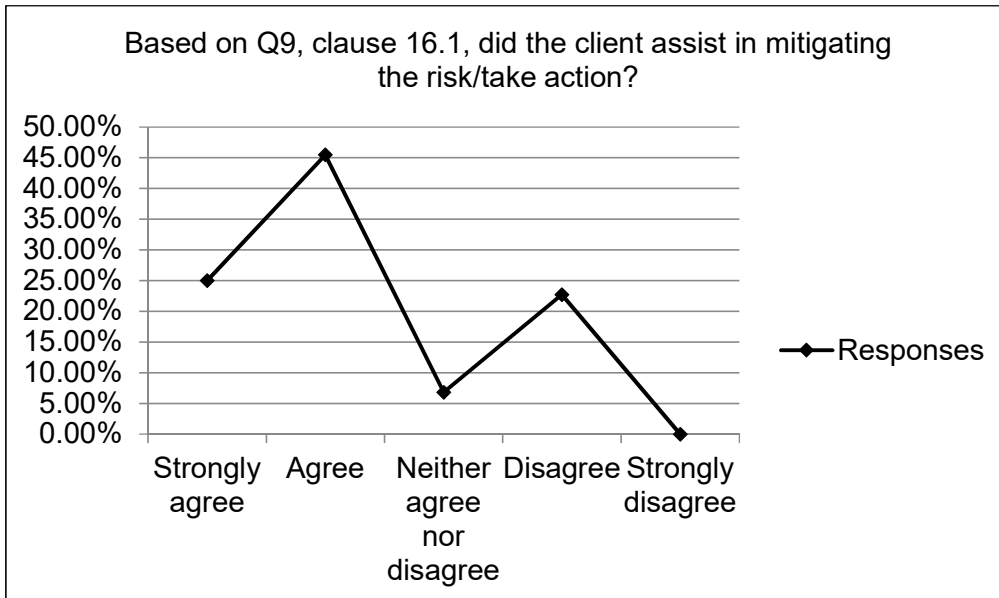


Figure 13: V12 summary of all NEC3 responses.

$N = 44$, strongly disagree = 0 (0%), disagree = 10 (22.73%), neither agree nor disagree = 3 (6.82%), agree = 20 (45.45%) and strongly agree = 11 (25%).

Survey tool basic statistics: minimum = 1, maximum = 4, $Mdn = 2$, $M = 2.27$, $SD = 1.07$.

5.5 Exploratory Factor Analysis (EFA)

The EFA was performed to study the correlations between v13–v46, and to examine whether these allowed for the creation of one or more indices. Only factors with eigenvalues of > 1 will be retained. The results for each factor (v36–v46) are represented in Tables 7–10. The minimum requirement for the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) is between 0.5 and 1, however, a $KMO > 0.8$ will be used and the Bartlett Test of Sphericity ($p < 0.05$) will be used to establish the adequacy of the item correlation matrix upon which the factor analysis was based (Field, 2009). For all EFAs performed, the p-values were smaller than the threshold of 0.05, which indicates a sufficiently large correlation between the items.

5.5.1 Trust factor analysis

Table 7: Exploratory Factor Analysis: Trust

Variable	Item/description	Communalities	Factor loading
V13	I feel comfortable about being dependent on the other party throughout the life of the project.	0.504	0.883
V14	I believe the other party will keep their word throughout the life of the project.	0.404	0.863
V15	I feel confident that the other party has a high level of integrity.	0.658	0.839
V16	I believe the other party will adhere to high ethical principles throughout the life of the project.	0.703	0.838
V17	I am certain the other party will be fair throughout the life of the project.	0.781	0.822
V18	I believe the other party would like to see me do well.	0.567	0.822
V19	I can rely on the other party to not take advantage of me.	0.675	0.811
V20	I am certain the other party has the ability to perform productively.	0.493	0.779
V21	I believe the project engineers and other technical people are competent.	0.494	0.753

Variable	Item/description	Communalities	Factor loading
V22	I am willing to be vulnerable to the other party.	0.227	0.733
V23	I believe the other party has ulterior motives or hidden agendas.	0.138	0.710
V24	My “gut feeling” tells me to be cautious when dealing with the other party on a project.	0.237	0.703
V25	The other party would not knowingly hurt me in order to benefit themselves during the life of the project.	0.220	0.702
V26	The other party is professional and dedicated.	0.703	0.636
V27	Most people, even those who are not close friends of the other party, would trust and respect them if they were to execute a project with them.	0.607	-0.487
V28	Other associates who must interact with these individuals would consider them to be trustworthy if they had to execute a project.	0.676	0.477
V29	Given the other party’s track record, I see no reason to doubt their competence and preparation for future projects.	0.744	0.469
V30	I can rely on the other party not to make the project more difficult by careless work.	0.538	-0.371
Keyser-Meyer-Olkin Measure of Sampling Adequacy (KMO > 0.8)			0.824
Bartlett’s Test of Sphericity (p < 0.05)			< 0.001
Total variance explained			52.06%

The KMO for Factor 2 is 0.824 which is above the acceptable of 0.8 with a total variance explained of 52.06%.

5.5.2 Satisfaction with working relationship factor analysis

Table 8: Exploratory Factor Analysis: Satisfaction with Working Relationship

Variable	Item/description	Communalities	Factor loading
V31	My working relationship with the other party feels right.	0.795	0.904
V32	I enjoy associating with the other party throughout the life of the project.	0.756	0.894
V33	I can talk freely to the other party about difficulties I am having on the project and know they will want to listen.	0.799	0.892
V34	If I shared problems with the parties during the project, I know they would respond constructively and caringly.	0.817	0.874
V35	We would feel a sense of loss if one of us was transferred and we could not complete the project together.	0.502	0.869
V36	I would have to say that we have made a considerable emotional investment in our relationship.	0.493	0.708
V37	We can all freely share our ideas, feelings and hopes during the project.	0.764	0.702
Keyser-Meyer-Olkin Measure of Sampling Adequacy (KMO > 0.8)			0.846
Bartlett's Test of Sphericity ($p < 0.05$)			< 0.001
Total variance explained			70.351%

The KMO for Factor 3 is 0.846 which is above the acceptable of 0.8 with a total variance explained of 70.351%.

5.5.3 Project success factor analysis

Table 9: Exploratory Factor Analysis: Project Success

Variable	Item/description	Communalities	Factor loading
V38	This project has/will come in on schedule.	0.662	0.893
V39	This project has/will come in on budget.	0.697	0.884

Variable	Item/description	Communalities	Factor loading
V40	The project results, or deliverables, are in line with the client/contractor objectives.	0.637	0.844
V41	The project that has been developed performs as intended (or, if still being developed, looks as if it would work).	0.661	0.835
V42	Given the problem for which it was developed, this project seems to do the best job of solving that problem – it was the best choice among the set of alternatives.	0.500	0.814
V43	I am/was satisfied with the process by which this project is being/was completed.	0.782	0.813
V44	This project will have a positive impact on those who make use of it.	0.347	0.798
V45	The client is/will be satisfied with the project outcomes.	0.712	0.707
V46	I am enthusiastic about the chances for success in this project.	0.798	0.589
Keyser-Meyer-Olkin Measure of Sampling Adequacy (KMO > 0.8)			0.814
Bartlett's Test of Sphericity ($p < 0.05$)			< 0.001
Total variance explained			64.396%

The KMO for Factor 4 is 0.814 which is above the acceptable of 0.8 with a total variance explained of 64.396%.

5.6 Reliability Analysis

The reliability analysis was done to measure the internal consistency of the scale used in the survey for the analysis. As a guide, the determination of the range of alpha values by Hair, Wolfinbarger Celsi, Money, Samouel, and Page (2011) is used as follows: < 0.6 is poor, 0.6 to < 0.7 is moderate, 0.7 to < 0.8 is good, 0.8 to < 0.9 is very good and ≥ 0.9 is excellent.

The Cronbach alpha (α) in the pilot phase for Factors 2 to 4 exceeds 0.7. The acceptable range being between 0.70 and 0.95.

The trust factor was measured on an 18-item scale and the test for internal reliability using Cronbach's alpha was 0.913. Satisfaction with the working relationship was measured on a 7-item scale and the Cronbach's alpha result was 0.927. Project success was measured on a 9-item scale and yielded a Cronbach's alpha value of 0.928. Although the Cronbach alpha results for Factors 2 to 4 are high and approaching 1, the researcher is comfortable that minimal redundancy had occurred with regards to the survey questions. Table 10 presents the summary of all Cronbach alpha results for Factors 1 to 4.

Table 10: Reliability Analysis for all Factors

Factor	Cronbach's alpha (α)	Inter-item correlation
Factor 2 – Trust	0.913	0.371
Factor 3 – Working relationship	0.927	0.647
Factor 4 – Project success	0.928	0.597

The inter-item correlation for Factors 3 and 4 is higher than 0.5 which may suggest that the items are closely related but not repetitive.

5.7 Summary of Survey Data for Comparison between Public and Private Sectors

The summary of the data collected between the public and private sectors is represented in Figures 14–20.

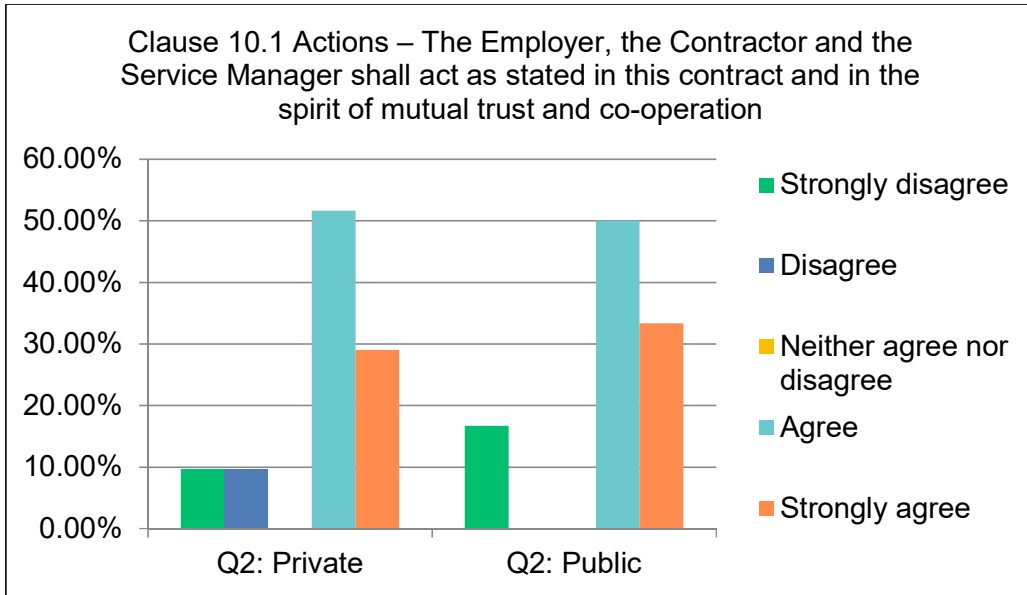


Figure 14: V6 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 3 (9.68%), disagree = 3 (9.68%), neither agree nor disagree = 0 (0%), agree = 16 (51.61%) and strongly agree = 9 (29.03%). Private sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 4$, $M = 3.81$, $SD = 1.23$.

Public sector data: $N = 12$, strongly disagree = 2 (16.67%), disagree = 0 (0%), neither agree nor disagree = 0 (0%), agree = 6 (50%) and strongly agree = 4 (33.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 4$, $M = 3.83$, $SD = 1.34$.

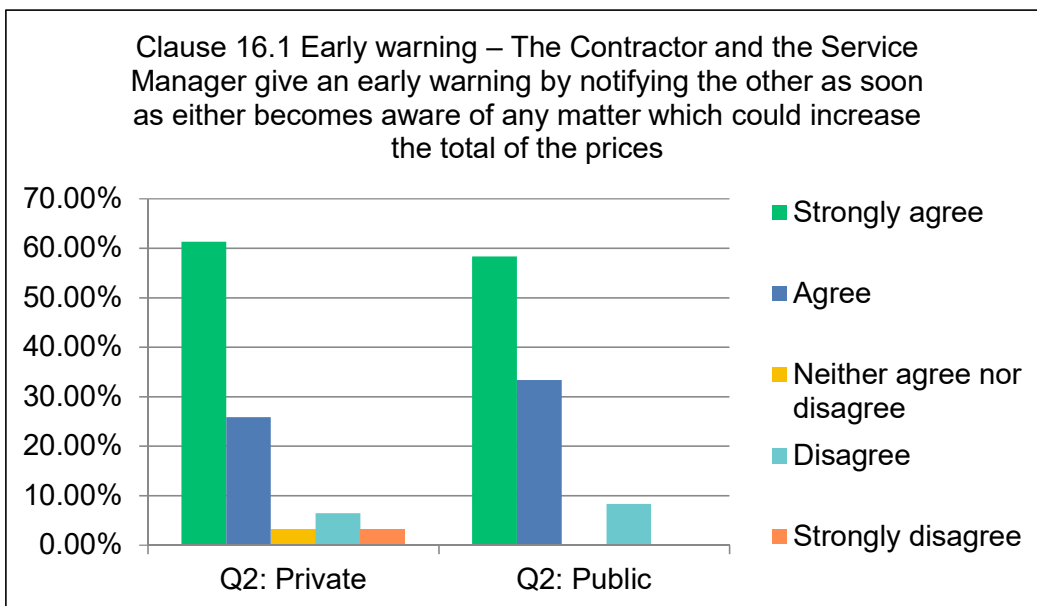


Figure 15: V7 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 1 (3.23%), disagree = 2 (6.45%), neither agree nor disagree = 1 (3.23%), agree = 8 (25.81%) and strongly agree = 19 (61.29%). Private sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 1$, $M = 1.65$, $SD = 1.03$.

Public sector data: $N = 12$, strongly disagree = 0 (0%), disagree = 1 (8.33%), neither agree nor disagree = 0 (0%), agree = 4 (33.33%) and strongly agree = 7 (58.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 4, $Mdn = 1$, $M = 1.58$, $SD = 0.86$.

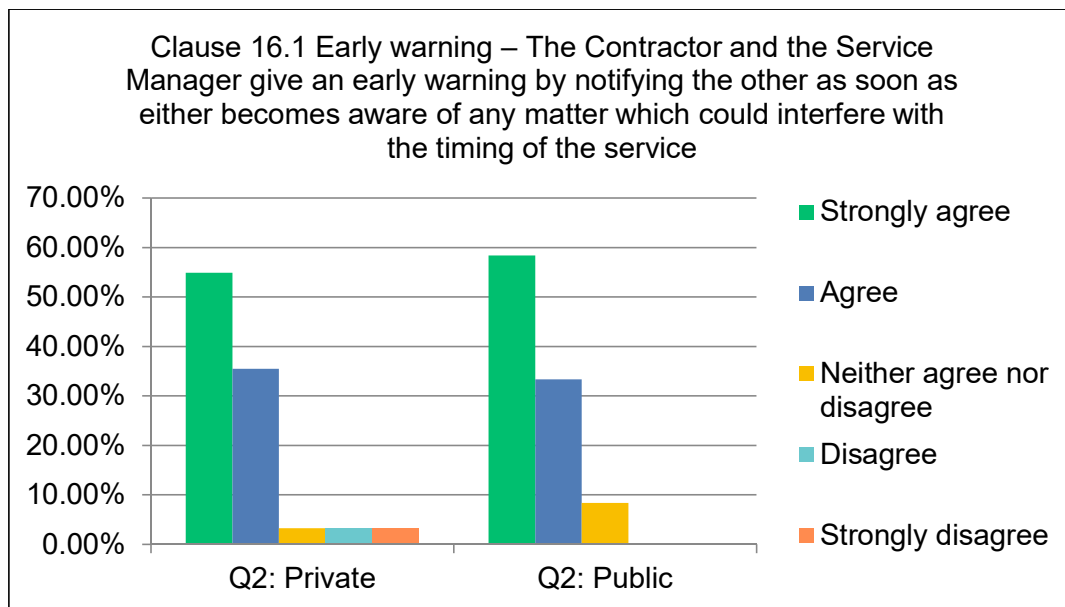


Figure 16: V8 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 1 (3.23%), disagree = 1 (3.23%), neither agree nor disagree = 1 (3.23%), agree = 11 (35.48%) and strongly agree = 17 (54.84%). Private sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 1$, $M = 1.65$, $SD = 0.93$.

Public sector data: $N = 12$, strongly disagree = 0 (0%), disagree = 0 (0%), neither agree nor disagree = 1 (8.33%), agree = 4 (33.33%) and strongly agree = 7 (58.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 3, $Mdn = 1$, $M = 1.50$, $SD = 0.65$.

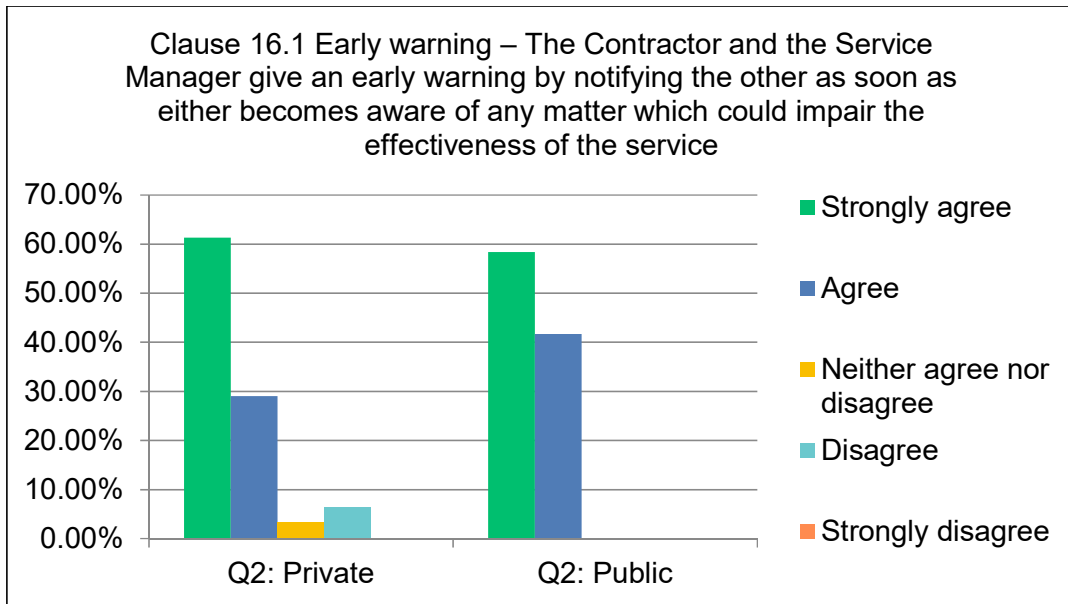


Figure 17: V9 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 0 (0%), disagree = 2 (6.45%), neither agree nor disagree = 1 (3.23%), agree = 9 (29.03%) and strongly agree = 19 (61.29%). Private sector survey tool basic statistics: minimum = 1, maximum = 4, $Mdn = 1$, $M = 1.55$, $SD = 0.84$.

Public sector data: $N = 12$, strongly disagree = 0 (0%), disagree = 0 (0%), neither agree nor disagree = 0 (0%), agree = 5 (41.67%) and strongly agree = 7 (58.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 2, $Mdn = 1$, $M = 1.42$, $SD = 0.49$.

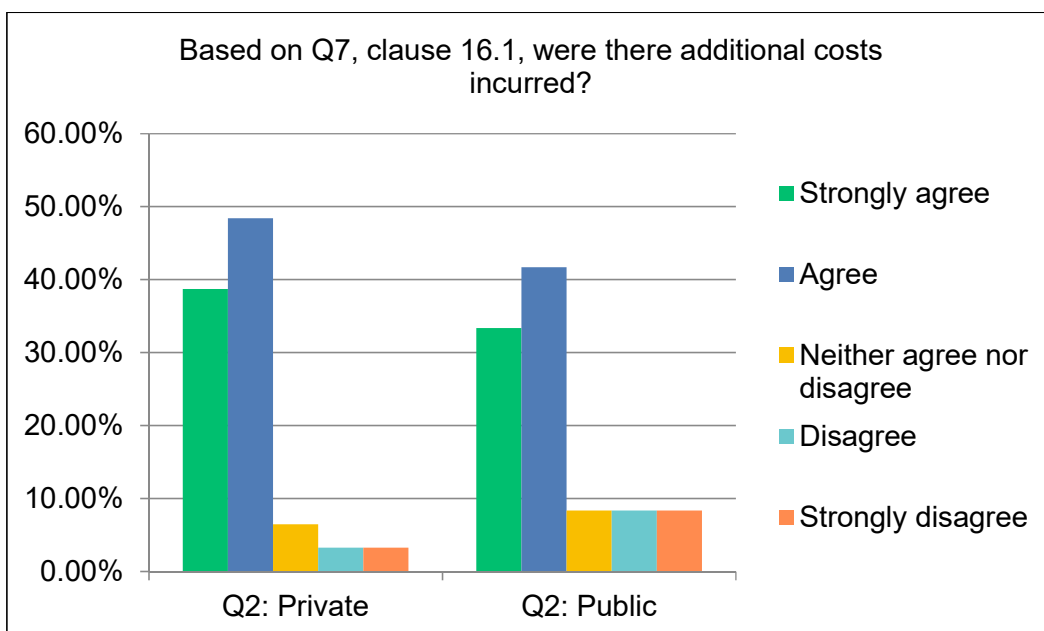


Figure 18: V10 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 1 (3.23%), disagree = 1 (3.23%), neither agree nor disagree = 2 (6.45%), agree = 15 (48.39%) and strongly agree = 12 (38.71%). Private sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 2$, $M = 1.84$, $SD = 0.92$.

Public sector data: $N = 12$, strongly disagree = 1 (8.33%), disagree = 1 (8.33%), neither agree nor disagree = 1 (8.33%), agree = 5 (41.67%) and strongly agree = 4 (33.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 2$, $M = 2.17$, $SD = 1.21$.

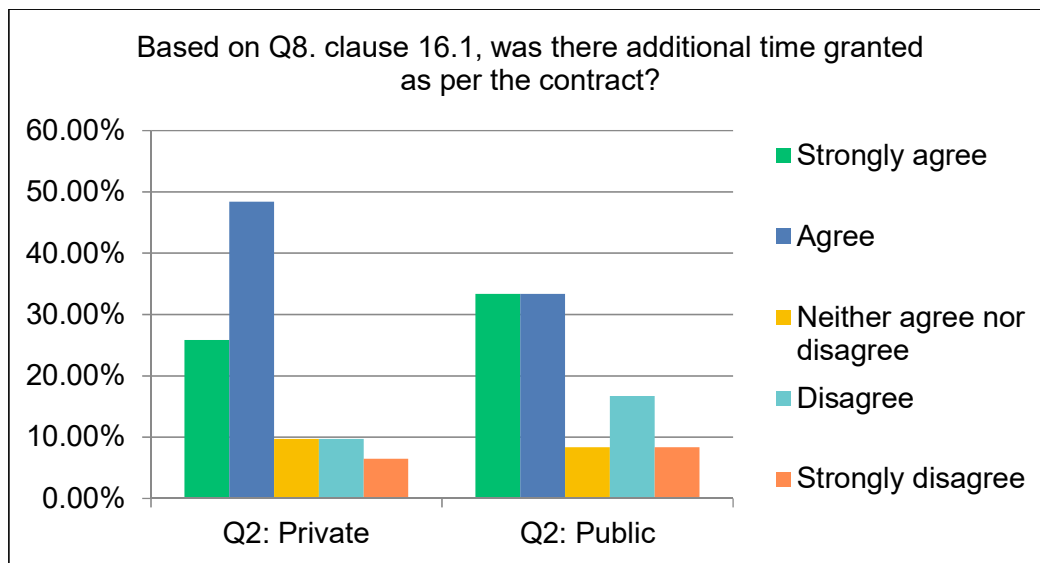


Figure 19: V11 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 2 (6.45%), disagree = 3 (9.68%), neither agree nor disagree = 3 (9.68%), agree = 15 (48.39%) and strongly agree = 8 (25.81%). Private sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 2$, $M = 2.23$, $SD = 1.13$.

Public sector data: $N = 12$, strongly disagree = 1 (8.33%), disagree = 2 (16.67%), neither agree nor disagree = 1 (8.33%), agree = 4 (33.33%) and strongly agree = 4 (33.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 5, $Mdn = 2$, $M = 2.33$, $SD = 1.31$.

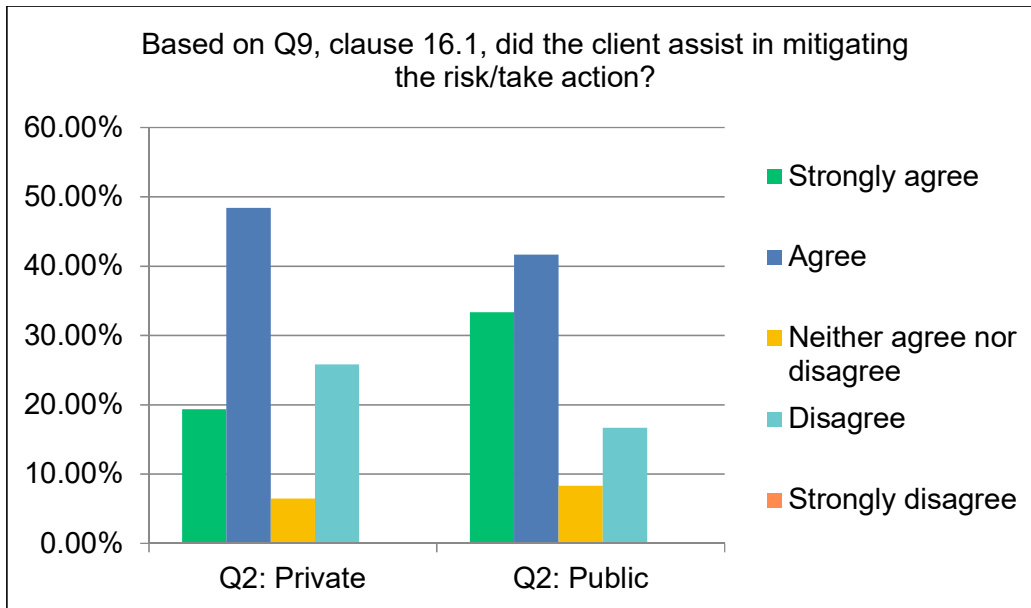


Figure 20: V12 summary of NEC3 public and private responses.

Private sector data: $N = 31$, strongly disagree = 0 (0%), disagree = 8 (25.81%), neither agree nor disagree = 2 (6.45%), agree = 15 (48.39%) and strongly agree = 6 (19.35%). Private sector survey tool basic statistics: minimum = 1, maximum = 4, $Mdn = 2$, $M = 2.39$, $SD = 1.07$.

Public sector data: $N = 12$, strongly disagree = 0 (0%), disagree = 2 (16.67%), neither agree nor disagree = 1 (8.33%), agree = 4 (41.67%) and strongly agree = 4 (33.33%). Public sector survey tool basic statistics: minimum = 1, maximum = 4, $Mdn = 2$, $M = 2.08$, $SD = 1.04$.

5.8 Correlation Analysis

To measure the strength of the relationship between the factors, a correlation analysis was performed. The Spearman's Rho correlation coefficient was applicable as ordinal data was used therefore the correlation coefficient is based on rank values. The results are interpreted as $r_s = 1$, being a perfect positive correlation and $r_s = -1$ being a perfect negative correlation. The results are tabulated in Tables 11–12. Figures 21-23 show the graphical representation of the correlation analysis.

5.8.1 Summary of correlation analysis – SPSS data

Table 11: Summary of Variable Correlation Analysis for NEC3 (Factor 1 variables), Trust (Factor 2), Relationship (Factor 3) and Success (Factor 4)

NEC3 variables		Trust	Relationship	Success	
Spearman's Rho	V6	r_s	0.265	0.109	0.154
		p	0.086	0.487	0.325
	V7	r_s	-0.030	0.011	-.363*
		p	0.849	0.947	0.017
	V8	r_s	0.018	0.012	-.356*
		p	0.910	0.941	0.019
	V9	r_s	-0.092	-0.026	-.364*
		p	0.556	0.870	0.016
	V10	r_s	0.127	0.039	0.016
		p	0.416	0.802	0.918
	V11	r_s	0.031	-0.074	-0.226
		p	0.842	0.639	0.146
V12	r_s	-0.270	-.383*	-.308*	
	p	0.080	0.011	0.044	

All the *correlations were significant at the $p < 0.05$ level; the tests were two-tailed with $N = 43$. All the **correlations were significant at the $p < 0.01$ level, the tests were two-tailed with $N = 43$.

Table 12: Summary of Factor Correlation Analysis Factors 2 to 4

Factor		Trust	Relationship	Success
Spearman's Rho	Trust (Factor 2)	1.000	.763**	.493**
			< 0.001	0.001
	Relationship (Factor 3)	.763**	1.000	.527**
		< 0.001		< 0.001
	Success (Factor 4)	.493**	.527**	1.000
		0.001	< 0.001	.493**

All the **correlations were significant at the 0.01 level; the tests were two-tailed with $N = 44$. Table 12 is further graphically represented in sections 5.8.2 to 5.8.4.

5.8.2 Graphical representation of Trust with Working Relationship factor – SPSS data

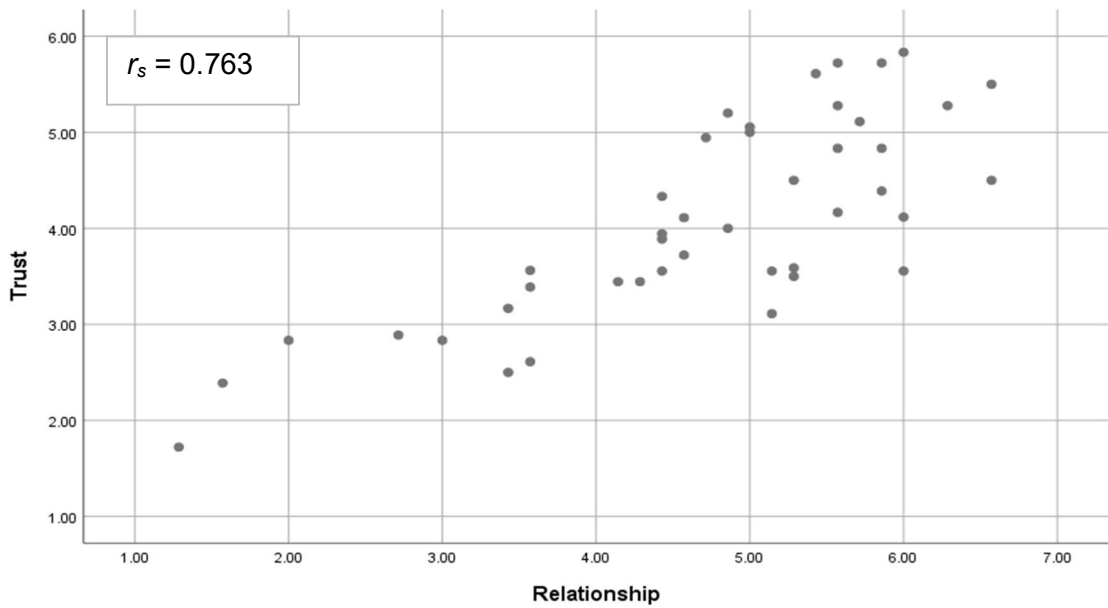


Figure 21: Trust with Working Relationship correlation graph.

A strong linear positive relationship between the trust factor and satisfaction with working relationship factor, where $p < 0.001$. The greater the trust, the better the working relationship.

5.8.3 Graphical representation of Trust with Success factors – SPSS data

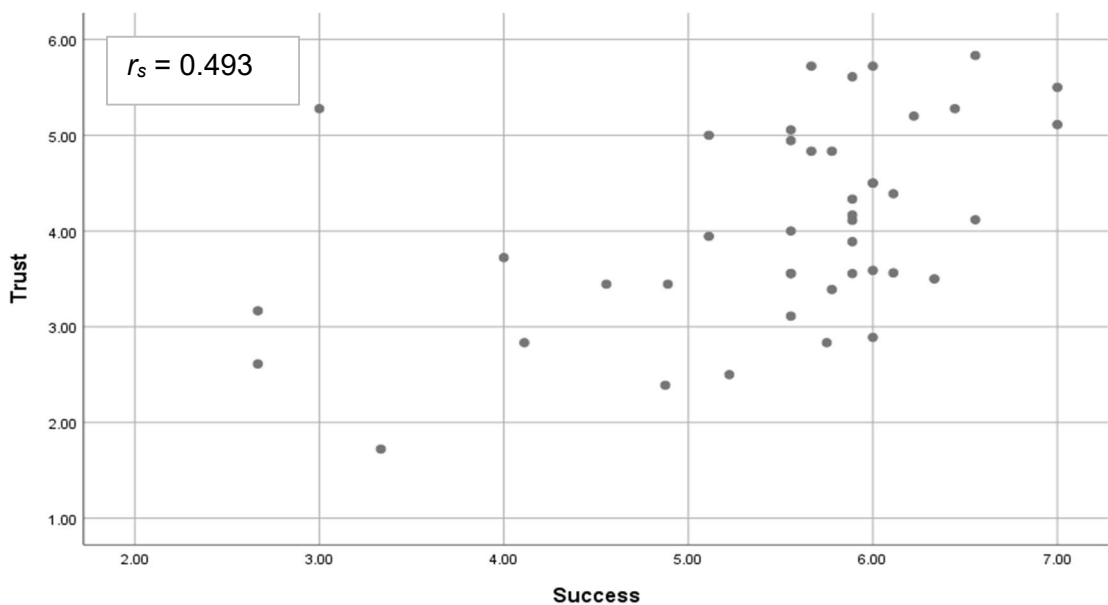


Figure 22: Trust with Success correlation graph.

A strong linear positive relationship between the trust factor and the success factor, where $p = 0.001$. The greater the trust, the better the likelihood of success.

5.8.4 Graphical representation of Working Relationship and Success factors – SPSS data

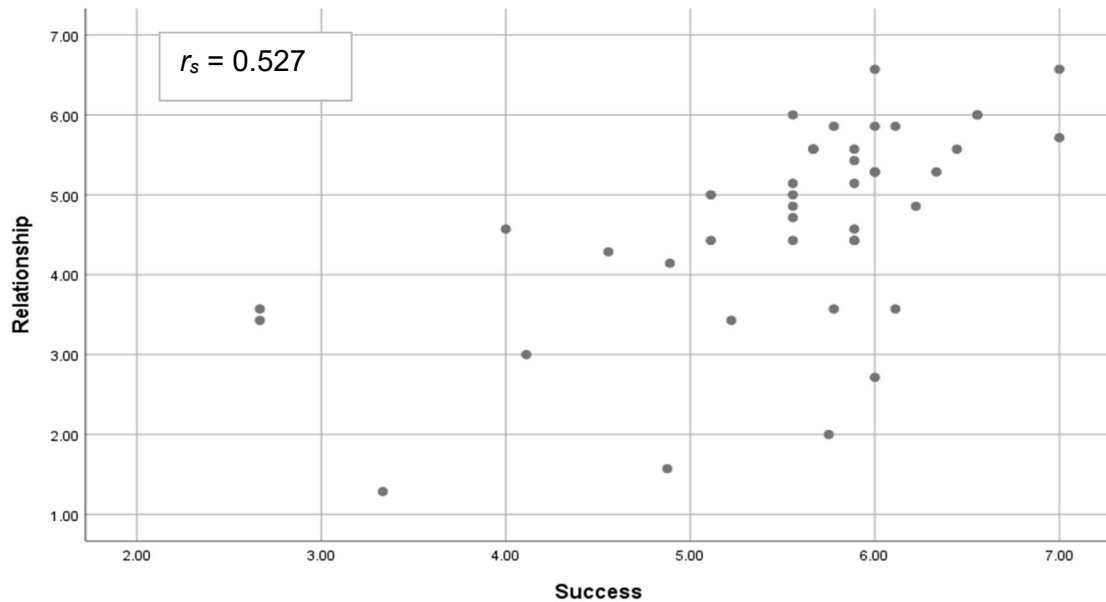


Figure 23: Working Relationship and Success graph.

A strong linear positive relationship between the working relationship factor and success factor, where $p < 0.001$. If the working relation is better, the likelihood of success is increased.

5.9 Comparison Between Sectors – SPSS Data

The comparison was done between the private and public sectors to demonstrate if there was a difference between the two sectors. This was done using a two-sample t-test. The assumption of normality was evaluated by visual inspections of histograms and q-q plots. The assumption of constant variance was evaluated using Levene's test. The results are shown in Table 13.

Table 13: Sector Comparison for Factors 2 to 4

Factor	Sector	<i>N</i>	<i>M</i>	<i>SD</i>	<i>p</i> -values	Cohen's <i>d</i>
Trust	Private	31	4.1636	0.97363	**0.434	0.23
	Public	11	3.8737	1.23880		
Relationship	Private	31	4.9217	1.05549	**0.112	0.42
	Public	11	4.2078	1.71472		
Success	Private	31	5.7124	0.80209	**0.038	0.74
	Public	11	4.7260	1.32608		

The ***p*-values were > 0.05 for Factors 2 to 3, with equal variances assumed. For Factor 4 the *p*-value is < 0.05 with equal variances not assumed. The tests were two-tailed with *N* = 31 for the private sector and *N* = 11 for the public sector.

6 ANALYSIS AND DISCUSSION

The method of analysis was designed to answer the hypothesis questions. The combination of statistical and analytical data was used to obtain the results for the analysis and discussion.

6.1 Hypothesis Question 1 Discussion – Does the Level of Participation in an NEC3 Contract Increase Trust and Create a Better Working Relationship?

The overall level of participation is determined by the respondents' answers to the survey questions with respect to the Factor 1 (NEC3) variables. The variables selected for the questionnaire, as previously discussed, represent the most participative aspects of the NEC3 during project execution and management. These variables allow all parties to inform each other of possible problems or delays, sensitise each other to material shortages/technical problems and create a platform via contractual meetings to eliminate, mitigate or resolve problems.

6.1.1 NEC3 survey responses

The Variables 6–9 of the questionnaire were obtained from Martin, Baird, and Weddell (2013). All Factor 1 variables were measured against a 5-point Likert scale and inferences were made from the results obtained.

Variable 6 “*Clause 10.1 Actions – The Employer, the Contractor and the Service Manager shall act as stated in this contract and in the spirit of mutual trust and cooperation*”.

Most of the respondents, 81.82% (agree = 50% and strongly agree = 31.82%) answered in the affirmative. $M = 3.84$ in relation to a maximum of 5, $SD = 1.26$ and $Mdn = 4$. The reference scale used for M and Mdn for this variable is closer to 5 indicates most of the respondents agree and closer to 1 means they disagree.

Variable 7 “*Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could increase the total of the Prices*”.

Most of the respondents, 88.63% (agree = 27.27% and strongly agree = 61.36%), answered in the affirmative. M = 1.61 in relation to a maximum of 5, SD of 0.98 and Mdn = 1. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Variable 8 “Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could interfere with the timing of the service”.

Most of the respondents, 90.91% (agree = 34.09% and strongly agree = 56.82%), answered in the affirmative. M = 1.59 in relation to a maximum of 5, SD = 0.86 and Mdn = 1. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Variable 9 “Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could impair the effectiveness of the service”.

Most of the respondents, 93.18% (agree = 31.82% and strongly agree = 61.36%), answered in the affirmative. M = 1.50 in relation to a maximum of 5, SD = 0.75 and Mdn 1. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

The following variables, Variables 10–12, are questions that were based on the NEC3 contract clauses, Variables 6–9. The questions were constructed to demonstrate if there was additional time and cost impact as well as collaboration between the parties.

Variable 10 “Based on Q7, clause 16.1, were there additional costs incurred?”

Most of the respondents, 84.09% (agree = 45.45% and strongly agree = 38.64%), answered in the affirmative. $M = 1.91$ in relation to a maximum of 5, $SD = 1.02$ and $Mdn = 2$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Variable 11 “Based on Q8. clause 16.1, was there additional time granted as per the contract?”

Most of the respondents, 72.73% (agree = 43.18% and strongly agree = 29.55%), answered in the affirmative. $M = 2.23$ in relation to a maximum of 5, $SD = 1.18$ and $Mdn = 2$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Variable 12 “Based on Q9, clause 16.1, did the client assist in mitigating the risk/take action?”

Most of the respondents, 70.45% (agree = 45.45% and strongly agree = 25.00%), answered in the affirmative. $M = 2.27$ in relation to a maximum of 5, $SD = 1.07$ and $Mdn = 2$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

The findings for v7–v9 show significant evidence that there is a high level of participation in the NEC3 contract. Abd El-Razek et al. (2008) ranked the “non-utilisation” of professional contract management, although stemming from the contractor’s side, as one of the highest causes of delays in projects in their study. This is a one-sided initiation from either party. The remaining respondents either disagree or neither agree nor disagree. The NEC3 contract has stipulations in terms of how to respond to the clauses in Variables 7–9 as the service manager and the contractor.

Given the findings from Shanmugapriya and Subramanian (2013) and Emsley and Alzahrami (2013), where they recommend that owner/client project

managers be competent and attempt to improve communication (Variables 6–12), show significant evidence of the contractual communication process.

The competence of the majority of project managers in this case is verified by their positions in Table 4. Although only 30.23% of the respondents hold the official title of project manager, the cumulative number of respondents (51.16%) fall within the same category. Furthermore, the remaining 48.84% (other) of them are within the desired category, however, the limited number of titles presented in the questionnaire skews this data.

To further substantiate the competence of the respondents, Table 4 also contains the educational level of all the respondents. In this case 86.37% of the respondents are in possession of a post-secondary education, i.e. from diploma to master's degree. McCord and Gunderson (2014) conclude that the capability and fairness of the project manager is one of the factors that influence the relationship. This was ranked 2/17 in the relationship factors that were ranked in order of importance.

The responses to Variables 10–12 indicate that there is significant interaction with and responses to Variables 7–9 based on the contract. This is key to effective contract management as stated by Naughter (2017) and Schepker, Oh, Martynov, and Poppo (2014). The evidence obtained is indicative of the requirements of the contract and support the PMBOK contract administration, section 12.5, of ensuring the seller meets the contractual requirements (A guide to the project management body of knowledge (PMBOK), 2008).

One of the indispensable ingredients for success in projects is inter-organisational cooperation (Fu et al., 2015). Taking the governance perspective into consideration, they defined contractual governance as “the extent to which one inter-organisational relationship is governed by a formal and written contract which explicitly stipulates the responsibilities and obligations of each other”. Similarly, the NEC3 contract – if the contract is managed correctly – makes provision for the roles and responsibilities of each party. Doloï (2013) ranked 48 attributes that influence cost performance in construction projects. The respondents were clients, contractors and

consultants. Of the 48 attributes, 'lack of communication between client and contractor ranked 16th, poor contract management ranked 21st and low speed of decision making ranked 28th overall' (Abd El-Razek et al., 2008).

In the study for cost overruns in Malaysian projects, Othman, Nasir, and Nuruddin (2017) rate project management and contract administration as the second highest with an RII of 0.892; the first is design and documentation with an RII of 0.915. They surmised that this factor affects the overall progress of the project with regards to time and, although not stated, increased time translates to increased cost.

The evidence based on Variables 10–12 in this study suggest support for the findings of both Fu et al. (2015), in the logic that the contractual governance aspect is adhered to and managed, and for Doloi (2013), according to the attribute ranking mentioned. The fourth factor mentioned by Doloi et al. (2012) dealt with the communication between parties in which they surmise that appropriate communication remained the responsibility of all parties.

The results of the responses to Variables 10–12 show that additional time and costs were incurred on the majority of the respondents' projects. The results also reveal that some collaboration from both parties was required to mitigate or eliminate the risks encountered. Overrunning cost and time, although not the subject of this study, are evident in the responses in Variables 10–12. Although no detail can be provided as in the studies by Mansfield et al. (1994), Doloi et al. (2012), Mukuka et al. (2015), Famiyeh et al. (2017) and others, it is assumed that some, if not most of the reasons mentioned in these studies, are relevant to the cost and time overruns experienced during the respondents' projects in the execution phase.

Davison and Sebastian (2009) highlighted typical contract administration problems based on contract type. Construction projects ticked 9/10 categories in their study. These were delays, definition of acceptance, change order, conflict, other sources, poor performance, risk of termination, subcontractors and cost.

Effective communication remains key to success for all stakeholders. The platform that the NEC3 contract creates, via the clauses, can be effectively

used to communicate in an open and transparent manner. Variables 7–12 show evidence of communication on a contractual basis. Communication is also one of the key aspects in developing trust. Variable 6 of the contract (Barnes et al., 2013b) states: “The Employer, the Contractor and the Service Manager shall act as stated in this contract and in the spirit of mutual trust and cooperation”.

In the responses to Variable 6, 81.82% of the respondents agreed that the above statement is true (agree = 50% and strongly agree = 31.82%). The remaining 18.18 responded negatively (disagree = 6.82% and strongly disagree = 11.36%). The deduction from these results is that the majority of the respondents have the belief that their counterparts act in trust and cooperation.

The study by Cheung et al. (2013) concluded that communication and trust were key factors that contributed to overall project success.

6.1.2 NEC3 survey responses and Factor 2 (trust) analysis

An EFA was conducted to determine the adequacy of the item correlations between the trust factor variables (Variables 13–30). For Factor 2, Bartlett’s Test for Sphericity p-value was smaller than the threshold of 0.05 at $p < 0.001$, which indicates a sufficiently large correlation between the items. The KMO value is 0.824 which is greater (> 0.8), with a total variance of 52.06% explained. Cronbach’s alpha = 0.913 and has an inter-item correlation of 0.371.

To ascertain the strength of the association between the Factor 1 variables (NEC3 Variables 6–12) and the Factor 2 (trust Variables 13–30) a correlation analysis was performed, and the results tabulated in Table 11. Figure 24 shows the results diagrammatically. As can be seen in the diagram, none of the NEC3 factor variables in relation to the trust factor variables have any statistical significance at the $p < 0.05$ or the $p < 0.01$ level.

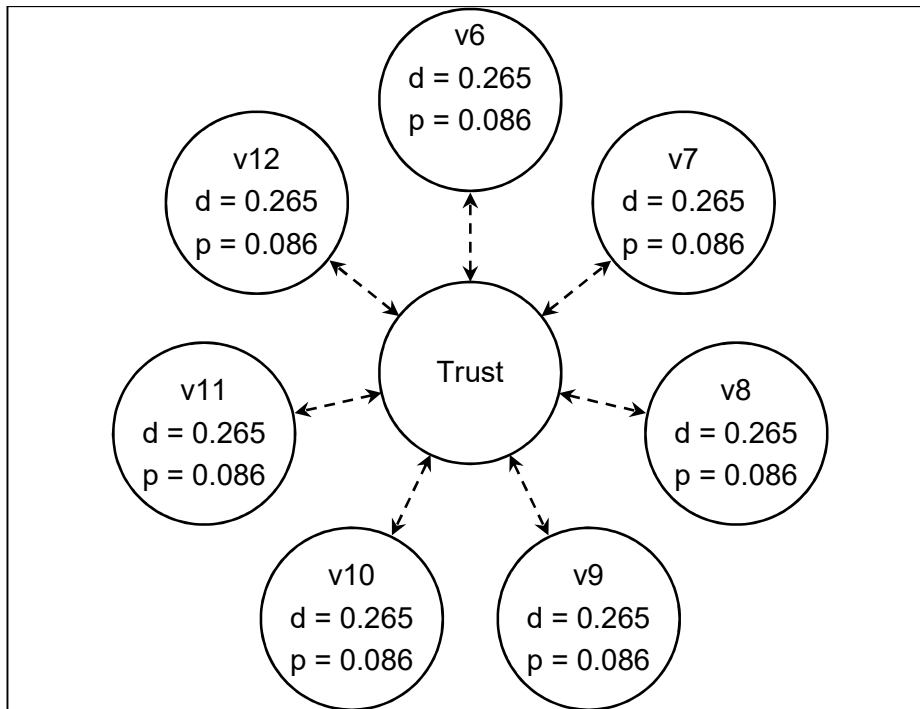


Figure 24: Diagrammatic representation of Factor 1 and Factor 2 correlation analysis results.

Projects, being temporary endeavours, require high levels of frequent communication on a two-way basis to minimise distrust between parties. Trust should not be mistaken for inter-organisational cooperation as trust can be encouraged by fear of financial loss, reputation or future work (Manu et al., 2015).

Thus far inter-organisational cooperation using the Factor 1 variables is proven. However, the results of the correlation analysis show that neither of the three forms of trust (incorporated as one factor) are significant in this study at the $p < 0.05$ and the $p < 0.01$ level. However, two of the seven variables, Variables 6 and 12 are significant at the $p < 0.1$ level.

There could be various reasons for this. First, the questionnaire was structured in general terms as a base to determine if effective contract management could be a moderator to project success. Unlike the research performed by Wong et al. (2008) and Pinto et al. (2009), where the trust factors were divided into different categories for their framework, their research produced definitive results in each of the trust categories. Perhaps

a more specific type of trust such as system-based trust, that focuses more on procedural and formal agreements, was pertinent.

Wong et al. (2008) and Bond-Barnard et al. (2018) stated that the relationship between risk and trust are reciprocal. Given this, it could be said that the parties in the study are risk-averse and the preference would be to rely heavily on the procedural aspect of project management.

Lewicki and Bunker (1996) offer a different perspective where they assumed that parties knew each other and would progress from one form of trust to the next, namely deterrence-based trust, then knowledge-based trust and eventually identification-based trust. From the findings provided, one could assume that most of the respondents are at the deterrence-based trust phase where parties were expected to honour agreements to avoid sanctions and penalties.

Additionally, Zou et al. (2014) stated that trust and relationships in private and public sector projects can increase efficiencies at a micro level but may not be able to establish trust. Both parties typically have different objectives, where the private sector is pursuing increased revenue and the public sector increased savings, better service, value for money and to advance social/public interests.

Trust initiation has been a dilemma in construction projects. Four factors were identified by Wong et al. (2005) and consist of performance (Factor 1), permeability (Factor 2), system-based trust (Factor 3) and relational bonding (Factor 4). Factor 1 consisted of six attributes which were problem-solving, competence, unity, communication and respect. The response rate to Variables 7–12 support problem-solving, competence and communication. Respect and unity cannot be validated. The combined six factors explained 28.96% of the variance. Factor 3 consisted of trust attributes and could be interpreted as system-based trust which is trust based on legal terms and bureaucracy instead of people and organisations. This factor accounted for 13.08% of the variance. They concluded that if the contractor initiated trust, the client would reciprocate.

The relationship between trust and control is dynamic (Weiping & Lu, 2017). Their research indicates that initial trust can be formed at the beginning of a project amongst parties that have not worked together before. The initial trust of any one of the parties could have an influence on the controls for the other party. However, the client has the dilemmatic choice, also mentioned by Wong et al. (2005), to trust contractors or to use the traditional safeguarding principle of the contract. In the same vein, Lau and Rowlinson (2011) conclude that although contracts are required to formalise arrangements, they are not substituting for honourable relationships. They also conclude that not only can contracts be used as a base for relationships, they can also be used to observe what barriers or constraints there are to trust and the implementation thereof.

6.1.3 NEC3 survey responses and Factor 3 (satisfaction with working relationship) analysis

Satisfaction with the working relationship is a spin-off of trust. As Rashvand and Majid (2014) stated, the success of a project cannot be limited to time, cost and quality. An EFA was conducted to determine the adequacy of the item correlations between the satisfaction with the working relationship factor variables (Variables 31–37). For Factor 3, Bartlett's Test for Sphericity p-value was smaller than the threshold of 0.05 at $p < 0.001$, which indicates a sufficiently large correlation between the items. The KMO value is 0.846 which is greater > 0.8 , with a total variance explained of 70.351%. Cronbach's alpha = 0.923 and an inter-item correlation of 0.647.

The strength of the relationship between the Factor 1 variables and the Factor 3 variables (Variables 31–37) was determined by a correlation analysis. These results are tabulated in Table 11. Figure 25 shows the results diagrammatically. As can be seen in the diagram, almost all the NEC3 factor variables in relation to the satisfaction with working relationship factor variables have a statistically significant relationship at the $p < 0.05$ or the $p < 0.01$ level. Only Variable 12 has a statistically significant relationship at the $p < 0.05$ level. Given the results of the trust factor, this partially explains the low significance of the satisfaction with working relationship factor. The generalist

approach used by Rashvand and Majid (2014) for customer satisfaction criteria showed that each group had different views on customer satisfaction.

These results also lend some credibility to Bond-Barnard et al. (2018) who stated that teams that had developed a trust base were better equipped to exploit relationship management, which in turn would increase the satisfaction in the working relationship.

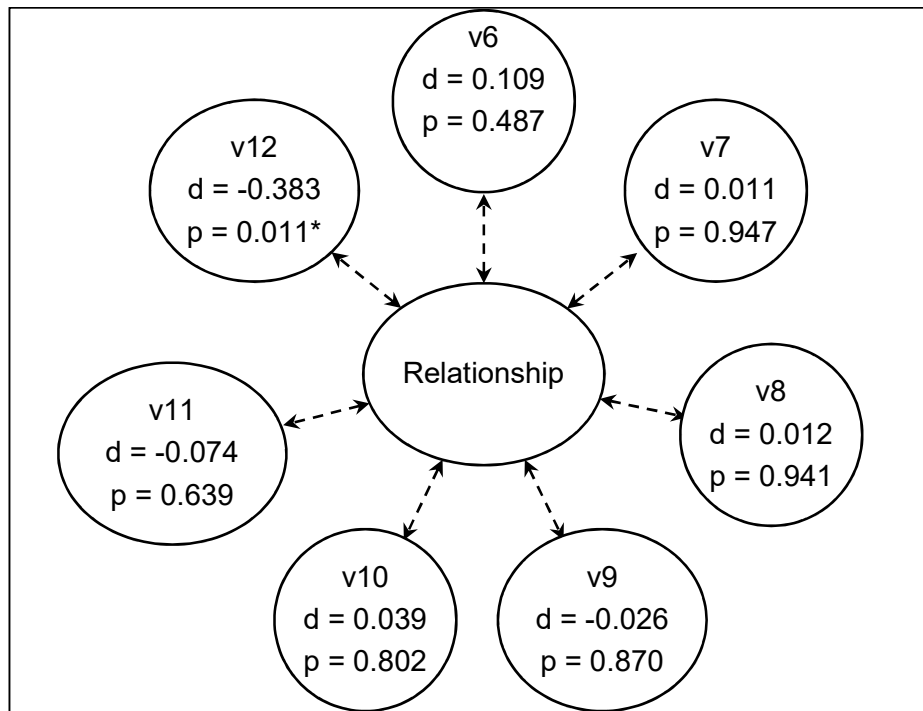


Figure 25: Diagrammatic representation of Factor 1 and Factor 3 correlation analysis results

6.1.4 NEC3 survey responses and Factor 4 (project success) analysis

The success component (Factor 4) of the project was measured and analysed in the same manner as Factors 2 and 3. An EFA was conducted to determine the adequacy of the item correlations between the project success factor variables (Variables 38–46). For Factor 4, Bartlett’s Test for Sphericity p-value was smaller than the threshold of 0.05 at $p < 0.001$, which indicates a sufficiently large correlation between the items. The KMO value is 0.814 which is greater than > 0.8 , with a total variance explained of 64.396%. Cronbach’s alpha = 0.928 and an inter-item correlation of 0.597.

The strength of the relationship between the Factor 1 variables and the Factor 4 variables (Variables 38–46) was determined by a correlation analysis. These results are tabulated in Table 11. Figure 26 shows the results diagrammatically. The results for this analysis are slightly different to the previous two factors. As can be seen in the diagram, four of the seven NEC3 factor variables, in relation to the project success factor variables, have a statistically significant relationship at the $p < 0.05$ level. Variables 7, 8, 9 and 12 are significant at the $p < 0.05$ level.

- There was a positive correlation between Variable 7 and the project success factor, $r = -0.363$, $N = 43$, $p = 0.017$.
- There was a positive correlation between Variable 8 and the project success factor, $r = -0.356$, $N = 43$, $p = 0.019$.
- There was a positive correlation between Variable 9 and the project success factor, $r = -0.364$, $N = 43$, $p = 0.016$.
- There was a negative correlation between Variable 12 and the project success factor, $r = -0.308$, $N = 43$, $p = 0.044$.

Notably, all four NEC3 variables that have a significant relationship are those that require some sort of interaction and collaboration between the parties. Mir and Pinnington (2014) focused on five enablers for high PM performance and the measurement of these was summed up in KPIs. Of the five, PM partnerships were of interest where the emphasis was placed on win-win partnerships and the effectiveness of these partnerships. Their view suggested that a collaborative effort between client and contractor was fundamental to achieving project success. The result of the analysis supports this finding.

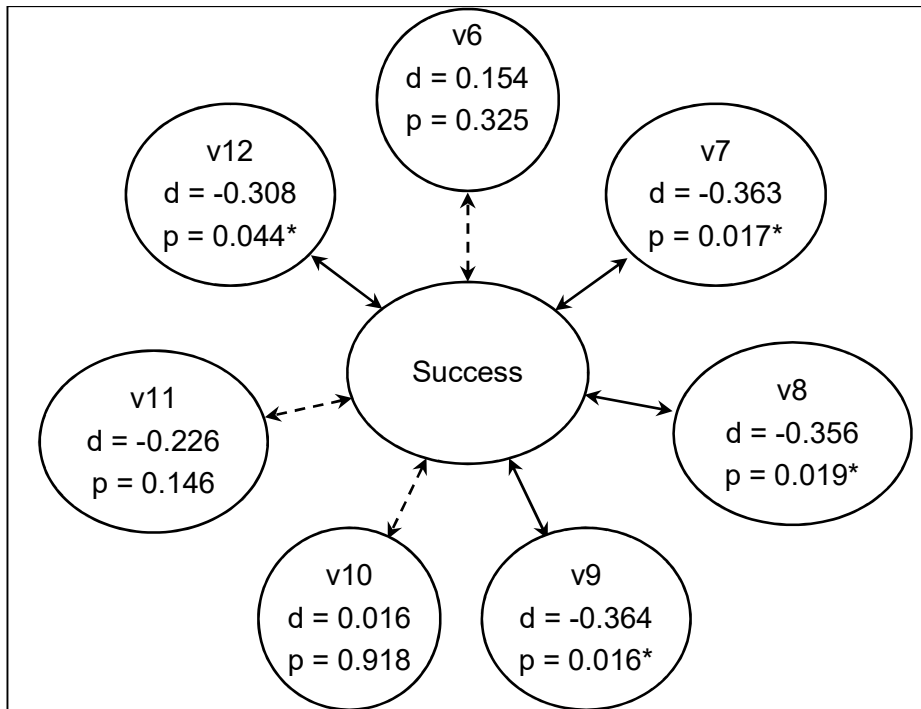


Figure 26: Diagrammatic representation of Factor 1 and Factor 4 correlation analysis results.

The success of projects depends on many factors and these factors often vary from client to client and contractor to contractor. Of the five categories used in the Pentagon model (Rolstadås et al., 2014), three of these would be applicable to the result of this study.

First, well-developed governance, procedures-aligned governance and contract strategy are considered. This category is validated using the NEC3 contract clauses that stipulate responses and response times. Secondly, proven project tools and risk management are viewed. Again, the NEC3 contract clauses are used as a monitoring tool and a tool to reduce risk. Thirdly, good interaction-information strategy and stakeholder management are the focus. This aspect is crucial as the sharing of information and managing the stakeholder expectation is critical. The NEC3 clauses provide the means to do both as is evident in the responses to Factor 4.

The results of the analysis seemed insufficient to draw an empirical conclusion for this hypothesis. This prompted further analysis to investigate

the correlation between Factors 2 to 4. The EFA for each factor was previously analysed.

6.1.5 Factor 2 to 4 correlation analysis

The results for this analysis showed that the factors had a significant statistical relationship at a $p \leq 0.001$ level. There was a positive correlation between trust and working relationship factors: $r = 0.763$, $N = 43$, $p < 0.001$. There was a positive correlation between working relationship and project success factors: $r = 0.527$, $N = 43$, $p < 0.001$. There was a positive correlation between trust and project success factors: $r = 0.493$, $N = 43$, $p = 0.001$. Figure 27 shows these results diagrammatically.

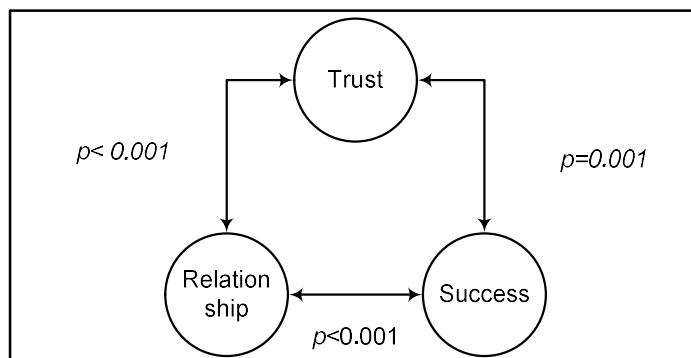


Figure 27: Diagrammatic representation of Factors 2, 3 and 4 correlation analysis results.

These results support the findings of Pinto et al. (2009) and Cheung et al. (2013). The graphical scatterplot representation of this analysis in Figures 21–23 show a strong linear positive relationship between these factors.

The foundation for system-based trust is the communication system, contracts/agreements and the organisational policy (Wong et al., 2008). Contracts and agreements create the base for working relationships and state the obligations for each party. These reduce uncertainties, have explicit expectations and share/shift risk amongst the contracting parties. This ultimately contributes to fair risk allocation, reduction in cost and improved overall project performance. Even though the structure of this research for Factor 4 (trust factor) does not explicitly cater for the various types of trust in this study. However, there is a high likelihood of system-based trust amid the groups in this study.

The research objective has been met. The analysis and discussion have given sufficient information and data to either accept the null or alternative hypothesis.

- The Null hypothesis (H_0) – There is a relationship between the level of participation in an NEC3 contract and trust.
- The Alternate hypothesis (H_1) – There is no relationship between the level of participation in an NEC3 contract and trust.

In this case H_0 is rejected in favour of H_1 .

6.2 Hypothesis Question 2 Discussion – Is the Level of Participation Greater in the Public Sector Than in the Private Sector?

The level of participation is determined by the respondents' answers to the survey questions with respect to the Factor 1 (NEC3) variables. The analysis of the survey data was conducted in a similar fashion to the analysis of the survey data for hypothesis question 1. In this case however, the results are split between private and public sectors.

6.2.1 NEC3 survey responses

The Variables 6–9 of the questionnaire were obtained from (Barnes et al., 2013a).

Variable 6: “Clause 10.1 Actions – The Employer, the Contractor and the Service Manager shall act as stated in this contract and in the spirit of mutual trust and cooperation”.

Private sector: most of the respondents, 80.64% (agree = 51.61% and strongly agree = 29.03%) answered in the affirmative. $M = 3.81$ in relation to a maximum of 5, $SD = 1.23$ and $Mdn = 4$ and $n = 31$. The reference scale used for the M and Mdn for this variable is closer to 5 indicates most of the respondents agree and closer to 1 means they disagree.

Public sector: most of the respondents, 83.33% (agree = 50% and strongly agree = 33.33%) answered in the affirmative. $M = 3.83$ in relation to a maximum of 5, $SD = 1.34$ and $Mdn = 4$ and $n = 12$. The reference

scale used for M and Mdn for this variable is closer to 5 indicates most of the respondents agree and closer to 1 means they disagree.

Variable 7: “Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could increase the total of the Prices”.

Private sector: most of the respondents, 87.1% (agree = 25.81% and strongly agree = 61.29%) answered in the affirmative. M = 1.65 in relation to a maximum of 5, SD = 1.03 and Mdn = 1 and n = 31. The reference scale used for the M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Public sector: most of the respondents, 91.66% (agree = 33.33% and strongly agree = 58.33%) answered in the affirmative. M = 1.58 in relation to a maximum of 4, SD = 0.86 and Mdn = 1 and n = 12. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 4 means they disagree.

Variable 8: “Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could interfere with the timing of the service”.

Private sector: most of the respondents, 90.32% (agree = 35.48% and strongly agree = 54.84%) answered in the affirmative. M = 1.65 in relation to a maximum of 5, SD = 0.93 and the Mdn = 1 and n = 31. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Public sector: most of the respondents, 91.66% (agree = 33.33% and strongly agree = 58.33%) answered in the affirmative. M = 1.5 in relation to a maximum of 3, SD = 0.65 and Mdn = 1 and n = 12. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 3 means they disagree.

Variable 9: “Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could impair the effectiveness of the service”.

Private sector: most of the respondents, 90.32% (agree = 29.03% and strongly agree = 61.29%) answered in the affirmative. M = 1.55 in relation to a maximum of 4, SD = 0.84 and Mdn = 1 and n = 31. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 4 means they disagree.

Public sector: all the respondents, 100% (agree = 41.67% and strongly agree = 58.33%) answered in the affirmative. M = 1.42 in relation to a maximum of 2, SD = 0.49 and Mdn = 1 and n = 12. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 2 means they disagree.

Variables 7–9 are clauses within the NEC3 contract that either party could use to initiate a contractual meeting for the reasons it was intended. When reviewing the averages of this data, it is clear that on average the public sector (average of 91.66%) scores higher than the private sector (average of 87.095%) in terms of positive responses. The average of the measure of central tendency, using the mean, is approximately the same with the private sector scoring slightly higher at 2.165% than the public sector at 2.0825%. The average Mdn for both groups is 1.

Of importance to note is that these clauses are used to inform parties and initiate meetings or discussions. Examples of the kind of risks associated with the type of correspondence are schedule risks-delays, contractual risk-change order, performance risk-poor performance, subcontractors, other risks, risk of failure and price risk-cost (Davison & Sebastian, 2009). Although the information is still relevant, it is not a reliable measure of the levels of participation for either party.

The following variables, Variables 10–12, are questions that were based on the NEC3 contract clauses, Variables 6–9. The questions were constructed

to demonstrate if there was additional time and cost impact as well as collaboration between the parties.

Variable 10: “Based on Q7, clause 16.1, were there additional costs incurred?”.

Private sector: most of the respondents, 87.1% (agree = 48.39% and strongly agree = 38.71%) answered in the affirmative. $M = 1.84$ in relation to a maximum of 5, $SD = 0.92$ and $Mdn = 2$ and $n = 31$. The reference scale used for the M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Public sector: most of the respondents, 75% (agree = 41.67% and strongly agree = 33.33%) answered in the affirmative. $M = 2.17$ in relation to a maximum of 5, $SD = 1.21$ and $Mdn = 2$ and $n = 12$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Variable 11: “Based on Q8. clause 16.1, was there additional time granted as per the contract?”.

Private sector: most of the respondents, 74.2% (agree = 48.39% and strongly agree = 25.81%) answered in the affirmative. $M = 2.23$ in relation to a maximum of 5, $SD = 1.13$ and $Mdn = 2$ and $n = 31$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Public sector: most of the respondents, 66.66% (agree = 33.33% and strongly agree = 33.33%) answered in the affirmative. $M = 2.33$ in relation to a maximum of 5, $SD = 1.31$ and $Mdn = 2$ and $n = 12$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

Variable 12: “Based on Q9, clause 16.1, did the client assist in mitigating the risk/take action?”.

Private sector: most of the respondents, 67.74% (agree = 48.39% and strongly agree = 19.35%) answered in the affirmative. $M = 2.39$ in relation to a maximum of 4, $SD = 1.07$ and $Mdn = 2$ and $N = 31$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 4 means they disagree.

Public sector: most of the respondents, 75% (agree = 41.67% and strongly agree = 33.33%) answered in the affirmative. $M = 2.08$ in relation to a maximum of 4, $SD = 1.04$ and $Mdn = 2$ and $N = 12$. The reference scale used for M and Mdn for this variable is closer to 1 indicates most of the respondents agree and closer to 5 means they disagree.

When reviewing the averages of this data, it is seen that on average the public sector (72.22%) scores lower than the private sector (76.346%) in terms of positive responses. The average of the measure of central tendency, using the mean, is approximately the same with the private sector scoring slightly lower at 2.153% than the public sector at 2.1933%. The average Mdn for both groups is 2.

The response by parties with regards to Variable 12 is of interest. The private sector positive response is 67.74% and the public sector is 75%. This difference indicates that the private sector has the perception that their client in the public sector is not as eager to assist in resolving problems or mitigating risks. On the other hand, the higher positive response rate of the public sector indicates that the contractor (private sector) is more willing to assist in risk mitigation and resolving problems.

6.2.2 Private and public sector t-test analysis

Further to the analysis and comparison of the survey data, a two-sample t-test analysis was performed to ascertain how the level of participation by the two sectors affects Factors 2–4. The results are tabulated in Table 13.

For Factor 2, the independent two-sample t-test was conducted to make a comparison between the private and public sector for the trust factor. There was no statistically significant difference in the scores for the private sector ($M = 4.16$, $SD = 0.97$) and the public sector ($M = 3.87$, $SD = 1.23$) conditions;

$t(40) = 0.8, p = 0.434$ at a statistically significant level of $p < 0.05, d = 0.23, 95\%CI [-0.45, 1.03]$.

For Factor 3, the independent two-sample t-test was conducted to make a comparison between the private and public sector for the satisfaction with working relationship factor. There was no statistically significant difference in the scores for the private sector ($M = 4.92, SD = 1.06$) and the public sector ($M = 4.2, SD = 1.71$) conditions; $t(12.8) = 1.3, p = 0.218$ at a statistically significant level of $p < 0.05, d = 0.24, 95\%CI [-0.45, 1.91]$.

For Factor 4, the independent two-sample t-test was conducted to make a comparison between the private and public sector for the success factor. There was a statistically significant difference in the scores for the private sector ($M = 5.71, SD = 0.80$) and the public sector ($M = 4.73, SD = 1.33$) conditions; $t(12.7) = 2.32, p = 0.038$ at a statistically significant level of $p < 0.05, d = 0.23, 95\%CI [0.07, 1.91]$.

These results are similar to that of hypothesis 1. The level of participation between the two sectors only has a statistically significant difference on Factor 4. Ziek and Anderson (2014) stated in their review of past literature that there was an indication that there is a relationship between performance and communication. Furthermore, they found that teams that have high cooperation, formally and informally, differed from teams with low cooperation.

The successful project teams were adept at communication and coordination and were able to resolve various problems. Given the complexity of RM in PPP contracted services, some of the results can be explained. One of the key contributors to the success of projects between private and public sectors is the quality of the relationship (Zou et al., 2014). The relationship as such, is based solely on the contractual agreement.

This researcher has some concerns regarding the sub-group size. The private sector ($n = 31$) and the public sector ($n = 12$) show a vast difference in the total of respondents. This could have an impact on the outcome of the results. Had the

sample sizes been closer – as was the aim initially – this might not have been of concern.

The research objective has been met. The analysis and discussion have given sufficient information and data to either accept the null or alternative hypothesis.

- The Null hypothesis (H_0) – The level of participation in an NEC3 contract is greater in public sector projects than in the private sector.
- The Alternate hypothesis (H_1) – The level of participation in an NEC3 contract is less in public sector projects than in the private sector.

In this case, H_0 is rejected in favour of H_1 .

7 CONCLUSION

Since the NEC3 family and standard contracts were conceived in 1985, this contract has been gaining momentum and popularity in South Africa. The reason for its conception was due to a recommendation to the Council for the London Institution of Civil Engineers by its Legal Affairs Committee to “lead a fundamental review of alternative contract strategies, with the objective of identifying the needs for good practice” (Construction Industry Development Board, 2005). While other contracts are still being used, the aim of this study was to determine how the effective administration of this contract type moderates to trust and project success. Secondly, given the large cost of the public project in South Africa, the aim was to measure if the utilisation of the contract is more evident in the public or private sectors.

7.1 Principal Findings

It is clear from the results that the effective administration of the NEC3 contract does not act as a moderator to trust in the South Africa project environment. The current use of the contract is more in the traditional sense and serves a safeguarding function, including incentive provisions. Incentive provisions create a predictable environment in which cooperation is based on economic rationale (Fu et al., 2015). The efficiency of the contract administration is more aligned with a coordination function, although it can be inferred from the results that system-based trust is more evident (Cheung et al., 2013).

The effective administration of the contract does not show any evidence with regards to the satisfaction with the working relationship. This could be that the projects are too short term to adequately develop a working relationship or the absence of the trust factor. KPIs are the measure of the working relationship and the financial and relational aspects of the project.

The current South African projects environment has been in the spotlight for a few years primarily for corruption, cost and time overruns. Given the complexity of creating RM in a PPP environment, it exacerbates and further complicates the development of integrity trust, competence trust, intuitive trust and trust in general. These issues combined do not create an environment conducive for RM. Instead,

inter-organisational cooperation forms the base of most, if not all, contractual relationships in the current South African environment.

The success of projects is interpreted differently by stakeholders. Project efficiency is defined as the project meeting the time, cost and quality aspects whereas project success is measured by meeting the stakeholders' requirements in terms of strategic goals and return on investment (Rolstadås et al., 2014; Serrador & Turner, 2015; Patanakul & Shenhar, 2011). The use of KPIs to measure project success can significantly impact PM success (Mir & Pinnington, 2014) and these can be/are also used as contractual incentives. Within the survey results, respondents were asked if additional time and costs were incurred, to which the majority responded in the affirmative. When correlating project efficiency to project success, Serrador and Turner (2015) noted that efficiency was highly correlated to project success in industries such as utilities and healthcare and the least correlated for government and technology.

The correlation analysis performed on Factors 2–4 yielded results that supported Pinto et al. (2009). This proved emphatically that trust, satisfaction with working relationship and project success were highly correlated without the inclusion of Factor 1 variables (NEC3 contract). The interpretation of this is that the contractual governance aspect of PM in South Africa is still the most relied on mechanism and the development of trust, other than system-based trust, still has a long way to go.

The comparison between sectors showed no statistically significant differences for Factors 2–3. However, Factor 4 showed a statistically significant difference with the private sector scoring higher than the public sector. The response to Variable 12 is also indicative of the private sector believing the public sector is less keen to assist in resolving problems. This supports the arms-length approach stated by Shanmugapriya and Subramanian (2013) and findings from Emsley and Alzahrami (2013) who suggest that the success of construction projects is closely related to contractors.

7.2 Implication for Management and Other Stakeholders

The sole reliance on the traditional safeguarding principle of contractual governance is fading. The research in this study focused on verifying additional soft tools to be

used in conjunction with this method. As changes often follow contractual agreements, contracts need to serve as adaptation tools which should force relationships between organisations to adapt (Schepker et al., 2014). These changes can be exogenous due to economic uncertainty, political or legal changes or endogenous due to resource restrictions and financial constraints to mention a few.

Stakeholders would be remiss to ignore the importance of trust in contractual relationships. Furthermore, in the current South African climate the propensity to trust becomes a key aspect in avoiding exploitation from either party. Fu et al. (2015) surmise that although increased contractual incentives can motivate contractors to perform better at their task, this does not necessarily promote trust. The soft components (trust, communication, cooperation and commitment) and the hard components (formal contracts) are key to contractual alliancing. These are complementary and cannot be substituted. In addition, they conclude that the client is responsible for relationship development.

The decision to invest in relational behaviour is prompted by a balance of the relational benefit and the cost of the effort. Contractors' relational behaviours are activated after initiation by the client promoting and resulting in the development of mutual relations. Wong et al. (2005) state that if the client uses control measures and trust correctly, project performance can be increased by this harmonious relationship.

Stakeholders and managers need to select project teams critically. The constant rotation of teams to various clients leaves no room for relational development. Buvik and Rolfsen (2015) state in their discussion that positive prior ties significantly affect the development of trust in project teams. Shared experiences are drawn on to create an atmosphere of shared learning, open communication, common philosophies, shared trust and clear expectations regarding roles.

7.3 Limitations of the Research

The study is based on the NEC3 terms and conditions contract. Not all areas of the contract were covered in the study. Only those that had an impact on project management success where the employer must participate were included and analysed. Given the limited time and resources, a cross-sectional study was done to

give an indication of the extent of participation. Furthermore, whereas the only industry that was excluded was the building industry as the general contract used is the JBCC, the study was limited to projects that had been completed in South Africa.

First, this study adds to the current literature on trust, satisfaction with working relationships and project success but gleans on the effect of contract administration and its possible moderating effect on trust-building relationships in South Africa.

Secondly, although there is evidence of system-based trust, the analysis was done on trust as a general factor and not sub-divided into competence, integrity and intuitive trust.

The third aspect of the limitation is the sample size. The respondent selection is not broad enough to encompass most of the major projects that used the NEC3 contracts done in the country. The convenience sampling method used only gave access to known respondents.

The fourth limitation is the cost and time overruns as per the respondents' responses. The responses to the trust and satisfaction with working relationship factors could have been marred due to not knowing the reason for the cost and time overruns. The various studies by Doloï et al. (2012), Emsley and Alzahrami (2013), Gunduz et al. (2013), Mansfield et al. (1994) and Shanmugapriya and Subramanian (2013) investigate the details for cost and time overruns in various countries. Although there is some confidence that some of the findings will be similar to those already presented by the various researchers, there could be aspects that are unique to this country and environment.

The fifth limitation of the research was that the focus was on individuals in project management or similar roles who are using the NEC3 contract or have used it in the past.

7.4 Suggestions for Future Research

The South African environment is ever changing and projects within this country are key to development and growth. This study has essentially looked at effective contract administration at a high level. The current quantitative study to establish the

role of effective contract administration can or should be validated by the use of a qualitative study which could give more details about the reason behind various responses based on the contractual relations between client and contractor.

Furthermore, the findings for comparison between sectors can be better substantiated with a qualitative analysis. Future research should also focus on companies rather than individuals as individual opinions could be biased. This occurs in the project environment when trust either declines as part of the trust development phase or, in some cases, after a single incident (Lewicki & Bunker, 1996).

Contractual controls will remain but the need to understand the unique reason behind cost and time overruns is key to understanding the current culture of distrust in organisations. Various methods, such as the Theory of Constraints (TOC) and Total Quality Management (TQM) (Bryde, 2003), used as tools/methods for planning and implementation of projects have had success in reducing these aspects. Limited research with the focus on South Africa has been done in these areas.

The TOC principle encompasses critical chain scheduling. This may seem like a planning tool; however, the effective implementation thereof manages client expectations. This can also be applied to cost and risk management (Steyn, 2002). This avenue needs to be explored within contract management at the feasibility phase to highlight risks and essentially reduce costs. In addition, the collaborative approach has an influence on trust.

Another form of contracting that can be explored is that of client-contractor collaboration. This type of partnership is a joint venture that is underpinned by standard forms of contracts. It typically includes a form of incentive system based on targets with a risk-reward element (Bresnan & Nick, 2000). The responsibilities within this PPP partnership differ from those of a traditional contract (Sarmiento & Renneboog, 2014). The more collaborative approach has the potential to reduce cost as bigger organisations such as the public sectors have more buying power and influence over suppliers. In addition, both parties when involved from conception to handover, with mutual agreements, can influence changes in cost and time.

Research into project alliancing can be very beneficial. This procurement approach

offers its clients an alternative to opportunistic behaviour in highly complex projects. Key advantages are that it embeds collaboration and demands transparency and accountability (Walker, Harley, & Mills, 2015). They also state in their results that one of the major factors that contribute to an alliance is communication and trust between leadership and operational teams.

The South African cultural environment is extremely diverse. Research in these aspects could give some understanding of how interactions between project managers of organisations play out. Cultural beliefs play an important role in establishing trust between individuals. The more interaction and collaboration within the contracting and projects environment can only improve trust, create a satisfactory working relationship and increase the chances of success. Furthermore, barriers to these softer aspects in the project management environment in South Africa can be identified, analysed and mitigated for future projects.

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Appendix 1 – Copy of survey questions

Variable	Item/Description	
V1	In what industry do you primarily work?	Respondent demographic
V2	Is this private or public sector?	
V3	What is your position?	
V4	What is the highest level of schooling you have completed or the highest degree you have received?	
V5	How many years of experience in project management do you have?	
V6	Clause 10.1 Actions – The Employer, the Contractor and the Service Manager shall act as stated in this contract and in the spirit of mutual trust and cooperation.	NEC3 Contract
V7	Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could increase the total of the prices.	
V8	Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could interfere with the timing of the service.	
V9	Clause 16.1 Early warning – The Contractor and the Service Manager give an early warning by notifying the other as soon as either becomes aware of any matter which could impair the effectiveness of the service.	
V10	Based on Q7, clause 16.1, were additional costs incurred?	

V11	Based on Q8. clause 16.1, was additional time granted as per the contract?	
V12	Based on Q9, clause 16.1, did the client assist in mitigating the risk/taking action?	
V13	I feel comfortable about being dependent on the other party throughout the life of the project.	Trust
V14	I believe the other party will keep their word throughout the life of the project.	
V15	I feel confident that the other party has a high level of integrity.	
V16	I believe the other party will adhere to high ethical principles throughout the life of the project.	
V17	I am certain the other party will be fair throughout the life of the project.	
V18	I believe the other party would like to see me do well.	
V19	I can rely on the other party to not take advantage of me.	
V20	I am certain the other party has the ability to perform productively.	
V21	I believe the project engineers and other technical people are competent.	
V22	I am willing to be vulnerable to the other party.	
V23	I believe the other party has ulterior motives or hidden agendas.	
V24	My "gut feeling" tells me to be cautious when dealing with the other party on a project.	

V25	The other party would not knowingly hurt me in order to benefit themselves during the life of the project.	
V26	The other party is professional and dedicated.	
V27	Most people, even those who are not close friends of the other party, would trust and respect them if they were to execute a project with them.	
V28	Other associates who must interact with these individuals would consider them to be trustworthy if they had to execute a project.	
V29	Given the other party's track record, I see no reason to doubt their competence and preparation for future projects.	
V30	I can rely on the other party not to make the project more difficult by careless work.	
V31	My working relationship with the other party feels right.	Satisfaction with working relationship
V32	I enjoy associating with the other party throughout the life of the project.	
V33	I can talk freely to the other party about difficulties I am having on the project and know they will want to listen	
V34	If I shared problems with the parties during the project, I know they would respond constructively and caringly.	
V35	We would feel a sense of loss if one of us was transferred and we could not complete the project together.	
V36	I would have to say that we have made a considerable emotional investment in our relationship.	
V37	We can all freely share our ideas, feelings and hopes during the project.	

V38	This project has/will come in on schedule.	Project success
V39	This project has/will come in on budget.	
V40	The project results, or deliverables, are in line with the client/contractor objectives.	
V41	The project that has been developed performs as intended (or, if still being developed, looks as if it would work).	
V42	Given the problem for which it was developed, this project seems to do the best job of solving that problem – it was the best choice among the set of alternatives.	
V43	I am/was satisfied with the process by which this project is being/was completed.	
V44	This project will have a positive impact on those who make use of it.	
V45	The client is/will be satisfied with the project outcomes.	
V46	I am enthusiastic about the chances for success in this project.	

Source: Pinto, Slevin, and English (2009)