Tinus Maritz & Andries Schutte

The calculation of acceleration costs on construction projects

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Abstract

A lack of understanding often exists between contractors, client organisations and consultants as to what may, and what may not, be included in acceleration claims on construction projects. The aim of this article is to create a better understanding of the complexity of acceleration claims. It should also lead to new insights into claim procedures and the substantiation of acceleration costs. The impacts and delays which may result in acceleration claims on a project were analysed as they form the basis for establishing liability in terms of a particular contract. Matters of principle that are applicable to acceleration claims, regardless of the form of contract recommended for use in the South African construction industry, were also examined.

The findings indicate that there are significant differences on a number of aspects regarding the calculation of acceleration costs on construction projects between contractors, consultants and employers/developers. The majority of the respondents, however, were of the opinion that of the various methods used for calculating acceleration costs, the time impact analysis is most frequently applied, but that the modified total cost approach is the method most suitable on projects where there is a significant increase in the scope of work, something that occurs regularly on construction projects.

Keywords: Construction, delays, acceleration, claims, float, critical path

Abstrak

Daar is dikwels onsekerheid by aannemers, kliënte-organisasies en konsultante oor wat mag, en wat mag nie, in versnellingseise op konstruksieprojekte ingesluit word. Die doel van hierdie artikel is om 'n beter begrip rakende die kompleksiteit van versnellingseise te bewerkstellig. Die artikel behoort ook te lei tot nuwe insigte oor die prosedures vir eise en die substansiëring van versnellingskoste. Die oorsake en vertragings wat aanleiding gee tot versnelling op 'n projek is ontleed aangesien dit die grondslag vir die bepaling van aanspreeklikheid ingevolge 'n spesifieke kontrak vorm. Belangrike prinsipiële aspekte wat op versnellingseise betrekking het, ongeag die kontrakvorm wat in die Suid-Afrikaanse konstruksiebedryf vir gebruik aanbeveel word, is verder ondersoek.

Die bevindinge dui daarop dat daar tussen aannemers, konsultante en kliënte/ontwikkelaars aansienlike verskille op verskeie aspekte bestaan met betrekking

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tot die berekening van versnellingskoste op konstruksieprojekte. Meeste respondente was egter van mening dat die "time impact analysis"-benadering die meeste toegepas word, maar dat die "modified total cost"-benadering die mees geskikte metode is op projekte waar daar 'n beduidende toename in die omvang van werk is, iets wat dikwels op konstruksieprojekte voorkom.

Sleutelwoorde: Konstruksie, vertragings, versnelling, eise, vlot, kritiese pad

1. Background

1.1 Delay classification and claims for acceleration costs

Sanders & Eagles (2001: 3) define a delay as an event that results in an extension of the time necessary to complete all or part of a project. Halvorson (1995: C&C.1.1) indicates that the contractor's right to recover increased performance costs as a result of acceleration depends on the type of delay that reduces the performance period.

He classifies delays as follows:

- Nonexcusable delay;
- Excusable delay;
- Compensable delay, suspension and disruption;
- Imposed milestone, and
- Concurrent delay.

Constructive acceleration occurs in the absence of owner-directed acceleration. The employer's refusal to grant an acceleration order or extension of time (EoT) for excusable delay will result in an acceleration effort by the contractor in order to complete the project on the contractual completion date.

The construction industry in the United States of America (USA) has become accustomed to the concept of a constructive acceleration order. Davison (2003) points out that the refusal to grant EoT for excusable delay in the USA is normally converted into an implied instruction to accelerate. In South Africa, however, the situation is somewhat different as indicated hereinafter.

The approach under English law, as pointed out by O'Reilly (2007), is that if there is no express authority in the contract to accelerate, then no entitlement arises to claim extra costs for acceleration. O'Reilly (2007) further states that the only exclusion is where the certifier is expressly empowered under the contract to order acceleration on the employer's behalf. Therefore, the refusal to grant an EoT

cannot amount to a "deemed" instruction to accelerate. A claim for constructive acceleration under English law must be based on the ordinary principles for breach of contract and damages.

The conditions of contract recommended for use in South Africa (the NEC, FIDIC, JBCC and GCC) all make use of different definitions and/or attach different interpretations to the term 'acceleration', while some do not address the issue at all. The meaning of acceleration as used by the NEC is to bring the completion date forward, which differs from the usage in the FIDIC where acceleration means speeding up the work to ensure that the completion date is achieved. The JBCC does not refer specifically to acceleration, whereas the GCC provides for acceleration in its clause 40.3, but without defining it anywhere.

For the purpose of this article acceleration is defined as the execution of outstanding contract work within a shorter time than originally planned to mitigate the extension of time that the contractor would have otherwise been entitled to.

1.2 Methods to calculate acceleration costs

Loots (1995: 777) argues that there is no hard and fast formula for calculating acceleration costs. He emphasises that each situation should be individually assessed to determine what costs were sustained in the attempt to buy back time. Davison (2003) points out that specific methods or a combination of methods which can be used to calculate acceleration costs exist. These are:

- The global or total cost approach;
- The modified total cost approach;
- The time impact methodology;
- The measured mile approach, and
- Formula approaches.

Claims in construction contracts very often result from the lack of a good control system. If there is no control system that can effectively register every change that occurs during the project execution, disputes are likely to emerge. The contents of a claim can be checked against Sotelo & Del Mercado's (1993: G.5.6) content checklist.

The checklist is compiled as follows:

- A summary of items and amounts to be claimed;
- Documents that support the claim;

- A detailed analysis of how the amounts were calculated, and
- Legal and contractual support.

Each standard form of contract has its own detailed requirements regarding record-keeping, document control, notices, *etc*. The prime source of information for any claim between the parties is the contract and the specific requirements contained therein. The process of keeping project records should start during the tender process. Tender documents are often used in disputes to help substantiate the costs that a contractor expects to incur on the project. Other project records such as project cost reports, daily logs and progress reports, daily payroll records, site instructions and related support documentation, minutes of meetings, project correspondence, documentation of design changes, photographs, *etc*. will be vital in substantiating an acceleration claim.

1.3 Float ownership

Float utilised efficiently by the employer and contractor can reduce the negative impact that acceleration or EoT may have on a project considerably. In the critical path method of scheduling, the time difference between the earliest finish and the latest finish of an activity is called total float. Employers in the construction industry are inclined to believe that all float exclusively belongs to the party who is defined as the employer to the particular contract. Contractors, on the other hand, are generally of the opinion that all float belongs to them as they have prepared the detailed programme and have allowed extra time and/or float for activities where high risks are involved (De Leon, 1986: 12). Float is then regarded as a saleable resource belonging to the contractor. Another school of thought is that float should belong to the project and not a specific party to the contract. Float will then be used on a first come, first serve basis. However, this solution may be regarded as being biased towards the employer as he absorbs float over which he has no influence over and which he has not earned.

2. Motivation for the study

The study attempts to define the views, opinions and understanding of employers, consultants and contractors in the construction industry regarding procedures and methods used to calculate and to substantiate acceleration costs on projects.

The reasons underlying the study are as follows:

- exploring whether most acceleration claims are the consequence of significant project scope increase;
- creating a better understanding of the complex nature of acceleration claims, and
- pointing out differences of opinion among consultants, contractors and employers regarding acceleration claims.

3. Problem statement

3.1 Main problem

Which procedure or methodology will normally be used by contractors, client organisations and consultants to calculate the acceleration costs on a project?

3.2 Sub-problems

- Is there a specific impact or delay that is normally the cause of accelerated working on a project?
- Are there key areas relating to acceleration claims where contractors, client organisations and consultants have significant differences in opinion among each other?

3.3 Hypotheses

The main hypothesis is that contractors, client organisations and consultants will generally choose the 'time impact analysis' as a method to calculate acceleration costs on projects.

This is broken down further into corresponding sub-hypotheses as follows:

- Most acceleration claims are the consequence of significant project scope increase as a result of numerous contract instructions.
- The parties normally involved in acceleration claims on projects have different opinions regarding:
  - ownership of float;
  - contractor's ability to claim additional costs for preliminaries or acceleration;
  - reduction of time to complete a project where work is omitted, and
  - implied instruction to accelerate where consultants refuse to issue instructions for acceleration or extension of time where excusable delays occurred.

4. Research approach

The study can fundamentally be characterised as descriptive quantitative research. Data collection was done by means of questionnaires which were completed by a selected group of 60 individuals. The questionnaires tested respondents' views and knowledge regarding issues relating to acceleration claims on construction projects in South Africa.

Leedy & Ormrod (2005: 183) define survey research as follows. The researcher:

- poses a series of questions to willing participants;
- summarises the participants' responses with percentages, frequency counts or more sophisticated statistical indexes, and
- draws inferences about a particular population from the responses of the sample.

4.1 Target population and sampling

The target population consisted of clients, consultants and contractors operating in the building, construction and mining industries in South Africa. The three categories represent the following parties:

- Employers: This category consists of the clients who undertake the projects and are responsible for the funding of such projects (i.e. the party engaging in a contract with a contractor).
- Consultants: This category includes the project specialists such as project managers, engineers and quantity surveyors who are registered with a governing body in terms of South African legislation and provide specific services to a client as prescribed by the particular contract.
- Contractors: This category consists of building and engineering contractors from the mechanical, electrical, civil and mining fields.

The research was restricted to individuals who were based at their respective organisations' head offices in Johannesburg, Gauteng. Purposive sampling was used to select a representative group. A group of 60 individuals was selected (20 employers, 20 consultants and 20 contractors) as they represent the diverse opinions on acceleration matters and provide a cross section of all clients, consultants and contractors within the South African project environment.

Respondents were requested to answer questions related to projects where the following factors were applicable:

- Contracts with bills of quantities (BoQ) and detailed programmes.
- Contracts based on either NEC, FIDIC or JBCC terms and conditions.
- Work remeasured to determine the final value.
- Work where a main contractor, main consultant and employer were involved.

4.2 Data collection procedure

The main objective of the research was to acquire information from three groups of people (contractors, consultants and employers/ developers) concerning their opinions on and previous experiences with regard to project acceleration.

A questionnaire containing eight main areas (Section A – H) of questioning was used to collect the data. The Department of Statistics at the University of Pretoria evaluated the questionnaire to establish whether meaningful conclusions could be derived from it.

Section A illustrates which impacts or delays have the biggest influence on construction projects. These impacts or delays generally cause acceleration and/or extension of time on projects. The impact or delay which occurs most frequently will determine the method to calculate acceleration costs. Section H indicates the method the respondents opted for when certain impacts or delays occurred. The six scenarios illustrated in Section H relate to the impacts and delays described in Section A. Section B reflects the success of contractors' acceleration claims. This is an indication of how well claims are prepared and substantiated. The results of Sections C to G are indicative of the respondents' knowledge relating to acceleration matters in general.

Appointments were made with the selected group of participants and the content and purpose of the questionnaire were explained to them. The researcher hand-delivered all questionnaires to the relevant participants. The participants were requested to complete the questionnaires before 23 September 2007. A pilot study was conducted where questionnaires were handed out to four respondents in order to establish whether they contained any unintelligible or weak areas. This resulted in minor changes to two sections of the questionnaire.

5. Results and recommendations

5.1 Section A: Delays or impacts causing delays on construction projects

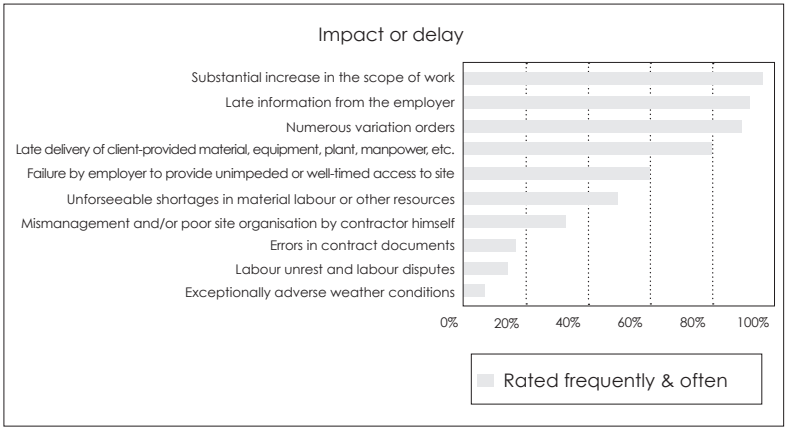

Figure 1: Delays and impacts on construction projects

The results from Figure 1 show that a 'substantial increase in the scope of the work' is the delay or impact that most frequently causes delays on construction projects.

5.2 Section B: How often contractors receive certain levels of compensation for claims

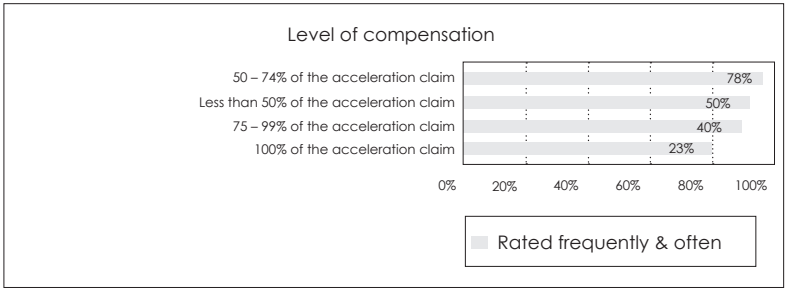

Figure 2: Compensation received by contractors for acceleration claims submitted

The results from Figure 2 indicate that the contractors targeted in the survey were of the opinion that the level of compensation most often received by them for an acceleration claim is 50 – 74% of the original amount of the acceleration claim.

5.3 Section C: Views regarding the origin of acceleration claims

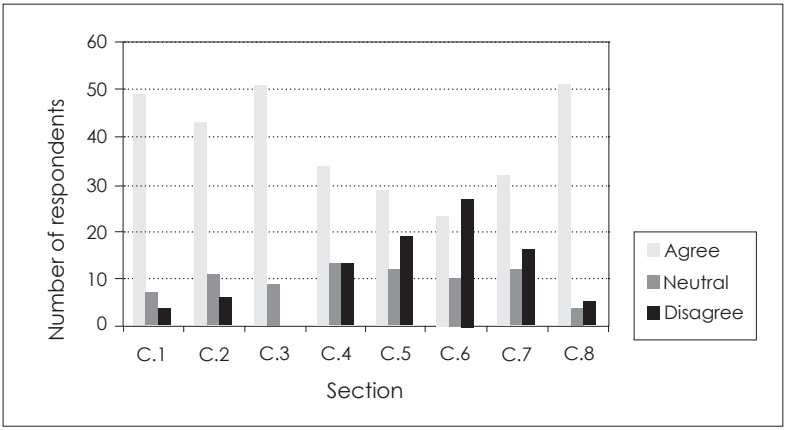

Figure 3: Views regarding the origin of acceleration claims

The following conclusions are drawn from the results portrayed in Figure 3:

- The respondents agreed that employers should allow more time and funds for the study (design) phases of projects (C.1).
- Most acceleration claims are the result of an increase in the scope of work (C.2).
- A poorly defined project scope is usually the reason for the high number of variation orders and claims on projects (C.3).
- An increase in quantities on admeasured contracts where such extra, addition or variation was ordered in writing often give reason to acceleration claims (C.4).
- There was a significant difference of opinion among contractors, consultants and employers/developers with regard to the statement that contractors regularly fail to identify and to alert the client to project risks such as an ill-defined scope in the early stages (e.g. at the tender clarification meetings) of a project (C.5).
- There was a significant difference of opinion among contractors, consultants and employers/developers with regard to the statement that contractors can generally accommodate contract variations and scope increases up to the value of 15% of the contract amount without claiming additional costs for preliminaries or acceleration (C.6).
- There was a significant difference of opinion among contractors, consultants and employers/developers with

regard to the statement that costs for preliminaries can be added to variation orders at any stage even if a contractual clause states that additional preliminaries can only be claimed once variations and scope changes exceed 15% of the contract amount in total (C.7).

- Scope changes can be identified in the early stages of a project by the contractor's quantity surveyor when he/she starts to remeasure work according to the issued construction drawings and specifications (C.8).

Based on the results of Section C the following recommendations can be made:

- The employer must bear the risk where the scope of work is poorly defined.
- The attention of the parties to the contract must be drawn to the fact that no variation order is required where there is an increase in quantities based on a quantity surveyor's remeasurements.
- Contractors must not be forced into a situation by employers where they have to accept contract conditions that prescribe an obligation to accommodate contract variations to a value of 15% of the contract amount without being able to claim for additional preliminaries.
- Scope changes must be identified through the employer's scope management processes.

5.4 Section D: Views regarding the impact of delays and float on the programme

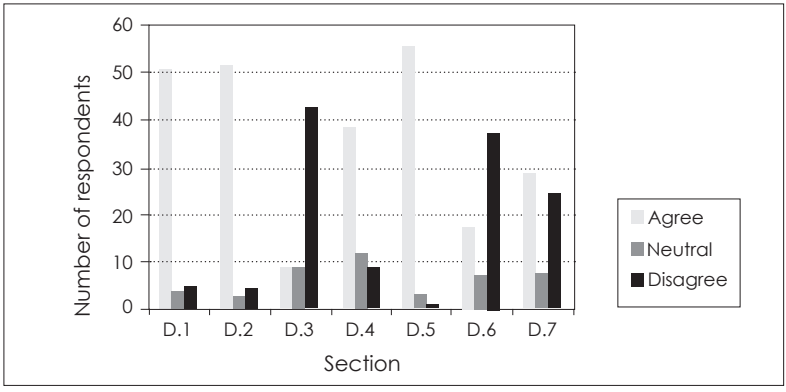

Figure 4: Views regarding the impact of delays and float on the programme

The following conclusions are drawn from the results portrayed in Figure 4:

- Delays or impacts which cause extension of time and/or acceleration are a frequent occurrence (D.1).
- Float in the programme (baseline) as submitted by the contractor within the period as required in terms of the particular contract belongs to the contractor and can be used at his/her discretion (D.2).
- Float does not belong to the project but to a specific party to the contract. Float cannot be used on a first come, first serve basis (D.3).
- The respondents indicated support for the following contract clause to be inserted: "Extension of time shall be based solely upon the effect of delays to the work as a whole…Time extensions shall not be granted for delays to parts of the work, whether or not changed by any variation order, that are not on the critical path of the official schedule. Further, time extensions shall not be granted until all float time available for parts of the work involved is used" (D.4).
- The respondents agreed that if the employer intends to gain the most advantage from the programme, the schedule should be prepared jointly by the contractor and consultant and be accepted as the baseline programme (D.5).
- The contractor cannot use the float for inexcusable delays such as slow work or lack of supervision (D.6).
- There was a significant difference of opinion among contractors, consultants and employers/developers with regard to the statement that the project manager or principal agent in terms of the particular contract can reduce the time for completion of the contract where work is omitted (D.7).

Based on the results of Section D the following recommendations can be made:

- The ownership of float must be clearly defined in the procurement documentation.
- Parties to the contract must be informed of the fact that the time for completion of the contract cannot be reduced where work is omitted. Finsen (2006: 160) supports this recommendation by stating the following in respect of time where work is omitted:

Authorities such as McKenzie, Quail and Malherbe and Lipshitz, relying on the judgement in Kelly and Hingle, conclude that the principal agent does not have the power to reduce time where work is omitted.

- The employer will gain the most advantage from the programme (optimisation) if the schedule is prepared jointly by the contractor and the consultant.

5.5 Section E: Views regarding constructive and directed acceleration

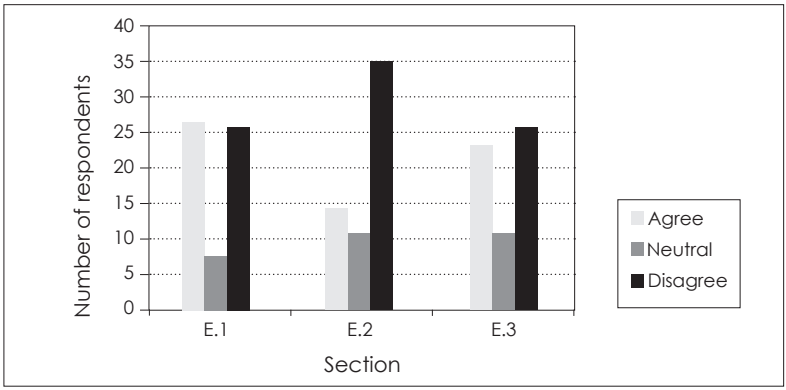

Figure 5: Views regarding constructive and directed acceleration

The following conclusions are drawn from the results portrayed in Figure 5:

- The respondents held opposing views with regard to the statement that the refusal of the certifier in terms of the particular contract to grant extension of time to a contractor for an excusable delay can be viewed as an implied instruction to accelerate (E.1).
- A warning by the project manager or principal agent in terms of the particular contract, which states that a contractor is behind the agreed schedule (due to owner-caused delay), cannot be viewed as an implied instruction to accelerate (E.2).
- The respondents were divided in their opinion regarding the statement that the certifier (consultant) seldom instructs the contractor to accelerate even when it is evident that an owner-caused delay made acceleration or EoT inevitable (E.3).

Based on the results of Section E the following recommendation can be made:

- The attention of the parties to the contract must be drawn to the fact that the refusal of the certifier in terms of the particular contract to grant EoT to a contractor for an excusable delay cannot be viewed as an implied instruction to accelerate. O'Reilly (2007) supports this recommendation by stating that the refusal to grant an EoT cannot amount to a "deemed" instruction to accelerate.

5.6 Section F: Quality of contractor's acceleration claims

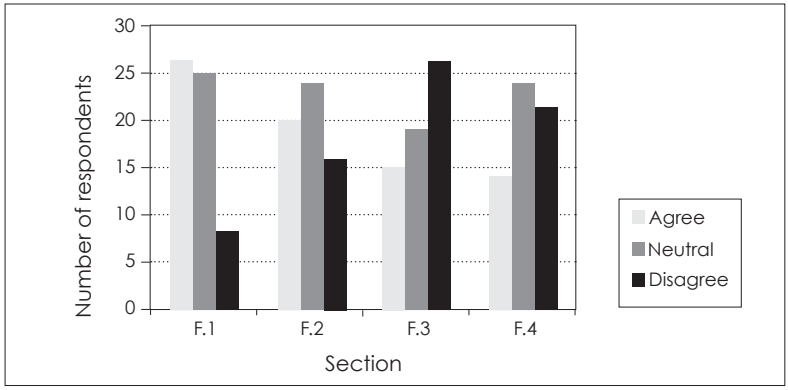

Figure 6: Views regarding the preparation of acceleration claims

The following conclusions are drawn from the results portrayed in Figure 6:

- The respondents agreed that contractors' acceleration claims frequently fail to clearly point out all the instances of contract breach (F.1).
- The respondents were divided in their opinion regarding the statement that contractors frequently cannot submit proper substantiated acceleration claims due to the bad quality or absence of project records such as project cost reports, daily logs and progress reports, daily payroll records, variation orders, minutes of meetings, project correspondence, *etc* (F.2).
- The respondents were divided in their opinion regarding the statement that contractors are reluctant to include a wide variety of project records in their acceleration claims (F.3).

- The respondents were divided in their opinion regarding the statement that contractors frequently neglect document control on construction sites (F.4).

Based on the results of Section F the following recommendations can be made:

- The attention of the parties to the contract must be drawn to the fact that contractors' acceleration claims should clearly indicate all the instances of contract breach in order to be successful.
- The attention of the parties to the contract must be drawn to the fact that contractors should adhere to certain quality standards regarding contract administration and document control.

5.7 Section G: The most suitable person to prepare an acceleration claim

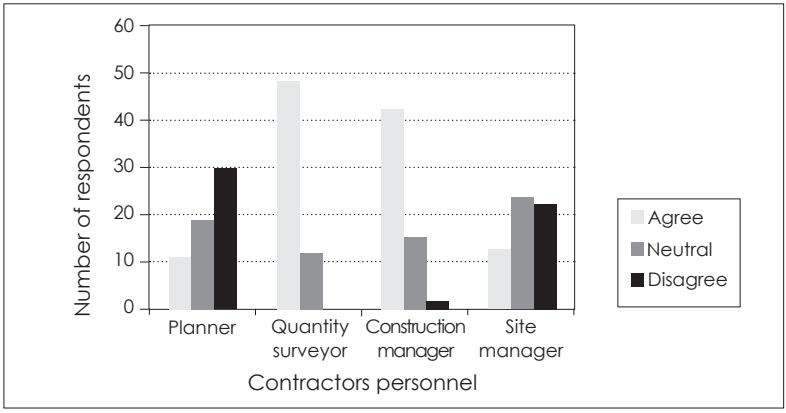

Figure 7: Views regarding the best equipped or skilled person employed by the contractor to prepare an acceleration claim

The following conclusion may be drawn from the results portrayed in Figure 7, which reflect the views of the respondents as to who among the contractor's personnel would be the best equipped or skilled person to prepare acceleration claims:

- The contractor's quantity surveyor was regarded to be the best equipped or to have the necessary skills to prepare an acceleration claim, but the respondents indicated that the construction manager would also be able to perform this task.

5.8 Section H: The best method for calculating acceleration costs

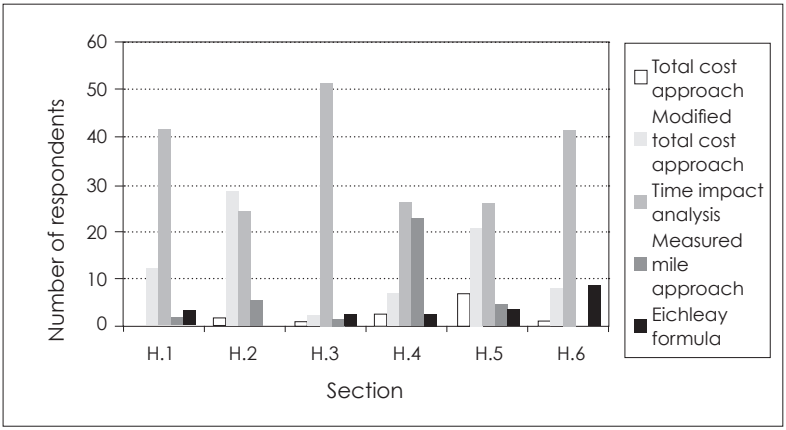

Figure 8: Methods to calculate acceleration costs

The following conclusions are drawn from the results portrayed in Figure 8:

- With the exclusion of H.2, contractors preferred the time impact analysis to calculate the acceleration costs on delay events (H.1, H.3 – H.6).
- The modified total cost approach is the preferred method for calculating acceleration costs where there is a substantial increase in the scope of work (H.2).

6. Conclusions

The following conclusions can be drawn based on the results of this study, and more specifically those obtained from Section H, as well as matters related to the claim methods, which were discussed in the literature study:

- The preferred method for calculating acceleration costs by contractors for most delay events is, in the opinion of most of the respondents, the time impact analysis; this opinion supports the main hypothesis. Other methods can also be used under certain conditions as indicated under scenario H.2. Results from the study indicate that a significant increase in the scope of work is a regular occurrence on construction projects. The modified total cost approach is in this instance regarded as the method most suitable to calculate the acceleration

costs. In this approach the detailed project as-planned and as-built activity schedules are analysed to identify the time frame of specific delays, disruptions, changes, acceleration, *etc*., which can be summarised by the following equation:

Acceleration costs = Total actual expenditure – Contract amount – Contract amendments – Non-compensable cost elements

- The results further indicated that in many areas relating to acceleration claims differences of opinion exist among contractors, client organisations and consultants; this supports the sub-hypothesis. This can be eliminated by implementing the necessary project management principles and by improving all stakeholders' knowledge of the commercial and legal issues involved in construction projects through continuous professional development.

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