

**THE METHODS EMPLOYED BY CONSTRUCTION PROFESSIONALS IN
ANALYSING DELAY CLAIMS UNDER THE JBCC'S PRINCIPAL BUILDING
AGREEMENT**

by

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DECLARATION

"I declare that the field study hereby handed in for the qualification Master's in Business Administration at the UFS Business School at the University of the Free State is my own independent work and that I have not previously submitted the same work, either as a whole or in part, for a qualification at/in another university."

Date: 11 Nov 2014

Signed:

A handwritten signature in black ink, appearing to be 'J. M. M. M.', written in a cursive style.

ABSTRACT

Resolving extension of time claims amicably and expeditiously seems an elusive concept for parties involved on construction projects. In the absence of generally accepted standards of practice and techniques for evaluating the extension of time claims in the construction industry, the methods of evaluation currently used by principal agents lead to disputes that tend to result in litigation and arbitration.

The aim of this research study was to determine the manner in which practitioners from a portion of the construction industry in South Africa perform the analysis of extension of time claims within the JBCC standard form of contract. As there are currently no standards of practice regarding delay analysis or schedules in South Africa, some international standards were expanded upon in order to establish local norms in comparison to international standards.

Within the contexts of the aims of the research, the researcher selected a mixed-method approach by utilising both qualitative and quantitative methods to investigate the current methods and delay analysis techniques employed by professionals in the construction industry in South Africa.

The researcher used a purposive sampling method with the aim of targeting construction professionals who could specifically contribute towards the objectives of the study.

Data collection was performed by analysing the literature and utilising semi-structured interviews. The semi-structured interviews were selected because of the perceived amplification of objectivity when obtaining responses. A pilot study was also conducted with an esteemed academic and experienced JBCC professional, which assisted in significantly refining the questions that constituted the semi-structured interview.

The findings of the research were that in this absence of a standard form of analysis, professionals in a portion of the South African construction industry have no knowledge of any formal analysis techniques when evaluating claims. Moreover, the research demonstrated that the absence of this standard, results in a portion of the industry applying different methods to the same extension of time claim, thereby creating inconsistent results for both contractors and employers to follow. Although the

research indicated a lack of knowledge of any of the formal delay analysis techniques, it was discovered that principal agents unknowingly use either the *As Planned Impacted* or the *As Planned But For* technique when they evaluate claims. The latter of which were the preferred technique.

The significance of the data within the context of the problem statement is that the two techniques, namely *As Planned Impacted* and the *As Planned But For* technique differ quite substantially in terms of the risk, additional cost and penalties they infer upon both parties to the building contract and the research confirms that there is a definite need for an objective standard in terms of delay claim adjudications.

KEY WORDS: delay, construction, extension of time claims, delay analysis techniques, JBCC, principal agents, construction programmes, schedules.

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CHAPTER 1: INTRODUCTION

1.1 BACKGROUND TO THE RESEARCH PROBLEM

Many reports indicate that worldwide, most projects in the construction industry are delayed in terms of their planned completion date (Pinell, 2005: 3). In the United Kingdom (UK) in 2005, it was reported that a mere 44% of government agencies' construction projects were completed on time (Pickavance, 2010: 3). Delay is one of the most common causes of construction related disputes and also one of the most difficult to evaluate (Critchlow, et al., 2006: 3).

Notable recent examples of delayed projects in South Africa include the Medupi coal fired power station and the Gautrain rapid rail system. Regarding the latter, the involved parties, namely Bombela and the Gautrain Management Agency (GMA) have been locked in an arbitration case for more than eighteen months after construction was concluded (Venter, 2013:8).

Resolving these claims amicably and expeditiously seems an elusive concept for parties involved on construction projects. Braimah and Ndekugri (2009:1279) accentuated this fact by explaining that the resolution of delay claims as a consequence of delayed completion of construction projects is beset with immense difficulties, and also indicated how these difficulties often lead to disputes between the parties.

These disputes, according to Pinell (2005: 3), extract significant portions of the available funds for construction and from Contractors' profits. The difficulties in resolving delay claims, as referred to by Braimah and Ndekugri (2009:1279) commences with the construction contract.

Most standard forms of construction contracts include an express provision in the agreement that allows the Contractor to submit a claim for a time extension. This claim is submitted whenever a circumstance occurred that delayed the project and that was not occasioned by the Contractor's default.

At present there are primarily four standard forms of contracts used in South Africa, namely FIDIC, NEC, JBCC and GCC (see Appendix A for exposition). In each of the aforementioned standard forms, the submission of an extension of time claim is made in the first instance to the principal agent (PA), contract administrator (CA) or Engineer, all terms referring to a professional who is appointed by the Client to manage a project on the Client's behalf. All of the aforementioned standard forms of contract, position the responsibility of evaluating these extension of time claims, squarely on the shoulders of these agents. For the purpose of simplicity, whenever this study refers to such an agent, the term PA shall be used reciprocally. According to Pickavance (2010: 276), in the context of these standard forms of contract, the question of whether and if so on what grounds an extension of time should be granted is a matter of opinion of the PA.

Currently, none of these standard forms of contract contain an express or any provision to indicate a specific technique or method on how a principal agent should implement an evaluation for the extension of time claim before awarding it to the Contractor. This fact was emphasised by Pickavance (2010:276) as he concluded that this situation becomes a crucial element that contributes to the subjective and uninformed management of delay claims on an international scale within the industry.

As a result, the nature of issues raised in such extension of time evaluations are overwhelmed with complexities and according to Schumacher (1995:11) parties habitually struggle to reach agreement on the entitlement, evaluation and duration of events that affected the initial completion date. Consequently, delay claims frequently escalate into litigation and arbitration. Due to this deficiency in contractual guidance with respect to delay claims and with no express provision in the standard forms of contract on a method for evaluating delay claims, few organisations like the Society of Construction Law (SCL) have attempted to compile a standard of practice. The SCL in particular compiled the "Delay and Disruption protocol" in October 2002 (Society of Construction Law, 2002). None of these protocols have been incorporated into any standard forms of contract and as Pickavance (2010: 2) indicated, the SCL protocol has more often than not, become just another confounding document clouding the opposition's case in disputes rather than aiding parties to primarily avoid disputes by following a set procedure.

The problem has been further compounded by the fact that construction schedules became the primary tool proposed by the SCL and other contract committees for evaluating the impacts of delays on time in construction projects (Pinell, 2005: 2; Pickavance, 2010: 352). Consequentially, the FIDIC and NEC standard forms added express provisions that required Contractors to compile and submit a construction schedule in their latest editions, published in 1999 and 2005 respectively.

Locally, the South African standard forms of contract, namely the JBCC and GCC followed suit from their international counterparts by including sub-clauses 15.6.1 and 12 respectively into their own editions, both obligating the Contractor to submit a construction schedule. JBCC's latest edition came into effect in 2007 and GCC was provided, in 2004. Both the JBCC's and GCC's previous versions had no contractual provision for a schedule (see Appendix A for relevant clauses). Effectually, the focus of delay analysis has shifted to the construction schedule.

Scott (2004: 32) noted that the analysis of claims based on a construction schedule are complex, requiring an understanding of contract law, contract forms, contract administration, project planning techniques, and an appreciation of how construction activity typically takes place. Furthermore, there are no generally accepted standards of practice for compiling and evaluating construction schedules in South Africa or abroad. This was indicated by Maritz (2003: 35) and reinforced by Marais and Martin (2008: 8).

A recent study by the Chartered Institute of Building (CIOB) in the UK indicated that PAs' knowledge of compiling and evaluating schedules are completely inadequate (CIOB, 2009:52). The study also mentioned that only 14% of respondents were familiar with the use of a fully-linked critical path network or schedules to manage the works.

In similar research done in Australia, Pickavance (2010: 339) stated that out of one thousand schedules that were analysed, less than ten per cent had adequate logic, which is a prerequisite for performing any kind of delay analysis with the schedule as a foundation.

This inadequacy was emphasised by Judge Humphrey Lloyd, when he remarked:

“as a matter of general practice within the industry it is quite common for Contractors not [to] produce satisfactory schedules as a matter of course throughout the job but rather to produce them retrospectively at the end of the job when they actually begin to litigate, or arbitrate extension of time claims” (Masons v WD King, 2003).

Further to the inadequacy of Contractors to produce proper and workable schedules, Pickavance (2010: 342) also concluded that few PAs have the practical experience or expertise in scheduling which is required to perform any form of schedule review, let alone an analysis of a claim based such a schedule. The lack of accepted standards of practice, coupled with a dearth of knowledge regarding the compilation and management of schedules, it becomes difficult for the construction schedule to fulfil its function. Pickavance (2010:352) asserted that the construction schedule is able to provide a foundation from which progress or lack thereof, excusable or culpable delay and disruption can be demonstrated and evaluated.

Within this context it is evident that PAs are left without any contractual guidance regarding the analysis of delay claims and that no accepted standards of practice are in place in South Africa with reference to delay claim analysis to assist PAs in evaluating these claims. Furthermore the construction schedule that is required by the construction contracts and that is widely construed as the basis for any delay evaluation is complex, controversial and requires a specific technical knowledge, which is in short supply in the industry.

1.2 PROBLEM STATEMENT

In the absence of contractual provisions or generally accepted standards of practice and techniques for evaluating the extension of time claims in the construction industry, the methods of evaluation currently used by principal agents lead to disputes that tend to result in litigation and arbitration.

1.3 AIM AND OBJECTIVES

The primary objective of the field study was to determine the current methods and delay analysis techniques used by construction professionals in the construction industry in Bloemfontein South Africa, to evaluate the extension of time claims under the JBCC standard form of contract.

The secondary objectives were:

- to analyse the current delay analysis techniques and international standards of practice currently employed elsewhere;
- and to compare the current methods used by professionals in Bloemfontein South Africa, against the techniques and conditions prescribed in international best practice guides and standards.

The following chapter provides a literature review of the available research, methods and standards of practice in evaluating the extension of time claims.

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter firstly provides a contextual setting on the unique aspects of a construction contract, to provide a framework against which some of the general concepts such as: delays, extension of time claims, construction schedules and delay analysis techniques (DATs) are explored.

As an ultimate goal, the research sought to determine the manner in which practitioners from a portion of the construction industry in South Africa perform the analysis of the extension of time claims. As there are currently no standards of practice regarding delay analysis or schedules in South Africa, some international standards are expanded upon in order to establish local norms in comparison to international standards.

This overview is subsequently expanded on to garner a more profound understanding regarding the manner in which a specific standard form of construction contract in South-Africa incorporates these clauses for extension of time claims.

From this context it is also important to delineate that Scott, Harris and Greenwood (2004: 59) confirmed that the effective resolution of delay claims rely profoundly upon the ability of principal agents (PAs) to quantify a delay and to analyse its impact within the larger framework of the project. Throughout the research, the role of PAs in the process of delay analysis and extension of time claims are emphasised.

2.2 GENERAL CONCEPTS WITHIN THE FRAMEWORK OF THE RESEARCH

2.2.1 The unique nature of building contracts

A building contract in its simplest form is an agreement between two parties about each party's roles and responsibilities in relation to each other (Finsen, 2005: 1). The "terms" of the contract govern the framework in which such an agreement takes place. The terms of a contract according to Christie (2002:175) are a series of promises

agreed upon by the parties about how they will conduct themselves in performing their reciprocal obligations.

The definition of the building contract in its simplest form is expanded upon by Pickavance (2010: 106), who stated that in a typical building contract, the Contractor agrees to erect a building and the Client agrees to pay for it. Some terms may be added, which include the time taken for the performance and completion of the job. Thus, the Client may provide a date on which it requires the building as an express term of the agreement. This will suffice as a simple agreement between the parties with rights, obligations and terms.

Finsen (2005: 6) stated that under normal circumstances such a contract is reciprocal in nature, meaning that the Client is not obliged to pay the Contractor until such time that the Contractor has completed his work and delivered complete performance as specified on the date agreed. Also, the parties are not able to impose any changes on the performance, rights or terms of the other once such a contract is agreed upon.

Both Pickavance (2010: 106) and Finsen (2005: 6) concluded that such an inflexible contract is not practical in the construction industry. An argument to stress this fact was indicated by Chappell (2005: 33) when he posited that in certain contracts a term is referred to as being *of the essence* when the breach thereof by one party renders the contract valueless, or nearly so to the other party. In construction, if a building is not completed by a certain date, it very seldom renders the whole building valueless for the owner. It can at best cause additional cost or deferred income for the owner but it would not render the building valueless in its entirety.

As a result, this unique nature of construction included the development of many standard forms of construction and engineering contracts, specifically providing express provisions for changing the rights, obligations and terms of the agreement under certain circumstances.

Pickavance (2010: 107) confirmed that it is on this basis that building contracts differ from other forms of contract and he stated the following regarding the unique nature of construction contracts:

*“Once the parties enter into an agreement, the Client can change its mind about what it wants, **when it wants it**, where it wants it and how*

it wants it. In response the contract provides a mechanism for the Contractor to vary its price and the time within which he is to provide the work in the light of the changes requested by the Client.”

For the purpose of this research, the focus was on two very important variable terms of standard form construction contracts. It is also important to note that where mention is made of standard forms of construction contracts, it refers to the four standard forms of contracts used in South Africa, namely FIDIC, NEC, JBCC and GCC. Firstly all these standard forms incorporate a clause that allows the time for completion to be extended under certain circumstances. Secondly, the Client also needs to protect and limit his losses in terms of late completion and this is achieved by way of a liquidated damages or penalty provision, which according to Chappell (2005: 57) is a fixed and agreed sum which the parties decide on and in the event of a breach of contract, one party will pay to the other. The reason for such a provision is that in the event of late completion on a building project it may be difficult and expensive to prove the exact damage of such a default.

Currently, the solution is that the standard forms of construction contracts not only have a clause to vary time but also incorporate a clause which allows for liquidated damages or a penalty to apply, if the Contractor fails to complete a project by a stipulated date and no grounds for varying the time exists.

Consequently, this ability to vary the time for performance or to apply penalties based on certain circumstances makes the standard forms of construction contracts unique and also renders the definition of a delay on a construction project vague.

2.2.2 Delays on construction projects

To illustrate the imprecise nature of delays on construction projects, the initial example of the Medupi coal fired power station is topical. The question can be asked: “is the project in question delayed?” Many may argue that it is delayed because the current estimated completion date is already past the initial contractual completion date.

However, what if the reason for this current estimated completion date being late is due to changes made by the Client, for which the mechanisms of the contract allowed the Contractor to vary his date of completion?

If this new and changed date of completion is now the same as the estimated date for completion as a result of this change and consequent variation, is the project still delayed and is the Contractor suffering a delay on the project?

Sanders and Eagles (2001: 3) defined a delay as an event that results in an extension to the time that is necessary to complete a project.

From the previous section, the fact was established that the time necessary to complete a project under a construction contract is variable. Therefore, a definition of delay cannot be isolated from this contractual context and it first has to establish whether the event, which results in an extension to the time necessary to complete the project, is in fact an event for which the contract allows a variation of the time for performance or not. The answer will allow the delay to be categorised and this in turn will scrutinise the delay to ascertain whether or not it activates the mechanism for variation under the specific contract. Therefore, delays on a construction project cannot be defined in isolation but rather within a category.

Loots (1995: 773), together with various sources of literature, provided the following categories of delays on construction projects:

- a) Excusable delays: An event or circumstance beyond the reasonable control of both the Contractor and the Client takes place. In such an event, according to Loots (1995: 773) and under most standard forms of contract, the Contractor is relieved from paying penalties for late completion but he is not compensated for any additional cost he may suffer as a result of the delay.
- b) Compensable delays: The Client or any of his appointed agents on a project were delayed. In this instance the Contractor is relieved of penalties for the duration of the delay and should also be compensated for any additional cost suffered as a consequence of the delay.
- c) Non-compensable or non-excusable delays: The Contractor delayed himself and he has no entitlement to claim an extension of time, obtain relief of penalties or to be compensated.
- d) Concurrent delay: Marrin (2013: 2) asserted that this is one of the most difficult types of delay to apportion. It is defined as a period of project overrun which is caused by more than one effective reason for delay, with each reason having an equal causative potency. Equal causative potency refers to the delay as being

simultaneously excusable and non-excusable. It refers to a delay caused by two simultaneous events, one event being at the risk of the Contractor (non-excusable) and the other at the risk of the Client (excusable). This type of delay has troubled the courts in recent years and has been the subject matter of many research studies and discussions (Oram, 2012: 3).

From these categories of definition, it is evident that many statistics regarding construction project delays do not indicate whether the delays were in fact due to events for which the mechanisms in the contract allowed a revision of the completion date, or whether the statistic took the revised date into account when referring to delays.

One such example is a report by the CIOB (2009: 31) where it was observed that of 66 government departments' construction projects in the United Kingdom, 67% of those projects were delayed. The average delay by which they exceeded their completion date was 63%. By not categorising the type of delay suffered it is difficult to apportion the blame for these delays. Were these delays due to numerous changes on the government departments' side or were they due to the Contractors on these projects who underperformed with due regularity?

2.2.3 Extension of time claims

From the contractual context of construction projects it was established in Section 2.2.1 that most projects have a specific date or time in which the project should be completed. If this date is not reached, the Contractor must either call on the mechanisms in the contract to vary the time for completion or the Contractor will be liable for liquidated damages or penalties, the amount of which would have been agreed by the parties beforehand.

Also from Section 2.2.2, it was indicated that any delays suffered on a project should be categorised in order to determine whether the time for completion was in fact variable.

The importance of the Contractor having the ability to extend the time for completion for events beyond his control is two-fold, as emphasised by Finsen (2005: 148). Firstly, if the Contractor exceeded the stipulated date for completion and time was not

extended, the Contractor would be liable to pay the amounts as stated under the liquidated damages and penalty provisions. Secondly, if the Contractor exceeded the stipulated date for completion, he has to carry the additional time-related overhead costs for that extended period without having had the ability to allow for such costs at the onset of the project.

Essentially, the ability to extend the time for completion can relieve the Contractor of penalties and also provide for a reimbursement of the additional time-related overhead costs.

For the purpose of this research study, the mechanism in a construction contract to extend the time for completion is referred to as an extension of time provision and when the Contractor calls upon this provision it is referred to as an extension of time claim.

Pickavance (2010: 273) also confirmed the aforementioned facts when he concluded that the purpose of an extension of time clause in a construction contract is to deal with excusable and compensable delays (as defined in the previous section) suffered by the Contractor. The clause is designed to discharge the Contractor from his liability for liquidated damages during that extended period and to compensate him for costs associated with the delay and for which he would not have been in a position to allow for at the onset.

According to Oram (2012: 7) to obtain an extension of time, the Contractor must first establish that a delay was in fact caused that inhibited the completion date by a relevant event. Subsequently, the Contractor then concludes that the essence of an extension of time claim, both in regard to liability and damages must be that, but for the extension of time event relied upon, the Contractor would as a fact have completed earlier. The difference between the period in which he would have completed earlier and the eventual completion date is his claimed extension and if proven, it should reduce his liquidated damages to the same extent.

What constitutes a relevant event and how the Contractor should implement filing for an extension of time, or submitting an extension of time claim depends on the specific standard form of contract (Maritz & Schutte, 2009: 89). For this reason, the study was

delimited to the JBCC's standard form of contract, which was developed and is currently used extensively in South Africa.

The JBCC's clause for extension of time is elaborated in ensuing sections of the research study. Suffice it to state that none of the standard forms of contract offer any assistance in determining the assessment of extensions of time; a fact supported by a wide range of literature including but not limited to Finsen (2005: 159), Loots (1995: 774), Pickavance (2010: 276) and Critchlow, *et al.*(2006: 3).

Loots (1995: 774) added that extension of time claims seldom results from a single event. He confirmed that delays usually result from many events and that those events can be countervailing and categorised differently in terms of being excusable, compensable or non-excusable. In some instances, single events start a chain reaction leading to subsequent, consequential delays, thereby rendering the quantification of entitlement that much more difficult. Further to this, the cause of delays can differ in importance or may yield different durations. Some causes go unnoticed because there is a prevailing delay which prevented progress regardless.

Loots (1995: 774) continued that due to these aforementioned combinations of sequential or concurrent delays, the analysis of delay to understand entitlement under an extension of time claim, becomes an art. Briggs (2013: 9) indicated that in standard forms of contract it is only critical delay, or delay to activities on the critical path, that entitle the Contractor to an extension of time. Oram (2012: 7) confirmed the same by stating that in the context of contractual based extension of time, PAs and Contractors cannot purely perform retrospective exercises on the last number of events delaying the project but rather, it is required that the causes of the critically delayed works are considered throughout the process.

From the aforementioned literature on extension of time claims, two central themes have emerged:

Firstly, that standard forms provide no indication regarding the manner in which the PA should implement granting, reducing or refusing the period claimed in an extension of time claim. This has led to the establishment of a subset of literature and proposed standards on the topic of delay analysis, also referred to as **delay analysis techniques or delay protocols**.

Secondly, the extensions of time can only be claimed for circumstances that delayed critical progress or the critical path. To effectively assess a delay's impact on the critical progress of a project, a proper **construction schedule is required**. This initiated the analysis of a secondary subset of literature and shifted the focus to the science of time management and control on projects. It is well established in the literature (Briggs, 2013: 9), (SCL, 2002: 7), (Winter, 2009: 3), (Pinell, 2005: 2), (Pickavance, 2010: 352) that the only way to effectively assess the effect of a delay on critical progress is from a proper construction schedule.

Consequently, both construction schedules and delay analysis techniques are discussed.

2.2.4 Construction Schedules

Pickavance (2010: 338) asserted that there can be limited delay analysis without scheduling.

The Project Management Institute (PMI) (2007: 97), although using varying descriptions, defined a project schedule as the dynamic representation of the project's plan for executing the project's activities. The PMI (2007: 1) indicated three important roles of a schedule on a project:

- First, a schedule provides a “roadmap” or plan that represents the manner and sequence in which the various products comprising the scope of the project are delivered.
- Second, schedules track the progress of this plan in order to predict, recognise and address those factors and issues that affecting or may potentially affect the project's performance.
- Thirdly, from a contractual view, the schedule is an important document used to record all delays and to analyse extension of time and financial loss claims.

According to Bennett (2003: 130), the most popular method used for presenting a construction schedule is a bar chart. At present, all standard forms require the Contractor to furnish the Client with a bar chart that indicates how he plans to execute the various activities in order to complete the project (Bennett, 2003: 130). Construction

schedules habitually became the primary tool for evaluating the impacts of delays on time in construction projects, according to Pinell (2005: 2) and Pickavance (2010: 352).

In Section 2.2.3 the conclusion was drawn that extensions of time can only be claimed for circumstances that delayed critical progress or the critical path. As a result, numerous sources of literature subscribe to the use of the critical path method (CPM) type of schedule as the most sufficient in terms of monitoring progress and assessing the impacts of delay on a project's end date (SCL, 2002: 5).

Tieder (2009: 3) defined the CPM as a way to organise and schedule the numerous interrelated activities according to their respective duration and sequence in such a way that when analysed, a chain of activities emerge, the sum of whose durations determine the overall project duration. Essentially, any delay of work along this chain or group of activities affects the entire project. Such a chain or group of activities is known as the critical path.

In the United States of America (USA) it has been accepted that in order to recover a delay by claiming an extension of time, one of the elements of proof is causation. Since the early 1970s the USA's solution to proving the causation element of a delay is to use the CPM (Tieder, 2009: 3).

In the landmark case of *Minmar Builders* in 1972, the Contractor in this instance delivered his construction schedules as evidence to prove a delay. The court found that since no interrelationships were shown as between the tasks, the schedule could not demonstrate that if by the delay on any one activity, the overall project completion was thereby affected (Tieder, 2009: 3). In short, the schedules were not prepared by the CPM and therefore could not provide the causation required to establish entitlement to an extension of time.

Pickavance (2010: 530) stated that without CPM scheduling, the analysis of a delay becomes an approximation because non-CPM methods cannot take account of criticality. The SCL's approach is the same, stating that if the impact of events could be impacted upon a CPM schedule, which was up-to-date at that time, the effect could be calculated and measured instead of guessed (SCL, 2002: 5).

This has led to the incorporation of clauses in all standard forms which requires, as part of the obligations of the Contractor, a construction schedule. However, the drafting

of these clauses, according to Pickavance (2010: 407) is distressing. The most important point made by Pickavance (2010: 408) and emphasised by numerous sources of literature is that the time control requirements of the standard forms are desperately insufficient and at the core, these are disconnected from the provisions for extension of time claims.

When comparing this statement to the JBCC, it clearly denotes this deficiency. For instance, the provisions for cost control under JBCC are infinitely more comprehensive in that these constitute more than five pages of the contract. By comparison, for time control, there is only clause 15.6 stating that the Contractor shall prepare a programme of the works in sufficient detail to enable the principal agent to assess the progress of the works and timeously provide the necessary contract instructions. Furthermore, the contract states that the Contractor shall continuously revise and modify the programme and issue copies to the principal agent. Inasmuch, no mention is made of the programme in JBCC when dealing with the extension of time provision under clause 29, which indicates the disconnectedness between the time control provision and the extension of time provision.

The conclusion is that the standard forms provide no guidance regarding the compilation and submission of a schedule. However, in the literature reviewed and especially evident in international case law, it has been established that CPM schedules are the basis for analysing delays to completion. In light of the context of construction contracts, delays, extension of time claims and the disconnectedness between CPM scheduling and contractual provision, the following section attempts to determine the current techniques that are available to analyse delays.

2.2.5 Delay analysis techniques (DATs)

According to Brahimah (2013: 507) the objective of a delay analysis exercise is to determine the amount by which the project is delayed and to establish the portion of the delay that can be attributed to the each party in order to arrive at a cost or time compensation. The analysis or assessment of delay or delay analysis techniques as well as construction contract claims, have been the subject area of many studies in recent years (Brahmah & Ndekugri, 2009:1279).

Most studies are aimed at defining or refining the existing DATs or exploring specific delay related issues, such as concurrent delays. Winter (2009: 1) questioned the manner in which the delay should be analysed and the subsequent research, which was presented at the Society of Construction law's international conference, contained a summary of pertinent facts and relevant cases that focussed on the analysis of delays. The study also emphasised the difficult delay circumstances, known as concurrent delay and most of Winter's research was focussed on the relevant case law pertaining to concurrent delay.

Bordoli and Baldwin (1998: 331) also published research on the different methods for assessing delays together with Bubshait and Cunningham (1998: 320) and Kartam (1999: 409). This body of research contributed directly to the establishment of a delay analysis theory as well as making the different methods known.

Other studies performed by Ndekugri, Braimah and Gameson (2008: 629) investigated the effectiveness and use of existing DATs. Their research formed part of a considerable collection of literature on the effectiveness and shortcomings of the existing DATs in practice. Pinell (2005), Pickavance (2010) and Kumaraswamy and Yogeswaran (2003) all surveyed the aspects of existing methodologies.

Scott, Harris and Greenwood (2004: 59) furthermore indicated that a large absence of legal precedent exists in the UK, demonstrating the lack of the provision of a directive on how delay claims should be handled. The situation may be the same for South Africa, as the standard forms require arbitration or adjudication for all disputes in terms of the contract, thereby removing or reducing the legal precedent.

From the collection of literature it can be concluded that the following is a list of various techniques available for PAs to evaluate a delay claim, namely:

- a) As-Planned *versus* As-Built,
- b) Impacted As-Planned,
- c) As-Planned But for,
- d) Collapsed As-Built,
- e) "Window" Analysis, and
- f) Time Impact Analysis.

For the purpose of this research study, it would be ineffective to expand upon each method comprehensively. It is imperative to note that according to Pickavance (2010: 873), the methods are complex and require a CPM schedule as a basis for each evaluation method. The same factual data will produce a different result of the effect of a delay to progress on the completion date when employed by each method of analysis.. This was also illustrated by Critchlow, *et al.* (2006)

The most notable recent study by Braimah (2013) reviewed the current defined DATs and by means of a very practical case study revealed a number of prominent application issues and improvement needs. Accordingly it was confirmed that the different techniques yield different results when employed on the same delay scenario (Braimah, 2013: 506).

The deficiency in literature from a South African perspective regarding existing DATs is twofold. The first begs the question of how much knowledge PAs have regarding each of these methods, if any?

A significant part of Scott, Harris and Greenwood's (2004: 59) research emphasised a study in the UK where interviews with 46 professionals were conducted on how they would analyse the impacts of delays within different situations. However, in each instance they were given choices of methods and the research concluded that none of the respondents suggested any methods other than those shown.

Bordoli and Baldwin (1998) considered the question of the knowledge and methods used by professionals by interviewing 96 respondents within the construction industry in 1998. The focus was to determine the knowledge and methods used within the context of the list of available methods and not necessarily on the actual methods used within the industry.

Secondly, if PAs employ any of the existing DATs when evaluating a claim, are they aware of the different results that each technique would yield?

Table 1 below, indicates the different types of standard form contracts used in South Africa and how these compare in terms of their provisions for extension of time, schedules and delay analysis.

Table 1: Comparison of main standard forms of construction contracts in South Africa.

COMPARISON OF MAIN STANDARD FORMS OF CONSTRUCTION CONTRACT IN SOUTH AFRICA.					
CONTRACT PROVISIONS	TYPE OF CONTRACT				
	JBCC	GCC	NEC	FIDIC	
Contains a provision for extending the completion date (extension of time provision)?	Yes. Clause 29. ✓	Yes. Sub Clause 10.1.1 ✓	Yes. Clause 60. ✓	Yes. Clause 20.1. ✓	
Places an obligation on the Contractor to provide a construction schedule?	Yes. Clause 15. ✓	Yes. Clause 12. ✓	Yes. Clause 31.1 ✓	Yes. Clause 8. ✓	
Provides any indication of how the schedule should be compiled or what it should contain?	No. JBCC provides no guidance or indication of what is required in a schedule except that it should be in sufficient detail to allow the CA to evaluate progress. ✗	Yes. Very limited information. The clause states that the programme should show the order of procedure, duration of activities and the method which the Contractor proposed to use. ⚠	Yes. Should show order in which the Contractor intends to carry out works. Show each stage of work by nominated Subcontractors. Indicate sequence and timing of inspections. ⚠	Yes. Very comprehensive list of requirements under clause 31. ✓	
Refers to the programme under the extension of time clause?	No. JBCC under clause 29 has no reference to the programme as basis for calculation of the extension of time. ✗	No. GCC has no reference to the programme under clause 10.1.1. ✗	Yes. NEC does make reference to the accepted programme in calculating delays but only to the extent that the delays affect key dates as per the programme. ⚠	No. Very comprehensive list of requirements under clause 31. ✓	
Provides clear guidance on the method to follow in evaluating or calculating a claim?	No. ✗	No. ✗	No. ⚠	No. ✓	

2.3 INTERNATIONAL STANDARDS OF PRACTICE DEVELOPED FOR DELAY ANALYSIS

In the year 2000, a group of members to the Society of Construction Law probed the possibilities of making delay related disputes more predictable in terms of their resolution. They discussed the various methods available to deal with delay issues by parties to a construction contract as well as the courts. Two years later, in 2002 they published what is today known as the *Delay and Disruption protocol (Protocol)* (Society of Construction Law, 2002). The Protocol formed the first published standard in terms of how practitioners should evaluate and calculate extension of time claims within any form of contract (Pickavance, 2010: 532).

Other research studies, such as those conducted by Scott, Harris and Greenwood (2004: 50) assessed the SCL Protocol's effectiveness and use in the industry for dealing with delay and disruption. The research concluded that the methods in the Protocol appeared to have been acceptable to the construction industry.

Unfortunately, according to Pickavance (2010: 2) the SCL Protocol was never drafted into any of the standard forms of contract and has not been incorporated into the industry by practitioners. However, it is still regarded as an excellent standard on the methods to be used by PAs in their assessment of the extension of time claims (Winter,

2009: 13) and the Protocol provides a benchmark against which existing practices are measured, as investigated by the proposed research.

It should be noted that the Protocol is not a contractual document nor can it take precedence over express terms of an agreement between the parties (SCL, 2002: 3). Because the JBCC is deficient in its directive on how to calculate and analyse a delay to the practical completion date as shown in Finsen (2005: 159), the Protocol's role in this research serves as the only available benchmark, save for the provisions of the JBCC, against which to measure current practices.

The following paragraphs postulate fundamental theses from the Protocol, which is relevant in terms of providing supplementary support to the provisions of the JBCC relevant to this research. Together with the provisions of JBCC, the Protocol forms the benchmark for evaluating the practical application of knowledge by practitioners in analysing extension of time claims.

2.3.1 Objective of the Protocol

The objective is to provide beneficial direction on some common concerns that arise from construction contracts when one party wishes to recover from the other an extension of time or compensation for additional time spent and resources used in completing the project. Mainly the Protocol seeks to provide a directive on how to analyse extension of time claims and minimise disputes (SCL, 2002: 3).

2.3.2 Schedules

The Protocol states that in order to use a construction schedule as a tool for managing change and determining extension of time claims the programme should adhere to the following:

- a) a properly prepared schedule showing the manner and sequence in which the Contractor anticipates to the execute the project;
- b) the schedule should be updated regularly to track the actual progress and any extensions of time granted to date.

2.3.3 Procedure for extension of time claims

The Protocol suggests the following procedure to deal efficiently and accurately with extension of time claims (SCL, 2002: 3-6):

- 2.3.3.1 Ensure all requirements or conditions relating to an application for extension of time has been met as stated in the express provisions of the particular contract;
- 2.3.3.2 As close as possible to the date on which a delaying event takes place, the Contractor should insert the event on his updated schedule in order to gauge what effect this event had on the programme at that particular point in time. This indicates the actual or anticipated effect of the event on the completion date of the project. The Contractor should also keep all documents and records necessary to demonstrate entitlement in principle to the extension of time claim.
- 2.3.3.3 Before taking any action, the PA should establish whether the claimed event or cause of delay is a circumstance mentioned in the contract as an event for which the extension of time claim mechanism can be used. This is also referred to as a Client risk event. If not, then the delay is at the risk of the Contractor. If so, it should also be established if the event is an excusable or compensable delay event.
- 2.3.3.4 In determining the amount of time by which to extend the completion date, the Protocol recommends that the updated schedule be used as the primary tool. The extension should be granted to the extent that the Client risk event is predicted to prevent the project being completed by the contractual completion date at that time.
- 2.3.3.5 The method to be used by the PA is proposed by the Protocol as the **Time Impact Analysis** method. This method is implemented as follows:
 - a) the schedule is first brought completely up-to-date to the point immediately before the occurrence of the Client risk event;
 - b) the schedule should also be updated to reflect any realistic and achievable plans to recover any delays that have occurred;

- c) a sub-network of activities, representing the Client risk event shall then be inserted into this updated programme and;
 - d) the impact of this sub-network on the completion date shall be noted as the delay.
- 2.3.3.6 If the schedule contains demonstrably unrealistic logic or durations, these should be corrected by agreement before assessing the effect of the delay on the schedule.
- 2.3.3.7 Where there are concurrent delays, the time impact method should be applied for each event in the sequence they arose. In this situation, any Contractor delay should not reduce the amount of extension of time due to the Contractor as a result of the Client risk event or delay.

From this context it also important to emphasise that Scott, Harris and Greenwood (2004: 59) confirmed that the effective resolution of delay claims rely profoundly upon the ability of principal agents (PAs) to quantify a delay and to analyse its impact within the larger framework of the project.

2.4 LOCAL STANDARD FORM PROVISIONS FOR EXTENSION OF TIME CLAIMS

For the purpose of this research study, the JBCC was used as the relevant standard form of contract to understand the how professionals in the industry in Bloemfontein assess extension of time claims. As a consequence, the relevant extension of time clause of JBCC was used as a basis for the study.

The first clause of relevance is Clause 15.6. The clause delineates some obligations of the Contractor under the contract and the Contractor is duly is instructed to prepare a programme of the works in sufficient detail to enable the principal agent to assess the progress of the works and timeously provide the necessary contract instructions.

No definition is provided regarding what would constitute sufficient detail, only that it should enable the principal agent to assess the progress. No further reference to the programme is made in JBCC.

Clause 29.0 of the JBCC contract deals with extension of time. The clause is firstly divided into three categories, which is based on the categories of delay explained in Section 2.2.2 previously. These categories are listed in clauses 29.1, 29.2 and 29.3. Under each of these a list of circumstances is provided. The excerpts from the contract are provided hereunder:

Clause 29.1: *The circumstances for which the contractor is entitled to a revision of the date for practical completion and for which revision the principal agent shall not adjust the contract value are delays to practical completion caused by one or more the following...*

Clause 29.1 refers typically to delays beyond the control of both the Client and the Contractor. It includes events such as inclement weather, force majeure, strikes, late delivery of materials and the like. Claims in terms of clause 29.1 entitle the Contractor a revised completion date but does not compensate the Contractor for additional time expense. This is an excusable delay.

Clause 29.2: *The circumstances for which the contractor is entitled to a revision of the date for practical completion and for which revision the principal agent shall adjust the contract value are delays to practical completion caused by one or more the following...*

Clause 29.2, refers typically to delays beyond the control of both the Contractor but at the risk or default of the Client. It includes events such as variation orders, late issue of construction details, the execution of additional work, late delivery of items for which the Client is responsible and the like. Claims in terms of clause 29.2 entitle the Contractor to a revised completion date and it states that the principal agent shall adjust the contract value, in other words compensate the Contractor for additional time expenses. This is congruent with the definition of compensable delay.

Clause 29.3: *Further circumstances for which the contractor is entitled to a revision of the date for practical completion are delays to practical completion by any other cause beyond the contractor's reasonable control that could not have reasonably been anticipated and provided for. The principal agent shall adjust the contract value where such*

delay is due to the Client exercising his rights in terms of the agreement or by the default of the Client.

Clause 29.3 does not provide a list of events and the idea is to cover for any eventuality beyond the Contractor or Client's control.

Particularly noteworthy is the fact that the onus rests on the Contractor to apply for, and motivate an extension of time claim (Finsen, 2005: 155). In doing so, the Contractor must comply with a series of conditions or rules. The failure of complying with these conditions could result in the Contractor losing his right to claim.

The following list is a summary of the required conditions as stated in JBCC for the Contractor to be able to retain the right to claim once he becomes aware of a circumstance that could delay completion of the project, in terms of clause 29.1, 29.2 or 29.3:

1. give reasonable and timeous notice to the principal agent;
2. take all reasonable steps to avoid or reduce the delay;
3. within twenty (20) working days from the date of becoming aware or ought reasonably to have become aware of the potential delay, notify the PA of the intension to submit a claim for a revision to the date for practical completion;
4. within forty (40) working days from the date of becoming aware or ought reasonably to have become aware of the potential delay submit a claim to the PA.

The JBCC states under points 3 and 4 above, that a failure to give such notices shall cause the Contractor to forfeit his claim.

When submitting the claim for extension of time under clause 29, the contractor shall according to the JBCC seperately state in his claim the following:

1. the relevant clause on which the Contractor relies;
2. the particulars of the effect of the delay on **critical progress towards practical completion** (emphasis added) and;
3. the extension period claimed in working days, and the calculation thereof.

JBCC in clause 29.7 goes on to state that the PA shall within fifteen (15) working days of reciept of a claim grant in full, reduce or refuse the working days claimed.

As indicated previously and as can be seen in these clauses, JBCC provides no guidance on how the PA or Contractor should calculate the delay. The only indication is an indirect reference to the programme by stating that the contractor shall indicate the effect of the delay on critical progress towards practical completion.

In conclusion, from the JBCC it can be assumed that the following chronological method should be followed by PAs when evaluating a delay claim:

1. Determine if the Contractor provided reasonable and timeous notice of the event and gave notice of his intention to submit a claim.
2. Determine if the Contractor submitted his claim in the time stated in the Contract.
3. Determine if the Contractor took all practical steps to avoid or reduce the delay.
4. Scrutinise the relevant clause on which the Contractor relies for his claim.
5. Scrutinise the effect of the delay on critical progress towards practical completion.
6. Scrutinise and analyse the calculation of the days claimed by the Contractor.
7. Grant, reduce or refuse the extension of time claim, based on the outcome of any of the aforementioned points.

As the JBCC is silent on the method to employ in order to show the effect of the delay on critical progress towards completion and on the subsequent calculation of the days claimed, this research attempted to understand, how PAs implement the analysis of delays in this context. The research methodology is succinctly explained in the ensuing chapter.

CHAPTER 3: RESEARCH METHODOLOGY

The aim and objective of this study as outlined in the previous sections, sought to establish the current methods and delay analysis techniques used by construction professionals in the role of a principal agent within the JBCC standard form of contract as depicted in Appendix A. The reviewed literature suggested sufficient information on the existing delay analysis techniques available and the prescribed standard of practice in applying these methodologies, their effectiveness and rate of implementation.

The researcher selected a mixed-method approach by utilising both qualitative and quantitative methods to investigate the current methods and delay analysis techniques employed by professionals in the construction industry in South Africa. The philosophy was largely reinforced by the post-positivism theory, shaping the knowledge that is based on measures completed by the participants or observations recorded by the researcher.

As a primary focus, the researcher minimised suggestive research questions or surveys where alternative or listed methods were indicated, in order to probe the actual current methods used in the construction industry, as objectively as possible.

3.1 SAMPLING STRATEGY

The researcher intended to use a purposive sampling method with the aim of targeting construction professionals who could specifically contribute towards the objectives of the study. These would be any construction professionals who are regularly appointed as principal agents in terms of the JBCC standard form, which requires them to analyse and make decisions regarding the extension of time claims.

The size of the population initially included 15 respondents, with the intention to expand the population until saturation was reached within the context of the objectives or when the sample was deemed representative of the local industry.

3.2 DATA COLLECTION

Data collection was performed by analysing the literature reviewed in Chapter 2, and utilising semi-structured interviews. The Semi-structured interviews were selected because of the perceived amplification of objectivity when obtaining responses. A pilot study was also conducted with an esteemed academic and experienced JBCC professional, which assisted in significantly refining the questions that constituted the semi-structured interview.

For the main study, the semi-structured interview was divided into four parts as described below:

- Part 1: Respondents' experiences as principal agents as well as in dealing with extension of time claims under JBCC.

The first part of the interview was designed to establish the experience of the sample population in terms of their appointment as principal agents under JBCC and the number of extension of time claims they have had to evaluate on average.

- Part 2: Main open-ended questions about the methods used by the professionals in extension of time claims.

The second part of the interview focussed on the main and secondary aims of the study, which sought to determine the methods used by professionals in evaluating an extension of time claim. Answers were provided in the absence of any stimulating or answer provoking questions. In evaluating the responses from this part of the interview, the researcher compiled the following list as a guideline in terms of extracting the data required to satisfy the main aim of the study:

- Do the respondents generally adhere to the procedures prescribed by the JBCC for evaluation of claims?
- How do respondents' indicated methods adhere to, or differ from the international protocol?
- Do the respondents use any other formal or informal collective set of procedures in evaluating claims?

- Do the respondents make use of any of the formal delay analysis techniques in their evaluation procedure?
 - Any other relevant observations in terms of the collective manner in which the respondents indicated they evaluate claims for extension of time.
- Part 3: Closed-type questions.

The third part of the interview was designed to guarantee feedback, which would be able to satisfy the secondary objective of the study which was a comparison of the current methods used by professionals in Bloemfontein South Africa, and the techniques and conditions prescribed in international best practice guides and standards. These questions were asked in agreement with the prescribed model derived in Chapter 2 for evaluation of extension of time claims in terms of JBCC and the SCL protocol. The questions were only relevant in circumstances where the professionals did not indicate them in their own stated method in the previous section of the questionnaire.

- Part 4: Small-scale case study to determine the actual delay analysis techniques used.

The last part of the interview was designed to satisfy part of the main aim of this study, namely, what delay analysis techniques are used by professionals in evaluating extension of time claims? In the pilot study a hypothesis was postulated that very few professionals would be aware or able to use any of the delay analysis techniques identified in the Literature. As a result, this part of the interview was specifically designed to extract that information objectively as each professional would use a default type of delay analysis technique, knowingly or unknowingly. The purpose of this part of the interview was to ascertain the techniques that are preferred by the respondents.

A project case study was compiled for this purpose. The case study was adapted from similar previous research study performed by (Braumah, 2013). The study introduced a typical construction project and construction schedule. On the schedule a number of delays were indicated. Respondents were asked to provide an analysis of the delays. The researcher reviewed these actual techniques employed in order to determine the delay analysis methods that were used and

preferred by the professionals, even in the absence of any knowledge of specific methods on their part.

3.3 DEMARCATION OF STUDY

The study took place within the field of Construction Project Management. It focussed on and was limited to understanding the methods and techniques used within a small portion of the professional construction community in South Africa. It was also delimited by analysing the evaluations of extension of time claims within the framework of the JBCC standard form of contract used in this construction industry. The target population was therefore construction professionals who are regularly appointed into the role of a principal agent within the JBCC standard form of contract used in South Africa and who have been required to analyse an extension of time claim within this context.

The population was further limited to construction professionals in Bloemfontein, South Africa in an attempt to establish the difference in actual methods employed, if any, in this portion of the industry, measured according to international standards in practice. The limit of the respondents being selected from Bloemfontein was also due to the accessibility of this population group by the researcher and was the result of an attempt by the researcher to make the study more manageable in terms of time and budgetary constraints.

3.4 ETHICAL CONSIDERATIONS

Due to the specific aim of this study to provide an objective insight into the actual methods employed by the respondents, the feedback received was treated confidentially. The nature of the results may have a negative commercial impact on the respondents or their businesses. As a result, the research was conducted under the assumption of anonymity.

Objectivity is affiliated with the fundamental aims of the research and as such it became a cornerstone of not only the success of the research but also served as a primary ethical consideration.

CHAPTER 4: RESEARCH RESULTS AND DISCUSSION

4.1 INTRODUCTION

This chapter presents the data collected from the interviews with respondents and provides a first stage analysis.

4.2 CONFIDENTIALITY

Respondents were provided with an unambiguous assertion that all commercially sensitive information regarding their company and employees would be treated strictly confidentially. It was also important to assure the respondents that neither would comparisons between companies be made nor that there would be any quantification of the accuracy of their feedback. It was important for the researcher to obtain clean (un-enhanced) feedback from respondents, which could have been compromised if respondents attempted to be accurate in any manner. Instead, the research sought to acquire an authentic approach regarding how the respondents act in specific situations.

4.3 DATA COLLECTED

As indicated in the previous chapter, the interview was divided into four parts. The first part consisted of the administrative portion and gathered information regarding experience, main profession and the average number of claims the respondents deal with on any given project.

4.3.1 Part 1: Respondents' experience of respondents and number of claims

The first question of Part 1 of the interview requested the respondents to indicate their experience, in years, as acting as the principal agent on construction projects in terms of the JBCC Principal Building Agreement. Figure 1 indicates that the average experience of the respondents was more than 10 years. The median established that

half of the respondents had more than 12 years' experience as principal agents. This was a positive indication that the interviewed group had sound levels of experience in terms of the JBCC and ensured confidence that the data collected was measured against a context of experienced professionals.

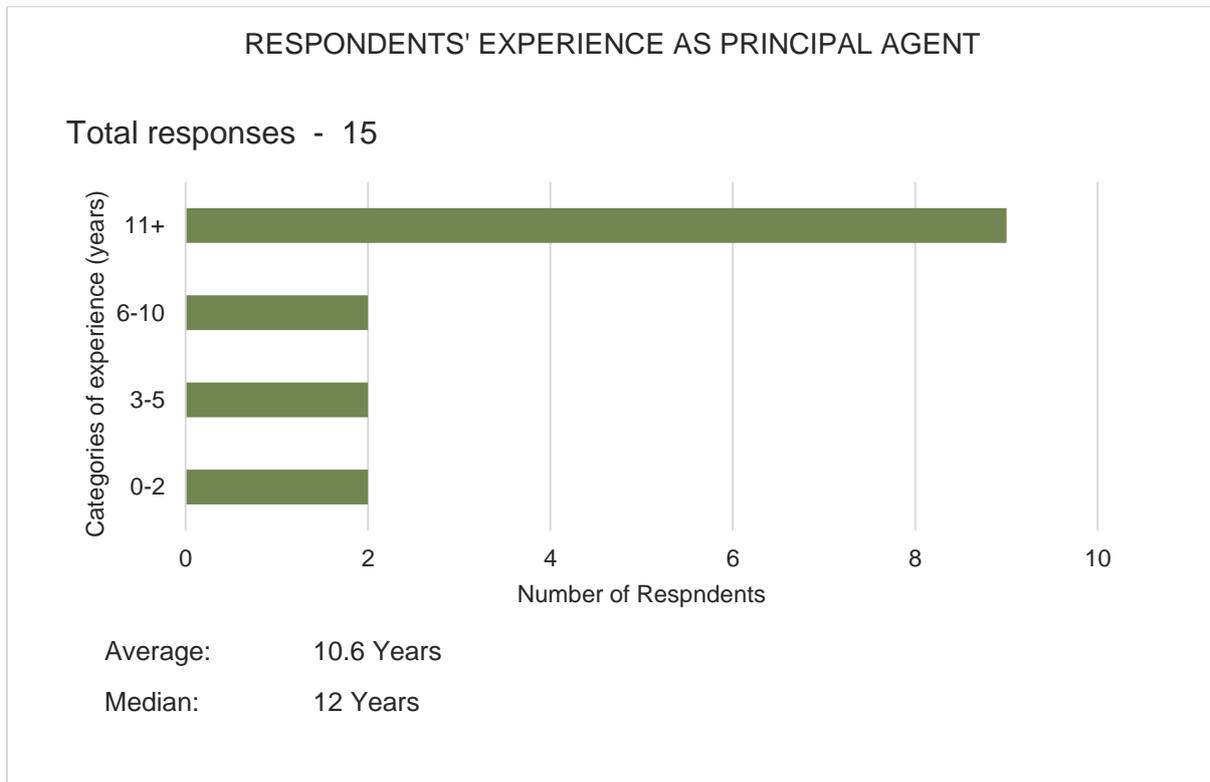


Figure 1: Respondents' experience as principal agents in terms of the JBCC.

The second question was constructed to retrieve information from the respondents pertaining to the average number of time extension claims they have encountered when evaluating a project, based on their last five projects as a benchmark to answer this question. Figure 2 below indicates that on average, the majority of the respondents evaluated between two and three extension of time claims for each project, while at least half of the respondents were required to evaluate three or more time extension claims on any given project.

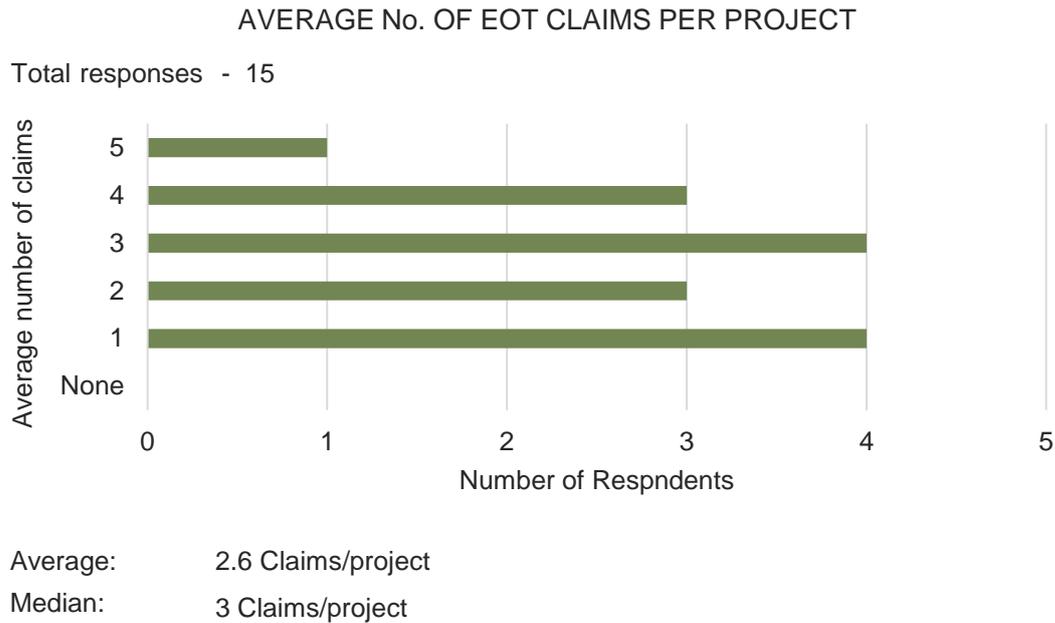


Figure 2: The average number of claims, in terms of JBCC, which the respondents evaluated in their capacity as principal agents.

Firstly, the data emphasised that all the respondents encounter at least one extension of time claim for any given project. Secondly, it indicated the amount of delays suffered on projects for which a claim is required by the Contractor, and this is congruent with Critchlow *et al.* (2006: 3).

4.3.2 Part 2: Open-ended main question

Part 2 of the interview dealt with the main and secondary aims of the study. These questions were open-ended, in an attempt to extract from the respondents their own, step-by-step method for evaluating an extension of time claim under JBCC. The question was constructed as follows: “When you are presented with an extension of time claim under clause 29.0 of the JBCC, please explain step-by-step and in as much detail as possible, the actual process you follow and methods you use to evaluate the claim?”

The question sought to obtain information regarding the actual methods used in the absence of any stimulating or answer provoking questions. Respondents were encouraged to concentrate on a recent project where they were presented with an extension of time claim to provide context for their answer. They were also reminded

that there are no correct answers and that the research merely sought to determine the actual methods used in practice.

An evaluation of the respondents' feedback of this and the subsequent question that was asked in Part 3 could only be executed after a combination of JBCC's clauses and the internationally established Protocol formed a benchmark against which to evaluate the responses. The benchmark would provide a tool with which to satisfy one of the secondary objectives of this study, which was to measure the methods employed by the sample population against an international best practice standard. The framework for this benchmark was derived from the literature reviewed in Chapter 2 and is shown in Figure 3 below. The responses to the main question in Part 2 were subsequently measured in the context of the derived benchmark by indicating which of the steps were emphasised by the respondents in their accounts of being presented with extension of time claims.

STEPS	SOURCE
Step 1 Ensure conditions relating to the EOT is met as per provision of relevant Contract	SCL Protocol
Conditions as stipulated in JBCC 1.1 Within 20 working days for the date upon which the Contractor became aware, notify the PA of his intention to submit an EOT. 1.2 Within 40 working days of the delay ceasing, submit such a claim.	JBCC JBCC
<i>If any one of these conditions (1.1 & 1.2) are not met, the contract states that the contractor shall forfeit his right to claim. If so, there will be no need to evaluate the claim any further and the PA should refuse the claim.</i>	
Step 2 Review the claimed circumstance against the specified clause and determine if it is valid and correct.	SCL Protocol
Step 3 Review the impact of the delay on critical progress, in other words on the CPM schedule. Review and calculate the delay using the Time Impact Analysis method on the Contractor's programme	JBCC SCL Protocol
Step 4 Proceed to grant, reduce or refuse the working days claimed within 15 working days of receipt of the claim	JBCC

Figure 3: Steps to evaluate a claim for extension of time in terms of JBCC and the Protocol.

The following section presents the data from responses to the main question within the framework of Figure 3 above.

4.3.2.1 *How many respondents indicated that they at any point specifically review the conditions according to the requirements of the JBCC, which enables a right to claim?*

From the 15 responses received, only eight respondents specifically mentioned that they start the process of evaluation by reviewing the suspensive conditions as formulated by the JBCC. The remaining seven respondents did not mention the review thereof at any stage.

4.3.2.2 *How many respondents indicated that they scrutinise the circumstances causing delay, comparing the cause to the JBCC clauses to ascertain whether the claim is valid, as stated against the correct clause?*

Most of the respondents, who exhaustively described their own method for analysing a delay claim, indicated that at some point they scrutinise the circumstance causing a delay according to the relevant JBCC clause.

4.3.2.3 *How many respondents indicated that they review the time claimed against the contractor's programme during any point of the analysis of time claim?*

All 15 respondents made specific mention to the programme as a basis for their review. This data supports the expectations of the Protocol, and confirms the statements found in literature (Briggs, 2013: 9), (SCL, 2002: 7), (Winter, 2009: 3), (Pinell, 2005: 2), (Pickavance, 2010: 352) that the only way to effectively assess the effect of a delay on critical progress is from an appropriate construction schedule. It must be noted that ten of the 15 respondents prudently made mention of the fact that in their view, construction schedules in most instances did not provide sufficient detail to confidently be used when analysing delays. The significance of this data is that the JBCC do not have any express requirement for an extension of time claim to be reviewed against a programme. It is therefore indicative of a sub-discipline created, accepted and operated by the industry without any contractual provision to support it. The fact that all the respondents indicated their use of the programme also underlines the deficiency in extension of time outcomes. As the literature study indicated, most

programmes are not adequately produced by the Contractors to allow for proper evaluation.

4.3.2.4 *How many respondents mentioned the use of any specific method or delay analysis technique for calculating the delay?*

None of the respondents, in their own accounts, mentioned the use of any specific method of calculating analysis of the delay of time claim. The Contractor’s programme was mainly indicated as the primary manner in which delays were reviewed. Respondents also emphasised that they rely on the burden of proof placed on the Contractor to substantiate his claim.

4.3.2.5 *How many respondents indicated that they provide feedback on the claim as required by JBCC within the 15 day period?*

None of the respondents, by their own account, mentioned a step whereby they provide feedback as required by the JBCC.

The feedback received from this open-ended question varied widely. Each professional described his own approach when evaluating a claim. In summary the following trends emerged as illustrated in Figure 4 below:

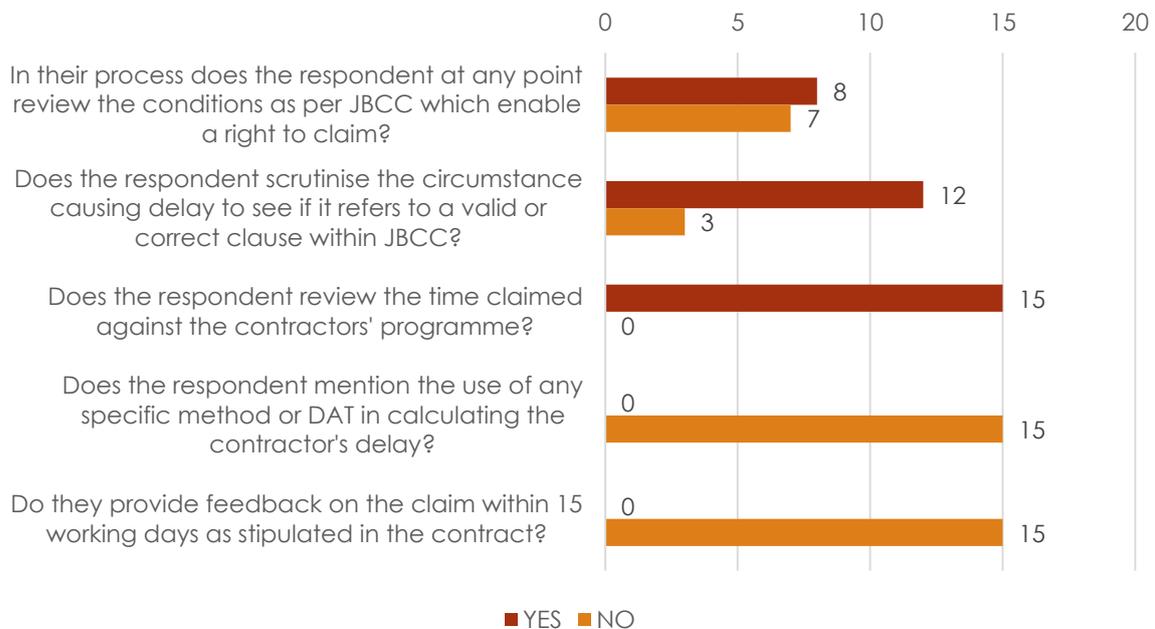


Figure 4: Summary of feedback on open-type question.

The data suggested that most respondents commence the evaluation of a claim by reviewing whether the contractor has a right to claim. From 15 respondents, 12 respondents indicated that they reviewed the clause on which the claim is based. All respondents indicated that they use the Contractor's programme as basis for evaluating a claim. None of the respondents mentioned any specific delay analysis technique or established the method they use for analysis of the amount of days claimed. None of the respondents indicated that they conclude their evaluation with formal feedback within the stipulated time.

The data suggested that the majority of respondents, in explaining their own methods for evaluating claims:

- a) use informal and divergent procedures to evaluating claims within the ambit of JBCC;
- b) collectively agreed on certain basic points of evaluation, which do not necessarily form part of the procedure in terms of JBCC, like the use of Contractors' programmes as basis for calculation;
- c) do not strictly follow the JBCC's requirements for evaluation of claims;
- d) do not conform to any existing standard, such as the internationally established Protocol of the SCL and;
- e) make no mention or use of specific delay analysis techniques.

4.3.3 Part 3: Closed-ended questions

After affording the respondents an opportunity to provide an explanation of the detailed method they used for evaluating claims without any suggestive questioning, the third part of the interview asked questions specifically related to the standard as well as the formal delay analysis techniques (DATs). These questions ensured that all areas of the Protocol were covered if they had not been spontaneously mentioned by the respondents in the second part of the interview.

When asked specifically about the matters relating to the analyses of claims, the following responses were noted:

4.3.3.1 *When evaluating a claim under JBCC, is it a priority for you to first check if the Contractor has a right to claim by having provided timeous notice as per clause 29.4.3 and by having submitted the claim within 40 days of the delay ceasing, as required by 29.5?*

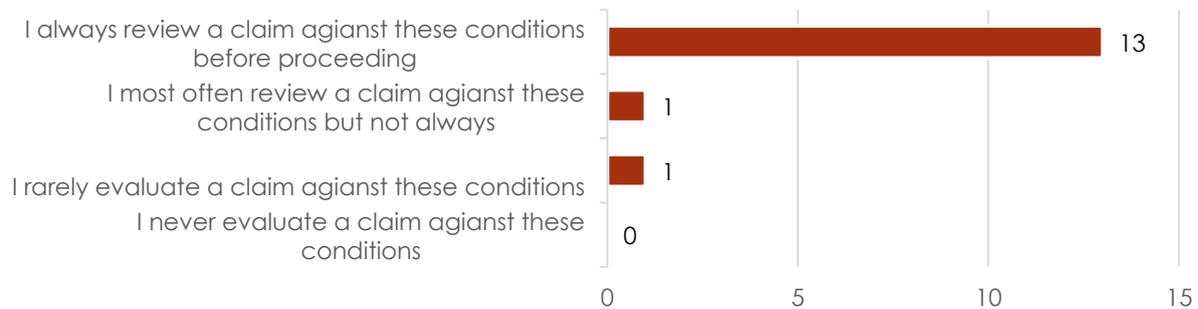


Figure 5: Feedback on the priority to establish a right to claim in terms of JBCC.

4.3.3.2 *When evaluating a claim under JBCC, is there a point in the process where you review the circumstance listed by the Contractor to determine whether it corresponds to the correct clause?*

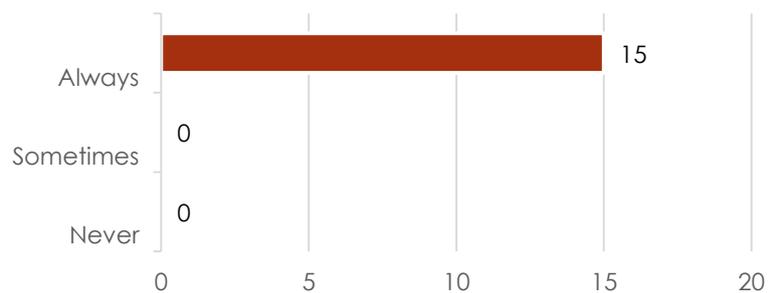


Figure 6: Feedback on whether the claim is reviewed for the correct JBCC clause.

4.3.3.3 *Are you familiar with delay analysis techniques such as Time Impact analysis, As-planned analysis, etc.?*



Figure 7: Feedback on the familiarity and use of delay analysis techniques.

4.3.3.4 *When evaluating a claim under JBCC, do you keep to the requirement of the Agreement to grant, refuse or reduce the amount of days claimed within (15) working days of receipt of a claim?*

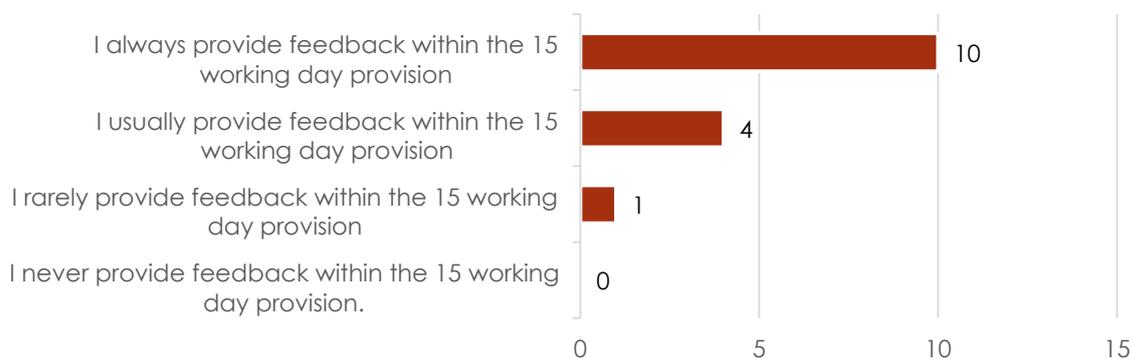


Figure 8: Feedback on the requirement to provide feedback within the time stated.

The data garnered from the questions asked to respondents in Part 3 indicated that when specifically questioned about whether they employ some of the techniques prescribed by the Protocol, respondents mostly indicated a favourable answer that is consistent with the Protocol. The only exception was that the respondents' had limited familiarity with delay analysis techniques. Further to this point, only six respondents indicated that they were aware of these methodologies. None of the respondents indicated that they applied any of these methods in practice. This is certainly a significant finding when correlating the research results to the literature found in Chapter 2 of this study. It was indicated that one of the deficiencies confirmed in the

current literature on delay analysis techniques in South Africa is the amount of knowledge PAs have about applying these techniques. Braimah and Ndekugri (2009:1285), in the United Kingdom construction industry, performed research on *inter alia*, the awareness and extent of use of DATs by professionals. It was indicated that at least 74% of professionals had knowledge of DATs and 52.2% made use of DATs to evaluate claims. In stark contrast to these findings, the current indication of a small sample in the South African industry is that 60% of respondents had never heard of any of the available DATs and 0% of respondents knew how to apply any of the DATs in practice.

4.3.4 Part 4: Actual methods used to analyse the delay

Part 4 of the interview was a practical case study of a contractor's programme that recorded three different delays. The respondents were requested to indicate their approach and calculations regarding the effect of the delay as well as present their conclusion in terms of an extension of time within the ambit of the JBCC. The significance of this portion of the interview was to determine the method or delay analysis technique used by the professionals to calculate the delay. It became evident from the precluding data that none of the respondents were familiar with applying the delay analysis techniques proposed by the Protocol or any other accepted DATs, as indicated in the literature. The interviewer recorded the respondents' approaches their respective conclusions for the EOT, indicated by the method they used.

The data indicated that most of the respondents used the *As-Planned But For* method of analysis, referring to an analysis of the delays where the as-planned programme was employed as a basis for calculation and only the relevant overriding delay by the employer is calculated. The "but for" refers to the question: "**But for** the delays of the contractor, what is the total delay attributable to the employer?"

Most respondents ignored the first delay of the contractor and only provided for the delay by the employer. These respondents indicated that they would grant a four-day extension of time with compensation, in other words the delay would result in a four-day compensable delay.

If the *As-Planned Impacted* method was used, respondents would have taken the contractor's three-day delay into account and would have granted a four-day extension

of time that only include one day with compensation. This method entails the measurement of delays on the *As-Planned* schedule at the moment these were impacted. This method argues that the contractor was responsible for three days of the delay and the employer was responsible for four days of the delay. According to the method, the employer should provide excusable delay extension for his four days, but the contractor cannot claim compensation for three of those four days as he was part of the delay. The figure below indicates that four of the 15 respondents used this method.

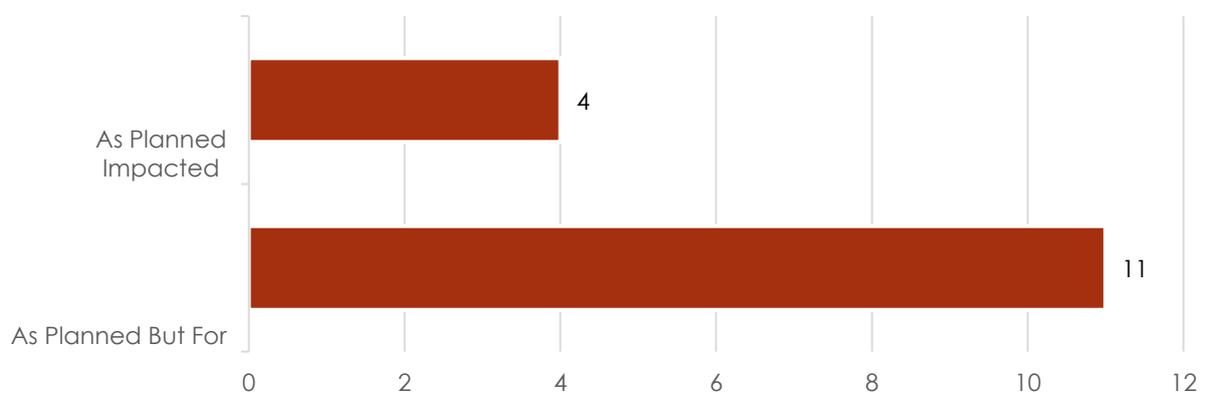


Figure 9: Utilisation of DATs by respondents in analysing an extension of time claim for a case study project.

4.4 SUMMARY

The data from the semi-structured interview satisfied the main and secondary aims of this study by providing insights regarding the detailed method and approach used by professionals when evaluating an extension of time claim. These responses were placed within the context of the JBCC standard form of contract and an international best practice standard.

The first part of the interview established that the sample population was suitable and satisfied the objectives of the research study. The second part of the interview provided data on the methods professionals use to evaluate claims and satisfied part of the main and secondary aims of the study. This information was provided from the

respondents' own perspectives. The third part of the interview obtained feedback on areas not dealt with by professionals in the second part of the interview. These were areas emphasised as important from the international standard of practice established in Chapter 2. The data from feedback of this portion of the interview indicated the difference between the actual methods employed to analyse an EOT compared to the international standard. Part 3 of the interview also provided a direct insight into the use of DATs by the respondents. Lastly, a case study was used as an objective tool to establish the preferred or default delay analysis technique employed by the respondents, either knowingly or unknowingly.

CHAPTER 5: RESEARCH RESULTS AND DISCUSSION

The main aim of this field study was to determine the current methods and delay analysis techniques used by construction professionals in the construction industry in Bloemfontein South Africa, in order to evaluate extension of time claims under the JBCC standard form of contract.

The secondary objectives were:

- to analyse the current delay analysis techniques and international standards of practice currently employed elsewhere;
- and to compare the current methods used by professionals in Bloemfontein South Africa, against the techniques and conditions prescribed in international best practice guides and standards.

These aims were achieved by a combination of a literature review and by collecting data from a sample of the industry in Bloemfontein through a process of semi-structured interviews.

The literature review studied the unique aspects of a construction contract, thus providing a framework against which some of the general concepts such as delays, extension of time claims, construction schedules and delay analysis techniques were explored.

The literature review not only explored the current delay analysis techniques used by professionals internationally but also derived an international best practice standard in terms of the SCL's Protocol for evaluation of extension of time claims. The combination of these delay analysis techniques satisfied one of the secondary aims of the field study.

Subsequently, a semi-structured interview was designed by means of a pilot study and the interview provided a platform for obtaining feedback from respondents by which the main- and remaining secondary aim of the study was achieved. The following provides a summary of the study, the conclusions drawn as well as specific areas of research recommended to further enhance future study into this topic.

5.1 CONCLUSION

The conclusion of this study is subsequently discussed in terms of the context of the main and sub-aims of the study.

5.1.1 **Main aim: Determine the current methods and delay analysis techniques used by construction professionals in the construction industry in Bloemfontein South Africa, in order to evaluate extension of time claims under the JBCC standard form of contract**

The study focussed on a sample of professionals within the construction industry in Bloemfontein, who regularly act as Principal Agents under a standard form construction contract known as the JBCC. The research employed a semi-structured interview methodology to obtain the necessary data.

The data obtained from the interview indicated the following in terms of:

- (a) the current methods used by construction professionals in order to evaluate extension of time claims under the JBCC standard form of contract:

The data suggested that when the majority of respondents explained their own methods for evaluating claims, it became evident that the respondents:

- had divergent procedures that were followed to evaluate claims within the ambit of JBCC;
- did not strictly follow the JBCC's requirements for evaluation of claims;
- had certain procedures they followed collectively, however these particular procedures do not form part of the JBCC's requirements. The use of a programme as a basis for evaluation is the specific procedure revealed by this data;
- made no mention of or intentionally used any of the identified delay analysis techniques found in the literature or that were proposed by the protocol and;
- did not conform to any existing standard, such as the internationally established Protocol of the SCL.

(b) The delay analysis techniques used by construction professionals in order to evaluate extension of time claims under the JBCC standard form of contract:

The data indicated that where respondents were requested to perform an evaluation on an extension of time for a case study project, the delay analysis techniques unintentionally used by these respondents differed between the *As-Planned But For-* and the *As Planned Impacted-* techniques of delay analysis. The *As-Planned But For* technique was the preferred method with the majority of respondents selecting this method.

The research study therefore concluded that professionals in the construction industry in Bloemfontein follow different methods for evaluating claims for extension of time in terms of the JBCC standard form. Furthermore, the research study's results indicated that these professionals do not strictly follow the process as formulated by the JBCC, nor do they follow the procedures as postulated by the SCL's protocol, considered to be the most prominent international standard for evaluating claims for extension of time.

The professionals interviewed also indicated steps in their methodology that do not fit into the ambit of the JBCC's requirements. The use of a Contractor's programme as a basis for the calculation were indicated by all professionals as forming part of their methodology, even though no such requirement exists within the prescribed methods of analysis from the JBCC. The research results confirmed that the professionals interviewed had no knowledge of how to apply the different DATs in practice and indicated that they never used any of the DATs intentionally in their evaluation process. It was recorded that when the interviewed professionals evaluated claims, they used different DATs, albeit unintentionally and most of the professionals indicated a preference to use the *As Planned But For* technique.

5.1.2 Secondary objective (a): Analyse the current delay analysis techniques and international standards of practice currently employed elsewhere;

In the literature review it was established that the SCL's Protocol formed the first published standard in terms of how practitioners should evaluate and calculate extension of time claims within any form of contract (Pickavance, 2010: 532). The

SCL's Protocol framework for evaluation was used in this research study to derive a series of steps to determine the evaluation of extension of time claims. This framework was also merged with the provisions of the JBCC to form a standard practise for how delay should be analysed. Figure 11 below, indicates this derived standard in a step-by-step format.

STEPS	SOURCE
Step 1	
Ensure conditions relating to the EOT is met as per provision of relevant Contract	SCL Protocol
Conditions as stipulated in JBCC	
1.1 Within 20 working days for the date upon which the Contractor became aware, notify the PA of his intention to submit an EOT.	JBCC
1.2 Within 40 working days of the delay ceasing, submit such a claim.	JBCC
 <p><i>If any one of these conditions (1.1 & 1.2) are not met, the contract states that the contractor shall forfeit his right to claim. If so, there will be no need to evaluate the claim any further and the PA should refuse the claim.</i></p>	
Step 2	
Review the claimed circumstance against the specified clause and determine if it is valid and correct.	SCL Protocol
Step 3	
Review the impact of the delay on critical progress, in other words on the CPM schedule.	JBCC
Review and calculate the delay using the Time Impact Analysis method on the Contractor's programme	SCL Protocol
Step 4	
Proceed to grant, reduce or refuse the working days claimed within 15 working days of receipt of the claim	JBCC

Figure 10: Derived standard to evaluate a claim for extension of time in terms of JBCC and the Protocol.

From the collection of literature it was established that the following list of DATs exist and are utilised in the United Kingdom by many construction industry professionals. Any technique used by professionals in analysing a delay should fall within one of these categories, whether intentionally or unintentionally:

- a) As-Planned *versus* As-Built,
- b) Impacted As-Planned,
- c) As-Planned But for,
- d) Collapsed As-Built;

- e) “Window” Analysis, and
- f) Time Impact Analysis.

The derived standard and list of existing DATs satisfied the first sub-aim of the study and it provided a foundation for compiling the semi-structured interview questions in order to proceed and satisfy the main- and second sub- aim.

5.1.3 Secondary objective (b): Compare the current methods used by professionals in Bloemfontein South Africa, to the techniques and conditions prescribed in international best practice guides and standards;

The data collected from the professionals’ own indications of the methods they followed suggested that none of them prescribed to a formal procedure when evaluating claims for extension of time. The responses of Part 2 were measured according to the benchmark of the derived standard and it became evident that the methods that the professionals followed do not conform to the available international standards for evaluation. When asked specifically about the methods they employ when analysing an extension of time claim, as specified in Part 3, most professionals indicated that they followed these procedures. This data is not objective and is rejected in order to derive a clear outcome. The fact that DATs form a central part of the SCL’s Protocol, and none of the professionals were able to use any of the existing DATs in their methods of analysis, provides conclusive evidence that the interviewed professionals do not conform to the requirements of the international standards. However, in some instances all the professionals conformed to the standard, as all the respondents who were interviewed explained that they used Contractor’s programmes for evaluating claims. While this is a protocol requirement, it is not contractual. However, all the professionals indicated that they use the programme as basis for their evaluation. Figure 11 below indicates the difference in responses between the second and third part of the interview.

STEPS	PART 2 FIRST RESPONSE	PART 3 SECOND RESPONSE
Step 1		
Ensure conditions relating to the EOT is met as per provision of relevant Contract	53%	100%
Step 2		
Review the claimed circumstance against the specified clause and determine if it is valid and correct.	80%	100%
Step 3		
Review the impact of the delay on critical progress, in other words on the CPM schedule.	100%	100%
Review and calculate the delay using the Time Impact Analysis method on the Contractor's programme	0%	0%
Step 4		
Proceed to grant, reduce or refuse the working days claimed within 15 working days of receipt of the claim	0%	93%

Figure 11: Derived standard to evaluate a claim for extension of time in terms of JBCC and the Protocol.

5.2 LIMITATIONS

The findings of this research study should be interpreted within the following context, where these areas also serve as opportunities for future research on the topic:

- In some instances it was difficult to obtain an objective understanding of the complete evaluation method followed by the respondents. Some of the data received were predominantly qualitative and subjective in nature and limited inferences could be concluded. Figure 11 is a good example in point.
- This study was conducted on a small sample in a portion of the construction industry in South Africa. It therefore provides a limited insight regarding the methods employed in the national or international construction industry.
- The study did not focus on the manner or methods employed by contractors in compiling their extension of time claims, which could have added a noteworthy comparison between the methods of principal agents and those of contractors.

5.3 RECOMMENDATIONS

To address the abovementioned limitations the following recommendations are made to improve future research:

- To obtain an enhanced, objective understanding of the complete evaluation method followed by the respondents, a case study of various projects' actual data should be researched. Such a case study will measure the exact methods employed by principal agents and gain an objective understanding regarding the complete evaluation method used.
- To apply the results to a larger group of professionals, the data provided should be representative of the industry as a whole. Such a quantitative study can provide the foundation for understanding the true need for a standard of practice in this area.
- There should be an increased focus on this topic within the curricula of various tertiary training institutions. This research correlates with that of the CIOB in 2009 (CIOB: 2009, 53) where it was indicated that the understanding and skills of construction professionals, were not adequate for a modern, progressive industry.
- A study of the manner or methods employed by contractors when compiling their extension of time claims could provide valuable information about the reasons attributable for the large amount of disputes within the profession and industry. This current study found that not only are there differences in approaches between professionals in evaluating these claims, but that the different methods that are employed yield different results. This indicates that contractors predominantly use a different method in their claims when compared to the methods that professionals use in their evaluation.
- Further research could analyse the effectiveness of evaluating extension of time claims in the industry with the aim to improve the evaluation process. By analysing the needs of practitioners in terms of evaluating extension of time claims, a standard of practice for the evaluation of claims in the industry could be derived.

5.4 CLOSING STATEMENT

This study indicated that delay is one of the most common causes of construction related disputes and also one of the most difficult to evaluate (Critchlow, et al., 2006: 3). Currently, none of the standard forms of contract express or provide an indication of how a principal agent should commence and conclude an evaluation that results in the awarding an extension of time claim (Pickavance: 2010:276).

In this absence of a standard form of analysis, the research found that professionals in a portion of the South African construction industry have no knowledge of any formal analysis techniques when evaluating claims. Moreover, the research demonstrated that the absence of this standard, results in a portion of the industry applying different methods to the same extension of time claim, thereby creating inconsistent results for both contractors and employers to follow.

The significance of the data within the context of the problem statement is that the two techniques, namely *As Planned Impacted* and the *As Planned But For* technique differ quite substantially in terms of the risk, additional cost and penalties they infer upon both parties to the building contract.

In resolving these claims amicably and expeditiously, it appears the industry in South Africa not only requires an objective standard for professionals to follow in terms of evaluating claims for delay but also the formal delay analysis techniques used by the professionals requires a reciprocal correlation. The research highlighted this need for an objective standard. If all principal agents can ascribe to and incorporate such a standard it may minimise or remove the dispute prone status of delay claims in the local industry.

APPENDIX A

The standard forms of contract used in South Africa:

1. **JBCC**. The Joint Building Contracts Committee (JBCC). 2007. *Principal Building Agreement (PBA)*. Series 2000, Edition 5.0.
2. **GCC**. The South African Institution of Civil Engineering (SAICE). 2010. *General conditions of contract for construction works (GCC)*. Second Edition.
3. **NEC**. The Institution of Civil Engineers (ICE). 2005. *New Engineering Contract (NEC)*. *Engineering and Construction contract (ECC)*. Third edition.
4. **FIDIC**. International Federation of Consulting Engineers (FIDIC). 1999. *FIDIC Conditions of Contract for Construction (Red book)*. First Edition.

The relevant clauses from the different standard forms in terms of extension of time claims:

- **JBCC**

Sub Clause 29.1: *“The circumstances for which the contractor is entitled to a revision of the date for practical completion...”*

Sub Clause 29.3: *“Further circumstances for which the contractor is entitled to a revision of the date for practical completion are delays by any other cause beyond the contractor’s reasonable control.”*

- **FIDIC**

Sub Clause 20.1: *“If the Contractor considers himself to be entitled to any extension of the Time for Completion...give notice to the Engineer, describing the event or circumstance giving rise to the claim.” “The Engineer shall proceed in accordance with Sub Clause 3.5 to agree or determine (i) the extension (if any) of the Time for Completion... to which the Contractor is entitled under the Contract.”*

- **NEC**

Clause 60 deals with compensation events. Compensation events according to NEC comprise proposed changes to the prices and any delay to the completion date. In sub clause 60.1, the contract provides nineteen (19) events falls within the definition of compensation events.

- **GCC**

Sub Clause 10.1.1: *“The following provisions shall apply to any claim by the Contractor for an extension of time for the Practical Completion of the Permanent Works...”*

Clauses obligating the contractor to prepare a programme in some of the most widely used construction contracts in South Africa:

- **FIDIC**

Clause 8. Programme: *“The contractor shall submit a detailed programme to the Engineer within 28 days...”*

- **NEC**

Clause 31.1. The Programme: *“... the Contractor submits a first programme to the Project Manager for acceptance within the period stated in the Contract Data.”*

- **GCC**

Clause 12. Programme of the works: *“The Contractor shall deliver to the Engineer... a realistic programme showing the order of procedure, the duration of activities making up the programme and the method which he proposes to use in carrying out the Works in order to meet the Due Completion Date.”*

- **JBCC**

Clause 15.0, Preparation for and execution of the works. Sub clause 15.6.1: *“The contractor shall prepare a programme of the works together with a schedule of outstanding construction information in sufficient detail to enable the principal agent to assess the progress of the works...”*

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