

SCHEDULING CLAIM ANALYSIS:
A COMPREHENSIVE SCHEDULE RELATED
CLAIMS OF CONTRACT ADMINISTRATION FOR
CONSTRUCTION INDUSTRY

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CLAIMS OF CONTRACT ADMINISTRATION FOR CONSTRUCTION INDUSTRY

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SUPERVISOR'S DECLARATION

I hereby that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of the Degree of Bachelor of Project Management with Honors.

Signature

Name of Supervisor:

Position:

Date

STUDENT'S DECLARATION

I hereby declare that the work in this project is my own except for quotations and summaries which have been duly acknowledged. The project has not been accepted for any degree and is not concurrently submitted for award of other degree.

Signature

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DEDICATION

I dedicate my dissertation work to my family and many friends.

A special feeling of gratitude to my loving parents, Mr.Jahidi bin Jamil and Mrs Rohani binti Yusup words of encouragement and push in completing this research.

My sisters and brothers have never left my side and are very special.

I also dedicate this dissertation to my many friends who have supported me throughout the process. I will always appreciate all they have done.

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ABSTRACT

As the construction industry rapidly grows in Malaysia and contributes to our nation's economic growth, it plays a very important role in the development of our country. The accuracy and completion of the project schedule is important to the early and successful resolution of the schedule delay claim issues. In advance, the causes that contribute to the schedule related claims need to be identified as it will be very helpful in the resolution process from the bottom of the issue. Besides, the adjustment or delay on project schedule that might causes delay claims need to be highlighted by the scheduling practitioners. As this research will study the scheduling claims from the different points of view of project parties (contractors and clients), the questionnaires are extremely critical components as the instrument for this research process. In addition, the data analysis was conducted accordingly from the process of identifying and notifying the contract claims, followed by the determination of the causes of schedule related contract claims and lastly the determination of key elements for a strong schedule related contract claims. The outcomes of this research show that the delays in construction and completion of the contract itself is the main causes that usually lead to a schedule related construction claims. This may due to the incomplete contract, which is the main thing as an agreement in the project. The potential causes to the schedule related contract claims identified in this research are ranked as; 1.Delays in construction and completion of the contract, 2.Incomplete and defective work, and 3.Abnormal or unusual weather conditions. Identify and rank the key elements for a strong schedule related contract claims is the second objective for this research to be conducted. These elements are important in order to obtain a clear and good claim as it is the characteristics that need to be considered and implemented in constructing a schedule related contract claims. The data analyzed find out that the outmost key element that need to be implemented in a strong schedule related contract claims is reviewing and understanding the contract itself in order to determine whether the contract allows for an extension of time and compensation. It means a clear understanding regarding the project's contract will definitely makes a contract claims stronger. While the other key elements identified are ranked as; 1.Review and understand the contract to determine whether the contract allows for an extension of time and compensation, 2.Notice (either actual or constructive) of the delay must be given, and 3.Determination of the critical path is often required for the calculation of delay damages.

ABSTRAK

Industri pembinaan yang pesat membangun di Malaysia juga merupakan penyumbang kepada pertumbuhan ekonomi negara kita. Ketepatan dalam penyediaan jadual projek adalah penting untuk resolusi awal dan penting dalam menangani isu-isu tuntutan akibat kelewatan jadual. Terlebih dahulu, sebab-sebab yang menyumbang kepada tuntutan berkaitan perlu dikenal pasti kerana ia akan sangat membantu dalam proses penyelesaian dari bahagian bawah isu itu. Selain itu, pelarasan atau kelewatan jadual projek juga mungkin menjadi sebab-sebab kelewatan tuntutan. Kajian ini akan mengkaji tuntutan penjadualan dari perspektif yang berbeza dari pihak projek (kontraktor dan pelanggan), dan soal selidik merupakan komponen yang amat kritikal sebagai instrumen dalam proses kajian ini. Di samping itu, analisis data yang telah dijalankan dengan sewajarnya bermula dari proses mengenal pasti punca-punca tuntutan kontrak jadual yang berkaitan dan akhir sekali penentuan elemen utama bagi tuntutan kontrak. Hasil kajian ini menunjukkan bahawa kelewatan dalam pembinaan dan penyediaan kontrak itu sendiri adalah punca utama yang biasanya membawa kepada tuntutan pembinaan jadual yang berkaitan. Ini mungkin disebabkan kontrak yang tidak lengkap, yang merupakan perkara utama sebagai perjanjian dalam projek tersebut. Punca-punca yang berpotensi untuk tuntutan kontrak berkaitan yang dikenal pasti dalam kajian ini adalah disenaraikan seperti ; 1.Penangguhan dalam pembinaan dan penyediaan kontrak, 2.tidak siap ataupun kerja yang rosak, dan 3.Keadaan cuaca yang luar biasa. Manakala elemen-elemen yang penting dalam usaha untuk mendapatkan tuntutan yang jelas dan baik juga perlu kerana ia adalah ciri-ciri yang perlu dipertimbangkan dan dilaksanakan dalam membina tuntutan kontrak jadual yang berkaitan. Data dianalisis menunjukkan bahawa elemen kunci perlu dilaksanakan dalam kontrak jadual berkaitan serta dengan memahami kontrak itu sendiri untuk menentukan sama ada kontrak itu membolehkan untuk melanjutkan masa dan pampasan. Elemen-elemen utama yang dikenal pasti adalah disenaraikan seperti berikut; 1.Membaca dan memahami kontrak untuk menentukan sama ada kontrak itu membolehkan untuk melanjutkan masa dan pampasan, 2.Notis (sama ada sebenar atau konstruktif) mengenai kelewatan mesti diberi, dan 3. Penentuan laluan kritikal sering diperlukan untuk pengiraan ganti rugi kelewatan.

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LIST OF ABBREVIATIONS

CI	Construction Industry
CPM	Critical Path Method
GDP	Gross Domestic Product
MYR	Malaysian Ringgit
PERT	Project Evaluation and Review Technique
PMBOK	Project Management Body of Knowledge
PMI	Project Management Institute

CHAPTER 1

INTRODUCTION TO THE RESEARCH

1.1 INTRODUCTION

Every project has unique and different characteristics. However, every each of them have same target towards successfulness by ensuring their client's satisfaction on the project. According to Ashworth (1991) a project is successful if the building is delivered at the right time, at the appropriate price and quality standards. Successful projects are influenced by the project phase's completion by the workforce which is the main resource of a project. As stated in *The Construction Contract Administration Practice Guide (2011)*, the successful project is a project that completed on schedule, within budget, and cleared with all claims.

Thus, in order to have a successful project, a project manager needs to avoid any claim that might be issued while completing the project on time. On the other hand, a prolonged or delayed project may lead to the construction claim issued which will affect both client and contractor. Therefore, this research was conducted to study on the schedule related contract claim of a project and the elements that need to be considered in facilitate the preparation of valid schedule related claims in Malaysian construction industry.

1.2 RESEARCH BACKGROUND

The construction industry is well known as a project-based industry in which construction firms form temporary project organizations to develop, perform and complete projects (Loosemore et al., 2006). The project manager in the construction

industry faced numbers of complex activities throughout the project, hence they need to be carefully planned and executed every project phases to avoid any problems happened. Such incident may cause project delay as well as the extended completion duration. Project delay is a nightmare for every project manager since it may lead to construction contract issues such as project prolongation claim. So, it requires extra precaution by outlining the obligations and legal rights for project participators to have an inevitable project outcome (Awad, n.d). Moreover, a contract claim due to project delay can be the largest and most frequent type of claim on construction project (Peter and John, 2009).

On the other hand, Peter and John (2009) mentioned that one of the most common claims in respect of construction contracts is that for additional payment as a result of delays to the contract works resulting in a delay to the contract completion date of that particular project. Thus, in considering of preventing the losses from such time-related cost, a good project negotiator needs to tackle the claim management problems that normally occur starting from the early stage of a project until the project completion.

1.3 PROBLEM STATEMENT

As the construction industry rapidly grows in Malaysia and contributes to our nation's economic growth, it plays a very important role in the development of our country. Unfortunately, construction industry in the country is facing issues such as poor performance of time and cost, construction waste, as well as poor productivity which these may lead to project delay. Intan, Akintoye and Kelly (2009) reported that only 20.5% of the public projects and 33.35% of the private sector projects were completed within the time. Such critical problems in construction industry may lead to issues that might arise in the project contract administration. Furthermore, as claimed by Murali and Yau (2006), disputes, arbitration, litigation, and total abandonment are examples of delay effects.

Therefore, the implementation of the appropriate processes and procedures of the project contract administration will help in facilitating the early resolution of

schedule related disputes and claims (*The Construction Contract Administration Practice Guide*, 2011). The accuracy and completion of the project schedule is important to the early and successful resolution of the schedule delay claim issues. In advance, the causes that contribute to the schedule related claims need to be identified as it will be very helpful in the resolution process from the bottom of the issue.

Besides, the adjustment or delay on project schedule that might causes delay claims need to be highlighted by the scheduling practitioners. Vidogah and Ndekugri (1998) had highlighted problems in claims management such as contractor's management information systems are ill-designed to support claims; products of basic good management practice, such as diaries, timesheets and programmes, often are inadequate in content even if available; and some aspects of the claims are impossible to quantify with a precision even when the best information is available. These problems need to be avoided in preparing for a construction contract claims.

As stated by Jim and Fred (2009) "There are no winners in delay." Both the project owner and the contractors suffer when there is a project delay: the loss of productive use of the project facility or product; increased finance costs both direct and indirectly; extended staffing costs and contractor overheads; the list goes on. If the project is delayed to the stage of dispute resolution, there are the costs for attorneys, claims consultants, depositions, discovery, mediation, arbitration, and litigation. Very rarely will anyone recover the full costs for those time impacts and none of these dispute resolution costs will bring back the project time that was lost. Therefore, professional schedulers need to be more effective in developing and using the Critical Path Method (CPM) schedule as a tool not only to get the project completed on time, but also to communicate to all of the project stakeholders the delay issues.

Furthermore, a schedule delay claim might be very useful and in contract administration and it will be more helpful to identify any potential causes as it can be used to minimize the potential of the project incurring unanticipated schedule related claims. During schedule development as well as by diligently performing specific actions during the project execution phase, the scheduler enables the project to provide

an as-built schedule that can be validated to the project records to be an effective tool to facilitate the preparation for and/or defence of a schedule related claim.

Therefore, this research will be conducted to study on the factors contribute to schedule related claims and look for the main elements of a strong schedule related contract claims.

1.4 RESEARCH OBJECTIVES

The objectives to be met in this study are:

- i. To determine the main potential causes of schedule related contract claims.
- ii. To identify the key elements in developing strong and firm schedule related contract claims.

1.5 RESEARCH QUESTIONS

This research is conducted to answer questions as following:

- i. Does the contract claims affecting the project management process in construction industry?
- ii. What are the potential issues that may cause construction contract claims?
- iii. Do the schedule related contract claims give advantages in construction contract administration?
- iv. What are the key elements in order to obtain a valid and strong schedule related contract claims?
- v. Does the Critical Path Method helpful to be used in the schedule related claims in construction contract administration?

1.6 SCOPE OF STUDY

This research is focussing on:

- i. Schedule related contract claim only in construction contract administration.
- ii. Project scheduling in the construction's project life cycle.
- iii. Time matter in project scheduling, without involving price analysis.
- iv. Residential construction industry in Bintulu, Sarawak.
- v. The potential respondents of this research are parties in a project, which are project clients and contractors.

1.7 SIGNIFICANCE OF RESEARCH

Changes of tasks that normally occur in construction projects such as delays in construction projects need to be monitored properly as it involves every party involved in the agreement and also may bring losses to them. As the changes in project may lead to contractual issues in their business, it needs a strong and valid solution in terms of contractual law in that particular industry. This research of schedule related contract claims in construction industry will benefits construction contract administration practitioners as well as project-related practitioners especially in construction industry as it study varies causes of schedule related contract claim and hence obtaining the key elements of a strong and firm contract claim.

1.8 EXPECTED RESULT

Generally in a project, the clients are the party that gives requirements or request for a project to be done with certain terms and condition. So, in this research, the findings might shows that contract claims will be mostly claimed by the owner against the contractor. This might due to main factors which are; failure of one or more of the parties to perform in a timely manner then thereby delaying the other party, abnormal or unusual weather conditions, project work prolongation, incomplete and defective work and also defects in the design or documentation issued for a project.

In the process of negotiating the claims, the importance of CPM used in schedule related claims in construction contract administration will be proven by the end of this research. It will be more useful by ensuring these elements are implemented in the claims, and there are; a CPM analysis establishes whether or not delay has occurred on the critical path, determination of the critical path is often required for the calculation of delay damages, a contractor should review the contract to determine whether the contract allows for an extension of time or both an extension of time as well as compensation, negotiate or adjudicate the claim, as well as read and understand the contract documents. By having the valid schedule related contract claims for a project, it will help in improving the project contract management in construction industry in Malaysia.

1.9 SUMMARY

General idea of this research have been explained in this chapter, as it will lead to the deeper elaboration regarding schedule related contract claims in construction industry on the next chapter. The finding of this research would answer the research questions and research objectives as stated.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter will review and describe on the previous scholar's reviews which related to this research. This research focussed on the scheduling claim of contract administration in the area of project management. This section will discussed on the contribution factors to the sources of construction contract claims, the potential causes of schedule related contract claims and the key elements of obtaining strong and successful schedule related contract claims within the construction industry.

2.2 PROJECT MANAGEMENT

Yang and Wang (2009) claimed that the complexity of the project are getting larger with the professional fields involved in large-scale projects increasing nowadays and the main parties involved in the project construction have increased their effort in ensuring effective construction project management. The purpose is for a win-win situation which is a difficult issue faced by managers at all levels of project management in our country. In addition, a project always involved a single individual or multiple individuals, a single organizational unit, or multiple organizational units from multiple organizations.

Due to the potential for change, the development of the project management plan plays an important role throughout the whole project's life cycle. These progressive and crucial factors involved continuous improvement for a more detailed and specific information as well as more accurate estimates became available.

According to Project Management Institute (PMI) as cited by Brewer Strahorn (2012), this well-structured project management plan may help improve the understanding and practice of project management by identifying, defining, documenting and championing generally accepted project management practices and a common project management lexicon. Hence, it allowed a project management team to define work and manage it to a greater level of detail as the project evolves.

The project management criteria for success however are assessed in terms of project completion within time and budget to the required quality (Pretorius et al. 2007). Nowadays, one of the important issues in Project Management domain is forecasting project time and cost (Iman and Ow, 2009). However, unexpected events and unplanned environmental impact were common during project implementation. Planning, executing, learning and experiencing are tightly connected in the mind-set of project members and managers as the project is truly ambiguous and filled with unexpected events created and things do not unfold as planned or because conditions change over time (Söderholm, 2008). The scholar also praised the amazing project managers that practicing the art of “managing the unexpected” parallel to executing the plan to cope with changes all the time,.

As example in construction industry, poor performance, such as time delays and cost overruns, and quality defects are not uncommon in construction projects (Meng, 2012 and Lo et al. 2006). Basically, the four most important factors that contributed to this issue has been identified by Mansfield et al. (1994) as finance and payment problems, poor contract management, changes in site conditions, and shortages of materials. On the other hand, Assaf and Al-Hejji (2006) grouped nine categories of delay factors as: project-related, client-related, design-related, contractor-related, consultant-related, materials-related, labor-related, equipment-related, and external factors.

As conclusion, every project is unique as they going through different processes towards completion, and every project aims for a success delivery as scheduled and within budgeted cost. A good project manager needs to tackle any issues that might happen during a project execution. Besides, following an appropriate

guidelines and plan in project management knowledge is important in ensuring a success project.

2.3 CONSTRUCTION INDUSTRY

As reported in International Construction Cost Survey (2012), the construction sector in many countries is now very competitive and tendered prices often come in below budget. The construction industry (CI) has played an important role in the Malaysia economic growth. The industry has been consistently contributed approximately 3% to 5% of the national Gross Domestic Product (GDP) (Shari, 2000, Takim, 2005). Shown below is the list of major projects in Malaysia according to International Construction Cost Survey 2012

Name of major projects	MYR (in billion)
Support for Corridors	853
Greater KL Mass Rapid Transit	40
Kuala Lumpur International Financial District (KLIFD)	26
Development of 1,084 hectare Malaysian Rubber Board Land, Sungai Buloh	10
Warisan Merdeka 100-Storey Tower	5

Table 2.1: Major Projects in Malaysia

As a matter of fact, most of the project faced huge amount of time and cost overrun (Aftab et al., 2012). They claimed that 92% of construction projects were overrun and only 8% of project could achieve completion within contract duration, and the major contributors of this poor performance include design and documentation issues, financial resource management and project management and contract administration issues.

In fact, the management of construction is complex enough without changes, yet it is a familiar characteristic of in construction projects. To effectively manage

change, project managers have to undertake detailed planning; to integrate the work activities of consultants, subcontractors and suppliers. Besides, changes that occur during a project's development may have significant and often unpredictable effects on its organization and management. Thus, project managers must react appropriately to change and understand how it can influence the behaviour of the project system. Only then any changes that happen can be managed effectively.

Knowing that construction project management is a unique discipline with its own tools and techniques, traditional control mechanisms (such as Work Breakdown Structure, Gantt Charts, PERT/CPM networks, Project Crashing Analysis, Trade-off Analysis, etc.) are not entirely adequate for managing complex projects (Lovea et al., 2002). As for the tasks rework in construction project, the two main causes that contribute to this issue are changes and errors in the project. Moreover, design changes are usually introduced to meet the requirements of any of the following customers:

- i. Owner - to fulfil their expectations regarding e.g. the operability of the facility;
- ii. Contractor - to enhance the constructability of the facility; or
- iii. Supplier/fabricator(s) - e.g. to facilitate the use of existing standard products.

Clearly, design and construction changes may contribute to rework which it can take the form of a variation claim if it directly influences a project's progress and causes disruption (Lovea et al., 2002). Furthermore, construction project success is usually measured by four typical success measures; cost, schedule, quality of performance and safety (Hughes et al., 2004). Brown et al. (2001) suggest the major factors contribute to the failure in many construction projects, which include:

- i. Lack of integration that may exist between designers and builders;
- ii. The use of innovative materials;
- iii. The use of incorrect procurement systems;
- iv. The condition of the general contracting market; and
- v. The inherent "uniqueness" of each new building project

Among all of these factors, most of the researchers agree that are the factor that always happen relate to the labour: Labour supply & Labour productivity. While other factor that also important that causes the delays construction: Shortage of manpower (skilled, semi-skilled and unskilled labour) & Presence of unskilled labour. Besides, Murali and Yau (2007) and Mohd (2010) agreed that normally, when the projects are delayed, they are either extended or accelerated and therefore, incur additional cost.

As a summary, construction industry and project management are inter-related to each other and hence both of these play their role in ensuring the success of the project. Besides that, the project manager should always be ready to wisely respond to any constraints to come whether it is an expected event or unplanned event. The outmost point of this issue is that the project manager need to keep in mind that project delays in construction projects are frequently expensive, since there is usually a construction loan involved which charges interest, management staff dedicated to the project whose costs are time dependent, and on-going inflation in wage and material prices (Mohd, 2010). In addition, it will surely cause contractual issues between client and contractors and hence this may increase unnecessary additional cost into that particular project.

2.4 CONTRACT ADMINISTRATION

The PMBOK (PMI Standards Committee, 2004) emphasized project knowledge areas which procurement is one of the nine main knowledge areas, and suggest several other procurement management processes. These processes include procurement planning, solicitation planning, solicitation, source selection, contract administration, and contract closeout. Project Procurement Management includes the contract management and change control processes required to develop and administer contracts or purchase orders issued by authorized project team members. This shows that a contract is very important in delivering a successful complete project.

A contract in a process plays huge role in a construction project as it is a way of creating a project organization (Turnera and Simister 2001). For instance, the

contract may ensure all works are conducted accordingly to the schedule and hence might help generate project's productivity. As cited from Smith (1996) by Zhao and Yin (2011), a valid contract management can enhance the project management performance about 8 to 20 percent of the actual outcomes. Moreover, contract management is identified by the creation and implementation of all contract documents, the interpretation of which is a highly charged and intense effort. Rarely is the contract administrator able to please all parties (Construction Contract Administration, 2011). Construction management is also requires being a people, equipment, materials, and environment manager.

However, revisions to the plans and specifications require "change orders". Change orders, once approved electronically in Site Manager may be implemented and the approved amount of the contract is modified to reflect the changes. The change order may request additional contract time (Construction Contract Administration, 2011). The Contractor must provide a letter requesting and justifying any additional time. As quoted in Guideline for Establishing Construction Contract Duration (2010), contract time is the maximum time allowed in the contract for completion of all work contained in the contract documents. Contract time often arises as an issue when there is too much time or too little time given in the contract.

As in contract time for a project, if too much time is allowed then the traveling public is being inconvenienced and the contractor does not appear to be aggressively pursuing the work. If not enough time is allowed then the contractor will submit claims for added cost and time to the contract. Besides, contract time also arises as an issue when the traveling public is being inconvenienced and the contractor does not appear to be aggressively pursuing the work. There may be a number of reasons for a project to appear dormant, such as weather limitations, concrete curing times and materials arriving late (Gondy and Hildreth, 2007).

In addition to production rates, the following items should be considered influencing the contract when determining contract time:

- i. Effects of maintenance of traffic requirements on scheduling and the sequence of operations
- ii. Conflicting operations of adjacent projects, both public and private
- iii. Time for reviewing false-work plans, shop drawings, post-tensioning plans, mix designs
- iv. Time to obtain necessary permits
- v. Restrictions for night-time and weekend operations
- vi. Time of the year of the letting as well as duration of the project.

This type of contract time determination techniques generally fall into the categories of bar charts and CPM techniques. Bar Charts are advantageous as they are simple to develop and easy to understand, and they offer a good method of determining contract time. While CPM focuses on the relationship of the critical activities, specifically, those which must be completed before other activities are started.

Furthermore, Shapiro et al. (2005) claimed that conflicts among owners, design professionals and contractors are commonplace due the nature of the construction referred to earlier. Thus, the essential elements in determining contract time for most projects might be very helpful to be implemented in the project management, there are; establishing production rates for all items, adopting production rates to a particular project, understanding potential factors such as business closures, environmental constraints and computation of contract time with a progress schedule or other techniques (Guideline for Establishing Construction Contract Duration, 2010).

As for more specific review, the construction project management basically implementing the construction contract administration which usually begins when the owner-contractor agreement is executed and concludes when final payment is accepted by the contractor. The actual start and completion times of a project are vary and it depends on the specific requirement of the contracts between the contractor and the owner. These services are sometimes provided by third parties. Lenders may have a contract administrator to ensure that the lender's interests are being protected. Construction project management is not the same as construction management since there is an added participant in the process, who may be employed by the owner for pre-

construction services, construction services, or both. The contract documents identify the procedures for communicating during construction, but unless the parties to the contract fully understand their roles, the communication process will not be totally effective (Davison and Mullen, 2009).

In a nutshell, contract administration is an important factor in project performance, as this can be seen from the construction project performance that boosted up by implementing a proper project contract management. Hence, an appropriate project contract management and planning process is crucial in determining project success.

2.5 CONTRACT CLAIMS

It is no doubt that an appropriate project management can increase the organizational efficiency. Moreover, the profits in the organization can increase as well about 3% to 5% through project management; by contrast, the profits will boost 10% to 20% through claim management (He and Chen, 2010). Generally, if the claim opportunities in an engineering project are identified and analyzed early, the success rate of claim is about 93%. Thus, the claim identification in the international project is an important content and segment in the work of the contractor's claim management.

According to Ovegoke (2006), during a construction project, delays may be caused by various factor such as the owner; the contractor. Besides, the act of God may contribute to it, which includes force majeure, unpredictable weather conditions, a loss or a damage occasioned by specified perils, e.g. an earthquake, a flood etc. In such a situation the architect gives a fair and reasonable extension of time to the contractor. While the third party of the project also may contribute, that includes a civil commotion, a local combination of workmen, a strike or a lock-out affecting any of the trades employed upon the works, a delay on the part of the nominated subcontractors or suppliers, a delay in giving instructions to contractor, etc.

In fact, there are 6 main types of claims stated in *Measuring the Efficiency of Construction Claim Administration in Construction Companies in Egypt*. First, claims

concerning the existence or applicability of the contract. Most claims concern matters within the scope of valid contract, but situations may arise outside the scope of contract. It consists of two scenarios: A binding contract was never established initially, and a contract has ceased to bind. For a binding contract to come into existence there must be agreement and intention to create legal relations when the binding contract was never established initially. Problems commonly occur within the pre-contract period. If agreement is eventually reached, the contract refers back to the start of the work. If the contract has ceased to bind it may be declared void by a court due to possible challenges to its validity. Such events rarely happen with standard forms of contract.

Second, claims arising from contract documentation. Assuming the contract is valid, the actual contract documents applicable to that contract and the actual words used in the documents will have a substantial effect on any claim. The contract provisions must be construed as they actually mean. These provisions, however, determine what the obligations and responsibilities of the parties are. Problems of documentations generally occurred as shortcoming documentation where the documents are prepared by people, and people are fallible. Besides, there are also implied terms documentation where the importance of knowing the terms that are implied as standard without neglecting the terms which are not implied, and ambiguities and discrepancies documentation which can arise between documents, or within a given document. Most forms of contract provide powers to resolve ambiguities and discrepancies as regards work to be executed with possible adjustments for payment.

Third, claims arising in connection with execution of the work. Claims arising in connection with the execution of the work concern the occurrence of the actual events, both physical and non-physical, including the discovery that an assumption, as to existing fact at the time of contract, was incorrect. There are three elements of this type of claims. Variations occur when there is a tendency not to appreciate the disruptive effect that a relatively minor variation can have on the work. Risks are the modern conditions of contract allocate risks likely to be met in the course of the work to one party or the other. While Defects is an important function of the employer's appointees is to supervise the work as it ensures that defective work is replaced or rectified before acceptance.

Forth, claims concerning payment for work. This claim usually centered on the applicability of the Bill of Quantities descriptions to the work as executed including errors or deficiencies. In this type of claims, there is valuation of varied work where the payment under unit price specified in tender documents is applicable only when the work in question is similar in all aspects of its character and the conditions under which it is executed, includes time, sequences, relationship to other work being done concurrently and everything else which could cause a difference in cost. Besides, there are also other provisions for payment including matters which are in the nature of breach of contract by the employer.

Fifth, claims concerning time delayers and acceleration. Delay is of two kinds; one where work is completely stopped the other (and the more usual) where work is slowed down. In fact, claims may also be made for costs incurred in overcoming delay which are known as "constructive acceleration claims". Delays in construction normally either the employer is responsible or the employer is not responsible. Delays for which the employer is responsible is when the delay occurs and the employer is responsible and in consequence the contractor incurs extra cost, then generally the contractor will be entitled to reimbursement. On the other hand, delay for which the employer is not responsible will not entitle the contractor to compensation, unless the contract explicitly provides entitlement.

Sixth, claims arising from breach or termination. This includes failure to complete within the stipulated time, for which provision is made for liquidated damages, or for which provision is made for rejection. The liquidated damages are damages which have been fixed or settled by agreement, usually by stipulation in a contract. The fact is that provided the contractor is entitled to no, or no further, extension of time, then the employer is entitled to recover the liquidated damages in respect of the period of delay. The rejection which is involves the quality or compliance with the specifications and drawings. If defects are not discovered during constructions but appear later, the employer will be thrown back on seeking to recover damages as compensation. Claims can arise in connection with the exercise of powers under these provisions.

All of the types of claims outlined above are very crucial in realizing the need to categorize claims for simpler identification, putting them in general categories and hence simplify the claims process. These categories need to be basic, logical, and generally applicable. On the other hand, *Resolution of Disputes to Avoid Construction Claims: A Synthesis of Highway Practice* reported that claims may occur from different perspectives within the organization management itself. Figure below shows all the causes of claims outlined which is vital in the claims identification process.

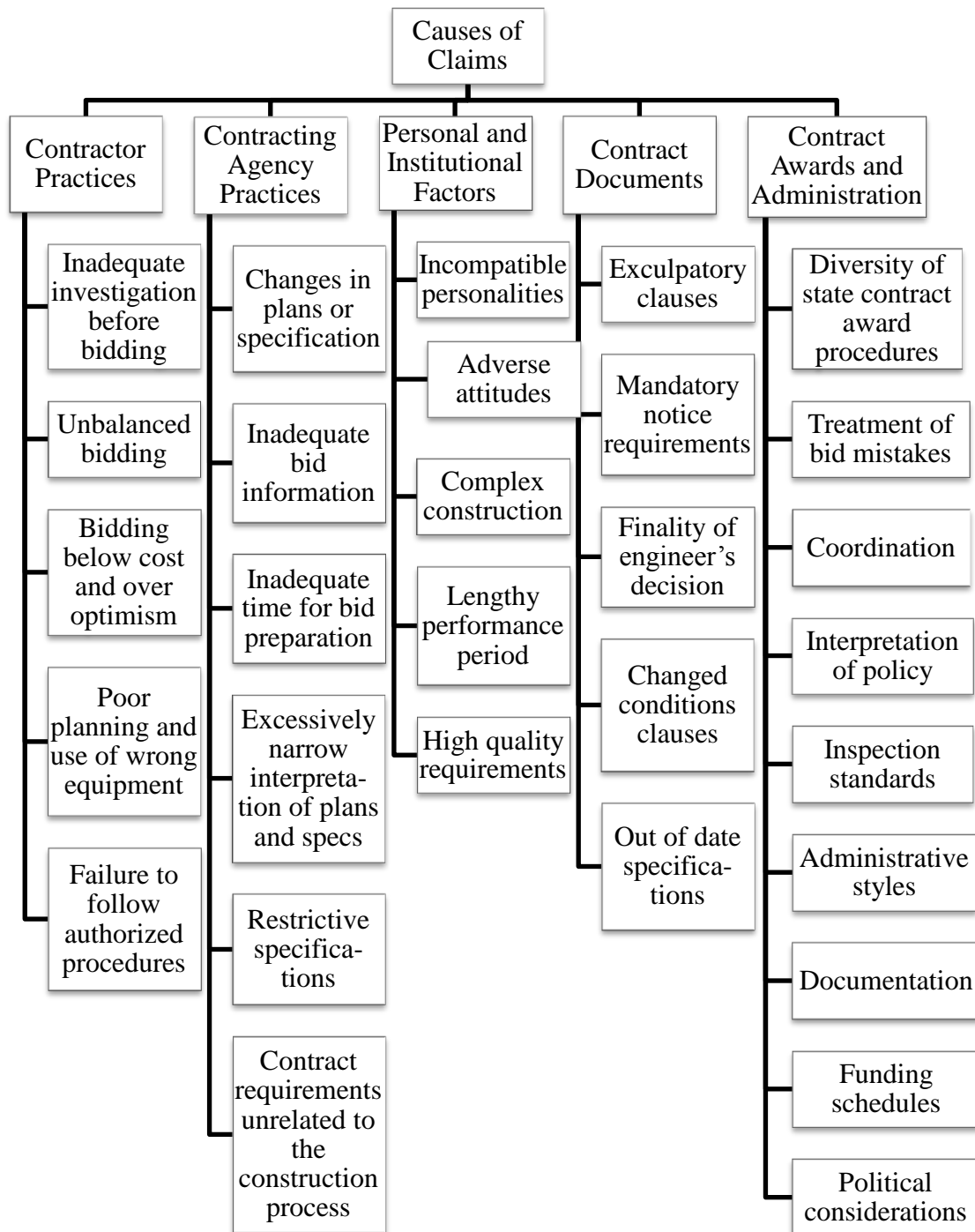


Figure 2.1: Causes of Claims in Contract Administration

For a better understanding in contract claim process, potential sources that might lead to issues in contract claims need to be clearly identified for a clearer Life Cycle of Construction Claims. According to Construction Contract Administration

Practice Guide 2011, the main sources of claims are; Claims by the contractor against the owner, Claims by the owner against the contractor, and Claims initiated by someone other than a party to the construction contract. In fact, the other sources that may contribute to this issue are the consultant of the project, the design architect as well as the project engineers.

Due to the complexities inherent in the claim identification and resolution process are illustrated in a brief examination by some of the consistent causes of contractor claims against owners, Construction Contract Claims: Causes and Quantum has emphasized fourteen main causes of contractor claims, which are:

- i. The owner's failure to adjust the construction schedule, or grant a time extension, even in the face of valid contractor claims.
- ii. Changed conditions relating to the contract between the Owner and Contractor that are so dramatically different as to render the original agreement void.
- iii. Conditions outside the base agreement that are unilaterally imposed by the Owner onto the Contractor.
- iv. Contract documents that contain errors and omissions, code violations, or a lack of inter-discipline coordination.
- v. Failure of one or more of the parties to perform in a timely manner, thereby delaying the other party.
- vi. Failure of the owner's agent to perform proper investigation of subsurface and/or site conditions.
- vii. Changes in the work unilaterally imposed by the owner onto the contractor.
- viii. Conditions known only by the owner that will adversely affect the contractor's performance.
- ix. Project conditions not contained in the contract documents that prevent a party from performing efficiently.
- x. Overzealous, deficient, or unreasonable performance on the part of an Owner's agent.
- xi. Unilateral or uncompensated suspension of the contractor's work.
- xii. Contracts that are terminated by the owner, either for convenience or for cause.

- xiii. Abnormal or unusual weather conditions.
- xiv. Untimely delivery or deficiency in a component furnished by the owner.

However, there are also claims that might arise from the project elements itself. Such issues might be caused by (Davison and Mullen, 2009):

- i. Defects in the design or documentation issued for a project
- ii. Unexpected occurrences
- iii. Changes in preferential engineering
- iv. Unconfirmed instructions in contract
- v. Changes to the works affecting the unit rates and prices
- vi. Changes on programmes of work
- vii. Constructive acceleration of project
- viii. Project prolongation
- ix. Project disruption
- x. Project progress acceleration
- xi. Letters of intent
- xii. Termination of employment
- xiii. Errors, omissions and contradictions
- xiv. Fluctuations in prices
- xv. Incomplete and defective work

It is normal that identifying the root cause to a problem may very effective in solving an issue. In this case, understanding what causes construction claims is the first step in avoiding them. How do construction claims arise in construction industry? Ip (2002) has been outlined few reasons that may contribute to construction claim, such as:

- i. Delays in construction and completion of the contract;
- ii. Changes which occur not at the request of the owner;
- iii. Poor management and administration of the construction site;
- iv. Site conditions which differ from those expected;
- v. Termination of the contract by the owner or the contractor;
- vi. Acceleration of the work;

- vii. Failure to adequately schedule and coordinate the work; and
- viii. Failure of parties to cooperate with each other in the performance of the work.

He and Chen (2010) also mentioned that claim management is an important solution for contractors to reduce their own risk. Besides, the timely and efficient identification of claim opportunity will be able to change the project risks into contractor's claim opportunities in maximum in order to avoid additional financial losses. The authors also stated that many interferences and risks unpredictable in the process of implementing the project make the actual process of the project deviate from the planned process of the project. The contractor should focus on analyzing the reasons that cause the deviation, in order to identify whether there are claim opportunities or not, and use it as the evidence for claiming and calculating amount of the claim. The specific approaches are as follow:

- i. Compile plan of the schedule
- ii. Measure the actual progress
- iii. Compare the actual progress with the planned progress, analyze the deviation and identify claim opportunities

As claimed by Oyegoke (2006), the actions of the employer and his representative that cause additional costs to the contractor in executing the project constitute a genuine claim. A claim will result from the contractor's prolonged presence on site, additional overhead costs, loss of profit for the extended period, site and general overheads, an extended attendance on the nominated subcontractors, extra winter costs, extra costs on preliminaries, variations, and acceleration costs. Hence, a good preparation of contract claim is important to obtain successful claim. According to Chen et al. 2008, the key to successful claims are:

- i. Leadership's attitude - Many contractors always have a shy and scared mind on claim, they are afraid that the claim will bring damage to the relationship between the owner and themselves, and fear of disputes and lawsuits. Claim is completely a legitimate requirement of rights, and a normal business in the course of implementing the contract.

- ii. Establishment of experienced claim team - It is generally acknowledged that claim Specialized talents have not only excellent spoken language, good interpersonal skills, elegant deportment, but also solid professional theoretical knowledge, rich experience and extensive knowledge structure. Besides, members of the team should get sharp sense of discovering all kinds of changes and claim clues, have spirit of being willing to use their brains and think of ways, be familiar with the project, possess dauntless spirit and be delighted to contribute.
- iii. Close cooperation of various departments - Project claim is a systematic project involving technology, contract, equipment, material, financial, and administrative management departments etc. One claim from the outset to the success has strict procedures but also needs a range of complete support materials and rigorous data, thus this requires close cooperation of relevant departments and hard work of the contractor's working staff.

Moreover, Ren, (2001) discussed that many researchers have identified inadequate information and poor documentation to support claims as major problems in current claims management practice. The first finding is the biggest failing on the part of contractors when dealing with claims is the lack of sufficient recorded data on the effects of delaying and disrupting events. Second, all stress the lack of initial records, such as minutes of meetings, correspondence, progress reports, status logs, photographs, records of delay and disturbance, and revised drawings, as the major reason for the failure of claims. Many contractors' management information systems are ill designed to support claims. Records are kept either in an inaccessible way or are incomplete or designed for other purposes even if they can be accessed. The author also identified that the reasons for these problems are: a culture of bias against paperwork on site operations, poor design of recording systems, the paper-based nature of most of the relevant information and poor resourcing of the claims management role in contracting organizations.

As the project schedule acceleration and delay are common in a construction project, a contractual procedure is compulsory in order to overcome this issue. As

conclusion, the contract claims is necessary to claim on the error of the construction project work progress.

2.6 SCHEDULE RELATED CONSTRUCTION CLAIMS

Improper scheduling and coordination of the trades leads to a disorganized construction project prone to disputes, claims and considerable losses for all involved. Ip (2002) emphasized that a proper scheduling and coordination is necessary for a successful and profitable construction project. The author list out two clauses that related to the issue of schedule and coordinate failure, which are scheduling clauses and coordination clauses. Scheduling clauses are intended to be used to:

- i. Assure the owner that the contractor has a rational schedule and plan for construction;
- ii. Alert the owner and its agents to dates by which the contractor may expect owner required actions;
- iii. Provide a standard for measuring the contractor's progress; and
- iv. Document the contractor's actual progress.

As for coordination clauses, the author stated that it allows for coordination of these issues and reduce the likelihood of delay resulting from failure to coordinate, due to the delay that often results as a result of the lack of coordination of various parties, activities and events on a construction project. Most coordination clauses afford the contractor the right and duty to coordinate, supervise, and direct the work, in addition to the means, methods, techniques, sequences and procedures of construction.

From previous study, scholars have been identified potential sources that may lead to schedule related contract claim specifically. There are:

- i. The owner's failure to adjust the construction schedule, or grant a time extension, even in the face of valid contractor claims.
- ii. Changed conditions relating to the contract between the Owner and Contractor that are so dramatically different as to render the original agreement void.

- iii. Failure of one or more of the parties to perform in a timely manner, thereby delaying the other party.
- iv. Changes in the work unilaterally imposed by the owner onto the contractor.
- v. Conditions known only by the owner that will adversely affect the contractor's performance.
- vi. Unilateral or uncompensated suspension of the contractor's work.
- vii. Abnormal or unusual weather conditions.
- viii. Defects in the design or documentation issued for a project
- ix. Changes in preferential engineering
- x. Changes to the works affecting the unit rates and prices
- xi. Changes on programmes of work
- xii. Constructive acceleration of project
- xiii. Project prolongation
- xiv. Project disruption
- xv. Project progress acceleration
- xvi. Incomplete and defective work

On the other hand, Stoll (2006) mentioned that time extension claims are common throughout the highway construction industry, and often both the contractor and supervising engineers spend a considerable amount of time substantiating and analyzing claims. The author then ascertain the causes of claims that arising out of project delay. There are:

- i. Delay Not Caused By A Party, such as site conditions which differ from what was expected
- ii. Delay Caused By The Owner, such as excessive changes in requirements or design;
- iii. Delay Caused By The Contractor, such as contractor management and performance problems

It shows that every element within the project environment may lead to the construction contract claims, and hence the project manager need to aware to any factors that may contribute to project delay.

As quoted from Arcuri and Hildreth (2007), delays and changes occur during construction that impact the schedule, consequently impacting the project in its completion. Schedule impact analysis which can be defined as the process of quantifying and apportioning the effect of delay or change on a project schedule, may be useful in project contract management. Although not all events that differ from the planned schedule of work will result in a schedule impact, this document is written to identify events that will have an impact, show what that impact is, and assign responsibility for the impact. Moreover, the author claimed that maintaining schedule documents are essential to any successful claim or defense against claim, as courts have upheld that regularly updated and maintained schedules most accurately portray the project in its completion. Whether caused by the owner, contractor, or another source out of their control, there are different types of events that may impact the schedule. After events are identified, they are then classified into categories of excusable/non-excusable and compensable/non-compensable delays. Doing so prepares the delays for a schedule impact analysis.

As project schedule delays act as disruptions, and the disruptions cause delays, both of which in turn further disrupt the project as they impact on one another. Consequently chains of causality between disruptions and delays occur (Williams, 2003). It shows that project delay will negatively affect the project schedule. Besides project delay, the other factors that contribute to schedule impacts are; Disruptions, Change, Suspensions, and Termination (Arcuri and Hildreth, 2007). The author also listed the main causes of project schedule impacts, which are the owner, the third party and the contractor.

Identifying the main factors that contribute to schedule impacts may help to ease the process of contract claim preparation since the causes are known. Therefore, the requirement to obtain a successful delay claim is also necessary in order to obtain a strong contract claim. According to Ip (2002), in order to establish a delay claim, the following elements must be proven or present:

- i. The delay must affect the overall construction and did not just eliminate the float.
- ii. It is not sufficient that the delay be troublesome; it must be critical. Critical delays are those that extend the overall project completion date.
- iii. The events or problems alleged actually caused the delay. One of the principal methods used for proving causation in delay claims is to use the critical path method (CPM):
 - * A CPM analysis establishes whether or not delay has occurred on the critical path
 - * Determination of the critical path is often required for the calculation of delay damages
- iv. The innocent party must prove that the delay is inexcusable and compensable (i.e. the responsibility of the party at fault)
- v. Notice (either actual or constructive) of the delay must be given
- vi. A contractor should review the contract to determine whether the contract allows for an extension of time or both an extension of time as well as compensation
- vii. Evidence in the form of accounting records to prove damages must be available.

Hence, the scheduling claim protection is needed as most of the construction project issues are related to the project scheduling. It is also important as project schedule is the most reliable support evidence in the construction contract claim.

2.7 SCHEDULING CLAIMS ANALYSIS

Project schedule acceleration rarely occurred in high technology construction industry. Directed acceleration occurs when the owner formally directs earlier project or milestone completion. According to Scheduling Claims Protection Methods (2009), the constructive acceleration generally occurs when a contractor is entitled to and requests a time extension which the owner declines to grant, or grants in an untimely manner, and

the contractor reasonably believes that he must accelerate in order to comply with his contract.

Project managers need to keep in mind that delays and disruption can also be caused scheduling claims in project contract management. Delays might be due to changes in the initial design, alterations to the specification and unforeseen circumstances such as unexpected ground conditions, poor weather or poor design which is only discovered during construction (Carmichaeli and Murray, 2006). Thus, change management principles have been developed to help manage delay as it happens and in so doing reduce the likelihood of disagreements regarding culpability for such delays and disruption.

Regarding schedule claims issue arise, unfortunately many projects still end up in disputes regarding extension of time claims and/or prolongation claims after the project has finished (Carmichaeli and Murray, 2006). This situation is unlikely to change in the future. Hence, a proper scheduling claim analysis is important to overcome delays and disputes issues. Sgarlata (2004) claimed that a well-trained construction manager must not only understand the benefits and shortcomings of each approach, but also why a particular approach may or may not be well suited for analyzing the delay encountered. In fact, courts and boards deciding contractors' delay claims have recognized that a critical path method (CPM) analysis can effectively segregate and identify responsibility for delay. The more detailed a schedule, the more precisely the effects of project delays and disruptions will appear.

Therefore, the analysis process of scheduling claims in project contract management is vital in obtaining a strong and valid claim. As reported in Texas Department of Transportation: Construction and Material Tips (2007), there are 4 steps of Claims Analysis Process, which are:

- i. Identifying the Cause of the Problem. The Contractor and department share responsibility in identifying the cause of the disputed item and determine the cause that actually impacted the project and led to the dispute.

- ii. Determining the Responsibility for the Problem. Determining the responsibility for an impact involves researching the contract, and identify the areas of risk or responsibility assigned by the contract to one party or the other and understanding contractual responsibilities. Then, determine if the Contractor should be granted additional time or compensation for the problem.
- iii. Determining How the Impact Affected the Project. One of the most critical decisions in the four-step process involves determining how the project was impacted. This decision is critical because each type of impact may cause only certain monetary damages.
- iv. Calculating the Costs. Once the impacts have been identified, categorized and evaluated, they must be quantified.

Arditi and Pattanakitchamroon (2006) emphasized that the selection of the proper analysis method depends upon a variety of factors including information available, time of analysis, capabilities of the methodology, and time, funds and effort allocated to the analysis. For instance, as-planned vs. as-built schedule analysis method, impact as-planned schedule analysis method, collapsed as-built schedule analysis method, and time impact analysis methods in delay analysis methods.

The first method is the as-planned vs. as-built method. It is the observation of the difference between an as-planned schedule and an as-built schedule. As stated by Fruchtman (2000), the method identifies the as-built critical activities, compares these activities with the activities on the as-planned schedule, assesses the impact of delays on the project, identifies the sequences which actually define the duration of the project, and determines the causation and responsibility of delays that impact project completion.

Arditi and Pattanakitchamroon (2006) discussed that the as-planned vs. as-built method is the simplest form of analysis among the four methods. But the majority of the researchers have negative opinions of the reliability of this method for the very reason that this method is only a simple comparison of as-planned and as-built schedules and that there is no advanced technique being applied. The author suggests that the as-planned vs. as-built method is useful as a starting point in relation to other complex

methods of analysis. However, some scholars do not recommend using the as-planned vs. as-built method because this method simply determines a net impact of all delay events as a whole rather than scrutinizing each individual delay event separately. This analysis method relies on common sense, a comparison of before-and-after delay events. The analysis incorporates both as-planned and as-built schedules, and both contractor and owner delay events, which supports the ability for recognizing concurrent delays and acceleration.

Second, the impact as-planned method uses only an as-planned or baseline schedule for delay analysis. Arditi and Pattanakitchamroon (2006) quoted from Wickwire et al. (1991) mentioned that it is based on the theory that the earliest date by which a project is completed can be determined by adding the delays into the as-planned schedule. New activities that represent delays, disruptions, and suspensions are added to the as-planned schedule and are used to demonstrate the reason why the project was completed later than planned. Contractors who submit claims that involve a time extension, add only owner caused delays to the as-planned schedule in the appropriate sequence to document the total project delay caused by the owner.

The impact as-planned method is the least favored method among the four methods discussed by Arditi and Pattanakitchamroon (2006), since many courts have not accepted this method. One of the reasons is because the method relies only on an as-planned schedule to determine the impact of delay. Indeed, this method does not measure the effect of actual work performed, but relies heavily on the validity of a baseline schedule. Another reason that undermines the reliability of the impact as-planned method is that the contractor, inserts only owner-caused delays into the as-planned schedule to prove the case.

Third, the collapsed as-built method. This analysis is popular in claim presentations because it is easily understood by triers of fact. This approach is a method of choice when a contractor lacks an acceptable schedule during the project, or when no as-planned schedule was required in the contract (Fruchtman, 2000). This method is based on the concept of what-if methodology similar to the impact as-planned analysis, but it has evolved to overcome some of the drawbacks of the impact as-planned

analysis. The as-built schedule depicts the factual information concerning the work that has been undertaken. Besides, the collapsed as-built schedule can determine delay impact in case of limited time and resources available for analysis. This method will be useful when both the contractor and the owner have access to the detail of as-built records and reasonably concur in interpreting the information used to construct the as-built network (Arditi and Pattanakitchamroon, 2006).

Forth, the time impact method, which relies on the assumption that delay impacts to a project can be assessed by running a series of analyses on schedule updates. Time impact analysis is a procedure that uses CPM principles. It assesses delays effects on the project schedule by analyzing the schedule periodically, generally on a day-by-day basis (Zack, 2001). Time impact analysis is the most credible delay analysis method among the four methods discussed in this paper. This analysis method is a refined method that determines delay impact in construction projects. It incorporates contemporaneous data to simulate actual circumstances at the time the delay occurs and accumulates impacts of delay events by using a series of windows. However, it requires significant time and effort.

In contract administration, a properly documented and presented claim is much easier to negotiate than an ill founded and disorganized claim. In certain circumstances, due to the contractors that harm their credibility in providing complicated, emotionally charged and over reaching claims without addressing the primary requirements for a successful claim, O'Connor (2003) emphasized few requirements in obtaining a successful claim. These include:

- i. Recognize when a potential claim arises and provide timely notice of the claim in accordance with the terms of the contract;
- ii. Determine the facts;
- iii. Establish entitlement/identify the applicable contract provision or law/establish liability;
- iv. Establish causation;
- v. Calculate damages in accordance with the contract; and
- vi. Negotiate or adjudicate the claim.

In certain situation, contract claims sometimes can be avoid from earlier stage of construction process, by means it need to be done from the top part of the project gantt chart as the successful claims avoidance results from prudent management activities. Long (2013) outlined activities during the construction phase of a project which are essential for both the owner's team and the contractor's team to mitigate claims and ensure the overall success of the project, and there are:

- i. Read and understand the contract documents
- ii. Implement a document control system to capture, code and file documents.
- iii. Hold pre-construction meetings and reach agreements on key project objectives.
- iv. Prioritize the relative importance of each objective
- v. Define clearly the roles and responsibility of each party
- vi. Allocate risks to the party best able to control those risks and provide equitable rewards for assuming risks.
- vii. Develop performance criteria to communicate expectations and to measure each party's achievements
- viii. Coordinate activities involving several parties
- ix. Implement cost, schedule and quality control procedures
- x. Hold periodic progress reviews and inspections
- xi. Maintain open communication throughout the project

As a summary, a fair and effective evaluation of schedule claim analysis will ensure a strong schedule claim and hence improve project contract management efficiency in overall.

2.8 SUMMARY

Based on this review of previous studies, it shows that contract management is very important in the construction industry of project management. Moreover, the contract management will help in improving the project management efficiency as well. This is due to the project schedule delay and acceleration that occur often, the

construction contract claim is vital as response to this issue. This chapter shows that project schedule such as Critical Path Method can be strong support evidence in preparing construction contract claims. Besides, as discussed in this chapter, scholars state that schedule claim in contract management is reliable and valid to be used in contractual procedures.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This research will be conducted by stressing on the factors contribute to schedule related claims and look for the main elements of a strong schedule related contract claims. This chapter of the research methodology generally will discuss on the methodology in obtaining answers for the research objectives. It will discuss on the research design, data collection method, population and sampling procedure, questionnaire design, data analysis method, statistical information and analysis of the research, as well as reliability and validity of the research.

3.2 RESEARCH OBJECTIVES

The objectives to be met in this study are:

- i. To determine the potential causes of schedule related contract claims.
- ii. To identify the key elements of strong and firm schedule related contract claims.

The findings to the research objectives listed above and the research questions stated in the previous chapter will be accomplished by conducting a descriptive study.

3.3 RESEARCH QUESTIONS

This research will be carried out to answer questions as following:

- i. Does the contract claims affecting the project management process in construction industry?
- ii. What are the potential issues that may cause construction contract claims?
- iii. Do the schedule related contract claims give advantages in construction contract administration?
- iv. What are the key elements in order to obtain a valid and strong schedule related contract claims?
- v. Does the Critical Path Method helpful to be used in the schedule related claims in construction contract administration?

3.4 RESEARCH DESIGN

The descriptive study mainly focuses on the present events. Besides, it also can be used in dealing with concurrent problems, solution the instant problems and shortcoming problem. The differences between the various types of descriptive research are in the process of description (Ghani et al., 2008). Descriptive research involves some interpretation of the meaning or significance of what it describes. This process is often criticized on the ground of bias towards the investigator's subjective judgment. They have mentioned six categories of descriptive research, which are:

- i. Survey research
- ii. Case studies
- iii. Development studies
- iv. Ethnographic studies
- v. Evaluation studies
- vi. Action research

Specifically, this research was a survey research type. Survey research is the most common type of descriptive research. As this study is a survey research, the

method of distributing questionnaire will be used. A group of management staves from construction company as well as construction project client will be this research respondent in answering the questionnaires. The results from the answered questionnaires will be used to measure and find the research findings.

A survey research design is most suitable for this study as it targets to identify the preferences of construction contract practitioners regarding schedule related claims in this industry. More importantly, the appropriate selection of instrumentation is important as this study will be focusing on the schedule related construction contract claims and hence determining the key elements of strong schedule related construction contract claims.

3.5 DATA COLLECTION METHOD

The main resource for the data collection process was from the questionnaires. As in this research, the questionnaires that have been prepared then will be distributed to the cluster group of management staves. All the answers in the questionnaire are the data or information that is important to find this research finding. The questionnaires that have been collected will then be analysed by the coding method and next will be continued in the data analysis process.

Data can be obtained in three ways; data that are made available by others (internal, external, primary or secondary data), data resulting from an experiment, and data collected in an observational study (Ghani et al., 2008). This research basically will use data that are made available by others which depending on the primary and secondary resources of document or evidence.

3.5.1 Source of Data

In order to meet this research's objectives, numbers of data from various sources have been used. The major sources used are categorized into 2; Primary data and Secondary data. Basically, the primary data can be accomplished through various methods, including questionnaires, while the secondary data was obtained from journals

and reviews from previous study/literature. Then, all the data obtained will be gathered to obtain the research finding and hence meet this research's objectives. This is necessary in obtaining a strong and good outcome for this research.

As this research targeted to study on schedule related contract claim among contract practitioners, few construction companies were selected as this research's respondents. The population of staves in that particular construction company were clustered into different job positions. Then, the respondents were selected only from top management as they are the closest parties involved in the construction contract administration. The respondents whom have been identified in the top management group were then randomly selected to answer the questionnaire. Hence, cluster random sampling was selected as it may increase the answers accuracy and this is crucial as it affect this research's validity.

3.5.2 Primary Data

As for the primary data, the collection method was by using questioning approach. The research questionnaire will be prepared and then print it out before hand them out to the research's respondents. This approach will involve the respondents to play an active role, interview or a formal questionnaire. This method was chosen as it is relatively cheap to conduct and requires no prior arrangements and it is most suitable and effective to obtain as the question designed were based on this research objective so that it will directly meet this research's objectives. Most importantly, this type of data collection will ensure the interviewer bias minimizes and thus it will help in promote accurate answers.

3.6 POPULATION AND SAMPLING

Each collected data can be classified either as Non-probability data or Probability data (Ghani et al., 2008). Non-probability data is one in which the judgment of the experimenter, the method in which the data is collected or other factors could affect the results of the sample. The probability data is one in which the chance of selection of each item in the population is known before the sample is picked. This

research was conducted to collect probability data to obtain information. There are four basic methods for obtaining samples as probability data, which are: random, systematic, stratified, and cluster.

This research will obtain information from cluster samples by dividing the population into sections/clusters, then randomly selects some of those clusters and then chooses all members from those selected cluster. This is due to the research aimed which focused on the contract claims, and thus the most suitable respondents to obtain the information from are the organizational contract administration practitioners itself. Therefore, the group of respondents will be selected among the managerial level in order to have more accurate information.

Defining the population is the first step in this study, thus sampling is a process of selecting a representative part of a population. Using a statistically valid sample, the objectives of this research can be measured. To obtain statistically valid sample data, the sample size should be carefully determined and the sample cases should be randomly selected in such a way that the individual cases in the population have an equal chance of being selected.

The ever increasing demand for research has created a need for an efficient method of determining the sample size needed to be representative of a given population created by Morgan and Krejcie (1970). In the article “Small Sample Techniques,” they have calculated the most suitable sample size from certain population number. The population in this study area is 40 registered private construction companies, and hence the most suitable sample size for this research is 36 companies.

3.6.1 Sampling Procedure

For this research, the sampling process comprises several stages as stated below:

- i. Defining the population of concern
- ii. Specifying a sampling frame that is possible to measure

- iii. Specifying a sampling method for the selected sampling frame
- iv. Determining the sample size
- v. Implementing the sampling plan
- vi. Conducting sampling and data collection
- vii. Reviewing the sampling process
- viii. Analysing the sampling and data collected to obtain research findings

In this research, the respondents will be selected by considering the factors that might influence the population such as their position in the organization. Then the researcher purposefully selects a sample that adequately represents the target population on these variables. The questionnaire distributed will act as a measuring device that is used to query a population/sample in order to obtain information for analysis.

3.6.2 Sampling Approach

The questionnaire will be distributed to a random sample of 5 participants representing each company by the different specializations of contractors and clients working in different positions. The choice of participants was achieved through the clustered sampling technique. The questionnaire will be personally handed over to respondents, and the researcher was available to answer questions about questionnaire and to ensure that the questionnaire is rightly administered. This mode of follow up communication led to the completion of 180 questionnaires from both contractors and client. The sample for this research was classified by 100% private construction companies.

3.7 QUESTIONNAIRE DESIGN

The objective of the questionnaire survey is to study on the schedule related contract claims from the different points of view of project parties (contractors and clients). Questionnaires are extremely critical components for this research process because they provide an insight to which information is important and the opinion of the participants about the problems discussed. This information obtained was the main reference in determining this research's findings. The design of the questionnaire

requires very careful considerations. The aim at formulating the questions for this research is such that no misinterpretation is possible. To do this the following points should be taken into consideration in designing the questionnaire:

- i. Proper introduction to the questionnaire explaining the purpose of the study and emphasizing the confidentiality of responses.
- ii. Questions must give the information required.
- iii. Questions must be concise and clear.
- iv. Questions must be presented in the best sequence possible preferably from simplest to most complex.

The questionnaire was designed to answer the questions based on this research objectives and research questions. Furthermore, all the questions given in the questionnaire were fully written in English. This is to avoid misunderstanding or confusing to the respondents in answering the questions. In addition, there are no open-ended questions in this research questionnaire. Thus, this will also ease data analysis process by minimizing respondents' confusion in answering questionnaire.

3.7.1 Developing Questionnaire

The management research question hierarchy was the foundation of this research process and also of successful instrument development. The questions for this research consist of two categories of questions:

- i. Classification questions which usually cover demographic variables that allow participant's answers to be grouped so that patterns are revealed and can be studied.
- ii. Target questions normally used to address the investigative questions of a specific study, and it may be structured or unstructured. This research will use structured questions where the questions present to the respondents with a fixed of choices and called close questions.

The questionnaire for this research consists of 2 parts with 13 questions which will investigate the work background of the respondents and their perspectives regarding construction contract and schedule related contract claims. This questionnaire was a nominal type. It was designed to measure the research data according to the research objectives as all the questions were constructed focussing on the research aim to study on the factors contribute to schedule related claims and look for the main elements of a strong schedule related contract claims.

3.7.2 Section A: Demography Questions

This section contains the questions obtain data regarding the respondent's working information, position, and work information. It will be used to analyse the respondents' range of working environment which might affect the data that will be obtained from questionnaire distributed.

3.7.3 Section B: Construction Contract Claims

For the questions constructed in this section, respondent was asked more detail on construction contract claims and also evaluate causes of claims according to the probability of occurrence. Besides, other questions which need to answer this research's objectives will be asked as well, such as the key elements in developing a successful claim.

3.8 DATA ANALYSIS

To make the existing data reliable, studying and analysing the information given by the graphical and descriptive statistics are essential. By doing that, any relationship obtained in the given information need to be identified. Furthermore, such information is important in making relevant statistical inferences such as research reliability and validity.

All the data collected from questionnaires will be compiled and then analysing using Microsoft Excel software. The graphical result obtained from descriptive statistics

will be used in analysing the data and to obtain the statistical inferences for this research and thus to obtain this research findings.

3.8.1 The Analysis Method

The analysis that will be used in this research as an approach that allows the use of sample data to see if the values of data obtained are accurate and consistent or vice versa. Once the questionnaires have been returned to the researcher, the coding process for the answer given was done. This is to ease the process of data transferring to the statistical analysis software, and then the calculation process may proceed. The main statistical data that will be used in data analysis was measures of central tendency to calculate and extract all the relevant information from questionnaires and also obtain the graphical statistics on the information.

In addition, descriptive statistics will be used in this research, which will include dispersion graphical summaries that show the spread of the data, and numerical summaries that either measures the central tendency of a data set or that describe the spread of the data. Dispersion graphs will be used in this research to identify patterns in data during the reliability test process. While the measures of central tendency will be used to summarize the data set by obtaining mean. Besides, the calculation of a measure of central tendency is best handled through a computer software package that will minimize the chance of errors and in this case Microsoft Office Excel software will be used. As for the measures of central tendency, it will be useful to describe the 'spread' of the data with a single number.

3.8.2 Section A: Demography Questions

The data obtained in this section will be analysed mainly by using the mode of frequency to find out the respondents range of working experience.

3.8.3 Section B: Construction Contract Claims

In the questionnaire's second section, the mean of frequency was used to analyse every question and the data obtained. All of the results obtained will be used to extract the data distribution from the respondents' answer in the questionnaire and next was analysed in relation with this research's objectives.

3.9 RELIABILITY AND VALIDITY

Reliability and validity are essential to the effectiveness of any data gathering procedure. A test must be reliable for it to be valid, but a test can be reliable and still not valid. Validity may lead to the strength of research inferences or conclusion. Furthermore, different types of tests will have different types of validity. This is because different tests are used for different purposes, then they have different issues (Ghani et al., 2008).

In fact, an instrument will be considered its validity if it measures what it is intended to measure and accurately achieves the purpose for which it was designed (Patten, 2004; Wallen & Fraenkel, 2001). Moreover, validity involves the appropriateness, meaningfulness, and usefulness of inferences made by the researcher on the basis of the data collected (Wallen & Fraenkel, 2001).

To provide additional content validity of the survey instrument, the researcher will conduct a pilot test to a group of targeted respondents which have been selected earlier. The information obtained will be analysed in the earlier stage of this research process. In this research, the reliability test will be carried out by using Statistical Package for Social Science (SPSS) software.

3.9.1 Pilot Survey

Before distributing the questionnaire, a pilot survey will be conducted where the questionnaire will be answer by a small group of respondents which own similar characteristics with the actual respondents. Then, the data collected will be analysed to

identify the finding's validity and reliability. Besides, this was also indicates the research finding consistency with the instrument that measures the research concept. Thus, the reliability and validity test is vital in ensuring a good research finding as the Chris Handley (n.d) stated that the determinant of the impact of the results is dependent upon two concepts: validity and reliability.

3.10 SUMMARY

As conclusion, the methodology for this research is the most crucial factors in order to obtain the most accurate finding. Thus, every element starting from determining the sample size until the analysis data method will be carried out accordingly to this research's objectives. The methodology discussed in his chapter was calculated and analyse in the next chapter of data analysis.

CHAPTER 4

RESEARCH FINDINGS AND ANALYSIS

4.1 INTRODUCTION

This chapter will discuss further and present on the data analysis for this research and hence obtaining the research findings. The research findings will answer the research objectives as well as the research questions. The research objectives are:

- i. To ascertain the potential causes of schedule related contract claims.
- ii. To identify the key elements of strong and firm schedule related contract claims.

The research questions for this research are:

- i. Does the contract claims affecting the project management process in construction industry?
- ii. What are the potential issues that may cause construction contract claims?
- iii. Does the schedule related claims give advantages construction contract administration?
- iv. What are the key elements in order to obtain a valid and strong schedule related contract claims?
- v. Does the Critical Path Method helpful to be used in the schedule related claims in construction contract administration?

Since descriptive statistics were used in this research analysis process, it will be obtaining the dispersion graphical summaries that show the spread of the data by

measure the central tendency of a data set or that describe the spread of the data. Central tendency will be used to summarize a data set by obtaining mode and mean for the research questionnaires, moreover, the calculation of a measure of central tendency is best handled through a computer software package that will minimize the chance of errors. In this research, the software used is Microsoft Office Excel.

Henceforth, the measures of central tendency will next extract all the relevant information from the answered questionnaire, tabulate the data obtained and draw the graphical statistics on the information.

As for the section A, the data obtained will be analyse mainly by using the mode to find out the respondents range of working experience. While the questions in second section, the mean and mode will be used to analyse every question as well, and then the pattern or spread of data will be identified. All of the results obtained will be used to extract the data distribution from the respondents' answer in the questionnaire and next will be analyze in relation with this research's objectives.

Lastly, all the calculation and the data extracted are then to be ranked accordingly to their calculated mean value and hence answering the research objectives. On the other hand, the items for research questions are then to be analysed by calculating the percentage and next the result will answer every research questions.

4.2 QUESTIONNAIRE DISTRIBUTION

Targeted respondents in the process of obtaining this research questionnaire's answers are mainly staves that work in any construction project and those who related to project contracts and procurements management.

Furthermore, this research questionnaire was designed in 2 sections, which are Demographic Section (Section A) and Construction Contract Claims related questions (Section B). The questionnaire constructed for this research is fully close-ended questions, which consist of Multiple Choice and Likert Scale type of questions. This is

to ease the answering process and to avoid respondent's confusion or misunderstanding during the process of answering the research questionnaires.

Therefore, the questionnaire for this research consists of 2 parts with 20 questions which were investigating the work background of the respondents and their perspectives regarding construction contract and schedule related contract claims. It was designed to measure the research data according to the research objectives as all the questions were constructed focussing on the research aim to study on the factors contribute to schedule related claims and look for the main elements of a strong schedule related contract claims.

As determined earlier in the research proposal, the population in this study area is 40 registered private construction companies, and hence the most suitable sample size for this research is 36 companies. In order to have a balance data analysis, the questionnaires were also distributed to a client who works in the construction industry. For this research, 5 samples from each company were randomly selected to answer the research questionnaires. However, there 5 companies that were no longer operate as in the company directories, and this reduced the number of respondents for this research. Next, Table 4.1 shows that 160 questionnaires were distributed manually by hand and via email, and only 70 questionnaires were returned which indicates 43.75% return rates.

Questionnaires Distribution Method	Total Number of Distribution	Total Number of Return	Questionnaires Return Rate
Replied via Email	160	70	43.75 %
Manually by Hand			

Table 4. 1 Questionnaires' Respond Rate

4.3 RELIABILITY OF MEASUREMENT

Basically, reliability of measurement in a research can be determined from the value of Cronbach's alpha. As for this research, the coefficient measures the internal consistency of the test, and it can be used for testing with partial credit and for

questionnaires using a Likert scale, as constructed in this research. Furthermore, a commonly-accepted rule of thumb is that the alpha value of 0.6-0.7 shows acceptable reliability and greater than 0.8 shows a good reliability.

Cronbach's Alpha value	Number of items	Item Deleted
0.874	20	None

Table 4. 2 Reliability Test Result

In particular, the Cronbach's alpha value obtained in this research is 0.874 which indicates the data set of this research was statistically reliable. Besides, the internal consistency was also statistically significant and shows that the set of data are closely related to each other as a group. The results of Reliability test for this research are summarized into the Table 4.2 shown above.

4.4 NORMALITY TEST

After the Cronbach's Alpha had been obtained, the normality test need to be conducted to determine the data distribution for this research. The result from the normality test for all the variables involved in the research will be tabulated into a table below. As the sample for this research is 70 respondents, the dataset small than 2000 elements, the Shapiro-Wilk test will be used to determine the data distribution (Psychology, Maths, Statistics and SPSS Tutors, 2010).

Tests of Normality						
	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Construction Claims Identification and Notification	0.177	3	.	1.000	3	0.970
The potential Causes of Schedule Related Contract Claims	0.314	3	.	0.893	3	0.363
The Key Elements of Strong Schedule Related Contract Claims	0.310	3	.	0.900	3	0.384
Schedule Related Contract Claims in Project Management	0.219	3	.	0.987	3	0.780

Table 4. 3 Test of Normality

For this test, if the significant value of the result is greater than p-value of 0.05, it will indicate that the dimension is normally distributed. From the Table 4.3, the p-value for all of the research elements are greater than 0.05. Hence, it can be concluded that all the data are normally distributed. The chart plotted for this test result were shown in Appendix C.

4.5 RESPONDENT PROFILE

In this research, the demographic section (Section A) was constructed to determine the respondent's profiles and work background. This is as an overview of respondents' profile which are those whom related to the project management as well as the contract and procurement management in their organization, so that the respondents may understand and answer the questions given easier.

As such, the targeted respondent's age for this research was from 21 years old. Which in this research, 7.14% of the respondents aged less than 21 years old, 20.00% were 21 to 30 years old, 34.29% were 30 to 40 years old, 24.29% were 40 to 50 years old, 14.28% were aged more than 50 years old. It can be seen that most of the respondents for this research aged between 21 to 30 years old.

Next, the number of year respondent working in construction industry was also considered in this research. The respondents that worked less than 5 years were 18.57% of the total respondents, respondents that worked 5 to 9 years were 18.57%, respondents that worked 10 to 14 years were 32.86%, respondents that worked 15 to 19 years were 10.00%, and respondents that worked more than 20 years were 20.00%. Thus, it shows that about one-third of the respondents worked about 10 to 14 years in the industry.

Besides, current respondent's job position was also used to study on the respondent's work background, which the highest in this research are Senior Executive of 27.14%, followed by Junior Executive of 21.43%, then Manager and Non-Executive of 18.57%, next Fresh/Entry Level of 8.58%, and lastly Senior Manager of 5.71%.

As for the last item in this section, which is the current respondent's working department, the respondents which from Executive Board was about 1.43%, while 21.43% from the Management Section, 37.14% from the Technical & Operation Section, 7.14% from the Architecture & Estimation Section, 2.86% from the Procurement Section, 14.29% from the Accounts & Financial Section, 7.14% from the Human Resources or Personnel Section and also from Sales and marketing Section, and lastly 1.43% from the Research & Development Section. To put it as a simple conclusion, all these data extracted were summarized into a table shown below.

No.	Items	Frequency	Percentage (%)
1	<u>Respondents' age</u>		
	i. Less than 21 year old	5	7.14
	ii. 21 to 30 year old	14	20.00
	iii. 30 to 40 year old	24	34.29
	iv. 40 to 50 year old	17	24.29
	v. More than 50 year old	10	14.28
	Total	70	100.00
2	<u>Number of years respondent working in construction industry</u>		
	i. Less than 5 years	13	18.57
	ii. 5 to 9 years	13	18.57
	iii. 10 to 14 years	23	32.86
	iv. 15 to 19 years	7	10.00
	v. More than 20 years	14	20.00
	Total	70	100.00
3	<u>Current respondent's job position</u>		
	i. Senior Manager Jobs	4	5.71
	ii. Manager Jobs	13	18.57
	iii. Senior Executive Jobs	19	27.14
	iv. Junior Executive Jobs	15	21.43
	v. Fresh/Entry Level Jobs	6	8.58
	vi. Non-Executive Jobs	13	18.57
	Total	70	100.00
4	<u>Current respondent's working department</u>		
	i. Executive Board	1	1.43
	ii. Management Section	15	21.43
	iii. Technical & Operation Section	26	37.14
	iv. Architecture & Estimation Section	5	7.14
	v. Procurement Section	2	2.86
	vi. Accounts & Financial Section	10	14.29
	vii. Human Resources or Personnel Section	5	7.14
	viii. Sales and marketing Section	5	7.14
	ix. Research & Development Section	1	1.43
	Total	70	100.00

Table 4. 4 Summarized Respondents' Profile

4.6 CONSTRUCTION CLAIMS IDENTIFICATION AND NOTIFICATION

First of all, the earlier part in this research questionnaire was constructed to determine how and when a construction claims were identified, as well as the construction claims notification. The significance of these three questions is to show the early step of the process in obtaining a construction contract claims.

As these three questions are multiple choice questions, the respondent required to choose only one answer as the most preferred answer. Thus, the data were then gathered, tabulated and analyzed to obtain the final result. The data were analysed by finding the frequency for each answer choice. Then, the mode for each item was identified, and this shows the most preferred and commonly used in construction claims identification and notification process. A summary of data analysis result for this part was tabulated as shown in table below.

No.	Items	Frequency	Percentage (%)
1.	When the construction claims are identified?		
	Before construction	19	27.14
	During construction	43	61.43
	After construction	7	10.00
	Not identified	1	1.43
	Total	70	100
2.	How did you identify the construction claims?		
	Discussions	28	40.00
	Periodical meetings	23	32.86
	By chance	2	2.86
	Other ways	17	24.28
	Total	70	100
3.	How construction claims are notified?		
	Dictions	15	21.43
	Periodical meetings	32	45.72
	By chance	4	5.71
	Other way	19	27.14
	Total	70	100

Table 4. 5 Summary of Identification and Notification of Construction Claims

Based on the data extracted from the questionnaire distributed, 43 respondents stated that the construction claims were identified usually occur in the middle of the construction progress. While 19 of the respondents stated the claims were identified before construction, and 7 respondents stated the identification process takes after construction. However, there is a time when none of this period that the construction claims were identified.

Next, the result indicates that most of the respondents' organizations identify the construction claims during discussions period (28 respondents). Besides, the

identification process occurred during periodical meetings (23 respondents). Other than that, the other organization (19 respondents) identified construction claims by other than during discussions and periodical meetings. It means that most of the time, construction contract claims were identified within group discussions or meetings.

Besides, the construction contract claims require the notification process as well. Which can be seen from the Table 4.5 shown above, most of the time, the claims were notified during the periodical meetings (32 respondents), followed by discussions within the team members (15 respondents) and by chance (4 respondents). However, 19 respondents stated that the construction contract claims were notified on the other way besides discussions, periodical meetings and by chance.

From the figures above, it can be summarized that construction contract claims were usually identified and notified during periodical meetings, and it shows that a continuous and constant periodical meeting is crucial in identifying and notifying a construction contract claims. The frequency and percentage of the respondents preferred answer are shown above.

4.7 THE POTENTIAL CAUSES OF SCHEDULE RELATED CONTRACT CLAIMS

The next part for this section was constructed to determine the potential causes that were contributed the most to the schedule related contract claims within a construction project. It shows what are the factors that need to be considered or not to be overlooked while managing a project, so that there will be earlier claims prevention can be done during the project progress after identifying the causes itself.

As the questions type are Likert-scale questions, the respondents were requested to select most preferred scale from 1 to 5 regarding on every each of the statement stated. The five-point scales are; 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree. The frequencies for each of the selected answer are shown in the Table 4.6 below, which total answer for every question is 70.

Then, the frequency for number of respondents that agree and strongly agree to the statement was summed up and divided by two to determine its mean. By determining the mean of agree and strongly agree selection for every statement, the result are then will be used to rank all of the statement of the potential causes of schedule related contract claims.

The finding of this research shows that the main potential causes of schedule related contract claims are; Delays in construction and completion of the contract, Changes on programmes of work, and Incomplete and defective work. This may due to numbers of delays and changes occur during construction that impact the schedule, consequently impacting the project in its completion (Arcuri and Hildreth, 2007). Once the completion date is affected, it will negatively impact the project overall and may produce the contract claims as well. Scholars had also mentioned on the project interference that may cause schedule related contract claims. He and Chen (2010) and Oyegoke (2006) stated that many events such as unpredictable changes of tasks in the process of implementing the project make the actual process of the project deviate from the planned process of the project.

Besides, a claim will result from the contractor's prolonged presence on site as well as the extended period due to incomplete work. This research finding prove that delays of completion, works changes and incomplete task in a project will negatively affect the project and will lead claims issued to the project. All the the research findings from the data extracted were summarized into the table given, and hence, the potential causes of schedule related contract claims were ranked as well in the table below.

Causes	Number of Respondents					Mean, $\frac{\mu}{(x+y)}$ 2	Rank
	Strongly Disagree	Disagree	Neutral	Agree, x	Strongly Agree, y		
Abnormal or unusual weather conditions.	1	7	17	19	26	22.5	4
Defects in the design or documentation issued for a project.	0	0	21	32	17	24.5	3
Changes on programmes of work.	6	2	11	42	9	25.5	2
Project progress acceleration.	0	7	19	39	5	22	5
Incomplete and defective work.	7	1	11	44	7	25.5	2
Delays in construction and completion of the contract.	5	0	10	39	16	27.5	1
Failure to adequately schedule and coordinate the work.	6	0	20	37	7	22	5

Table 4. 6 The Potential Causes of Schedule Related Contract Claims

The data analyzed in this question then was used to derive a conclusion which is, the delays in construction and completion of the contract were the main causes that usually or normally occur in a construction project that may cause schedule related contract claims. This means ensuring the project progress that goes accordingly to the schedule is very crucial in order to avoid the claims. The potential causes listed above then were graphically ranked into the figure below, so that the causes ranked can be read and understood easier.

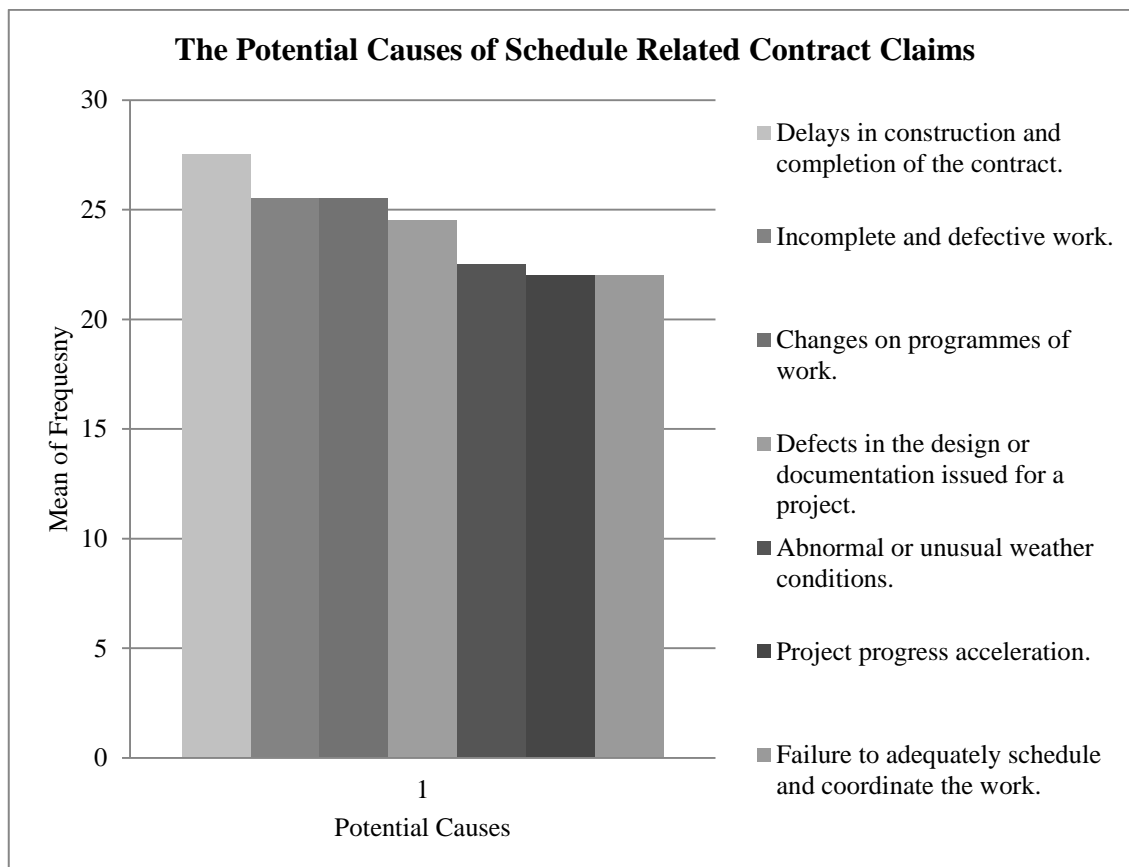


Figure 4. 1 The Potential Causes of Schedule Related Contract Claims

4.8 THE KEY ELEMENTS OF STRONG SCHEDULE RELATED CONTRACT CLAIMS

Next, this section was constructed to find out the key elements that significantly contribute to the strong schedule related contract claims. In a project, defending claims by obtaining a strong contract claims is very crucial, as it will affect the whole planning and budgeting of the project. The result from the questions will show the outmost characteristics that should not be neglected as it may strengthen a contract claims.

The questions type are Likert-scale questions, which are in the exact form of questions and answering procedure with the previous part. The respondents were requested to select most preferred scale from 1 to 5 regarding on every each of the

statement stated. The five-point scales are; 1: Strongly Disagree, 2: Disagree, 3: Neutral, 4: Agree, 5: Strongly Agree.

The frequencies for every answer that have been chosen by the respondents are shown in the table below, which total answer for every question is 70. Then, determining the mean of agree and strongly agree selection for every statement, the result are then will be used to rank all of the statement of the key elements that significantly contribute to the strong schedule related contract claims. All the data extracted were summarized into the Table 4.7 given and the analysis result was also ranked in the table shown below.

Key Elements	Number of Respondents					Mean, $\frac{\mu}{(x+y)}$ 2	Rank
	Strongly Disagree	Disagree	Neutral	Agree, x	Strongly Agree, y		
The delay must affect the overall construction and did not just eliminate the float.	2	1	17	36	14	25	5
A CPM analysis establishes whether or not delay has occurred on the critical path.	0	6	15	37	12	24.5	6
Determination of the critical path is often required for the calculation of delay damages.	0	0	11	44	15	29.5	3
Notice of the delay must be given.	0	1	8	43	18	30.5	2
Review and understand the contract whether the contract allows extension of time and compensation	0	0	7	44	19	31.5	1
Negotiate or adjudicate the claim.	0	4	13	44	9	26.5	4
Hold periodic progress reviews and inspections.	1	2	14	47	6	26.5	4

Table 4. 7 The Key Elements of Strong Schedule Related Contract Claims

Once the data analysis had been done, the result obtained will show the most important key elements that will significantly contribute to the strong schedule related contract claims, which is by review and understand the contract to determine whether the contract allows for an extension of time and compensation. This was followed by issuing a notice of the delay and determination of the critical path that requires the calculation of delay damages.

According to the research finding, it shows that the most important key elements of strong schedule related contract claims are; Review and understand the contract whether the contract allows extension of time, Notice of the delay must be given, and Determination of the critical path is often required for the calculation of delay damages. Sgarlata (2004) stated that the analysis process of scheduling claims in project contract management is vital in obtaining a strong and valid claim. The findings supported this statement which means that a clear understanding and reviewing the contract documents is very important. After that, a claim notice that has been given to the contractor is also very important in establishing a strong schedule related contract claim. Ip (2002) also stated that notice (either actual or constructive) of the delay must be given to establish a strong claims. Besides, Chen et al. (2008) and Ip (2002) pointed out that critical delays are those that extend the overall project completion date and it helps as support materials for a strong schedule related contract claims.

These three key elements were the most preferred options by the respondents, which may be the most common elements that were implemented by the organization of the respondents. All the three main key elements of a strong schedule related claims were ranked as shown in figure below along with the other options.

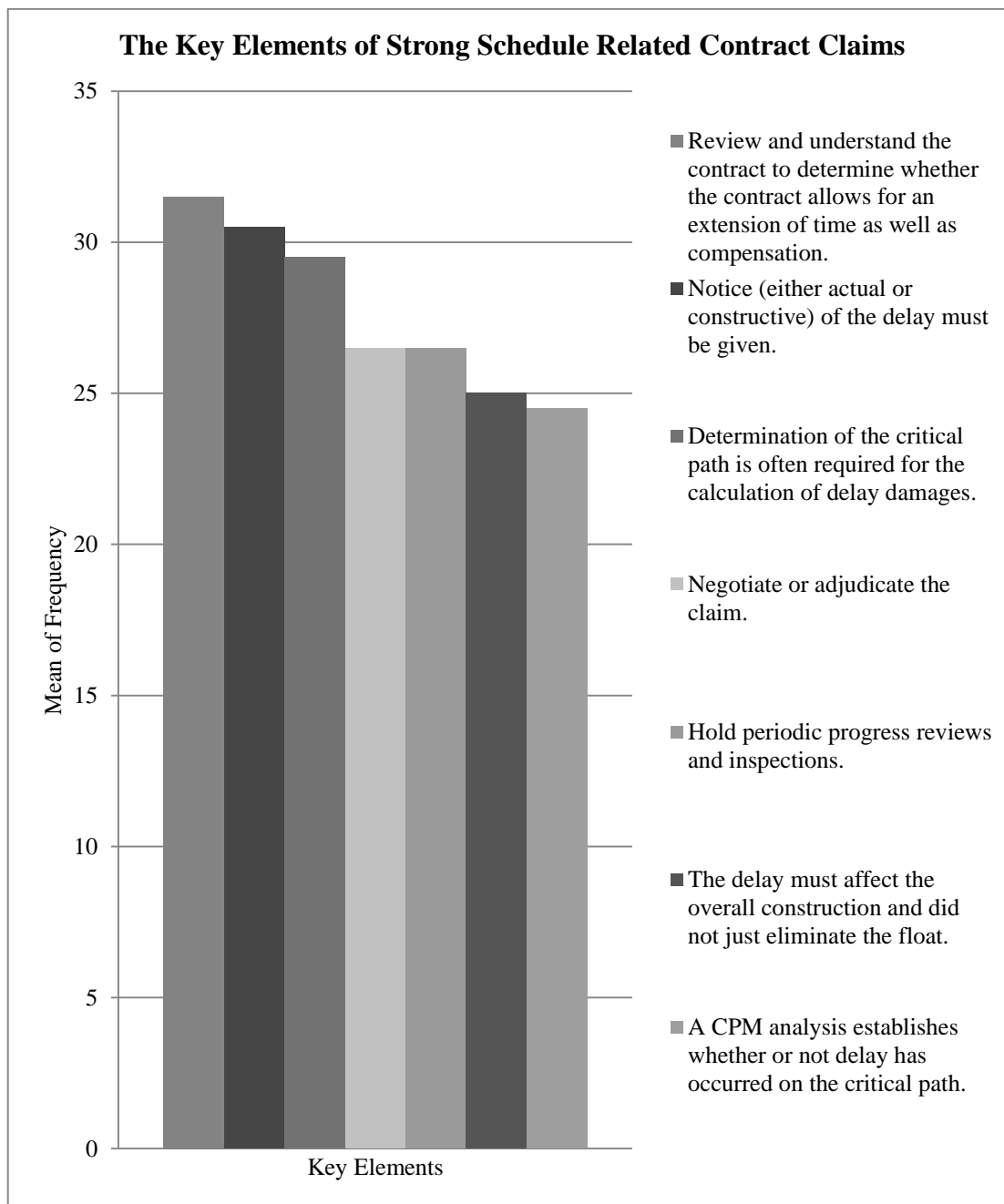


Figure 4. 2 The Key Elements of Strong Schedule Related Contract Claims

4.9 SCHEDULE RELATED CONTRACT CLAIMS IN CONTRACT ADMINISTRATION AND PROJECT MANAGEMENT

Generally, planning and scheduling is vital in every project. Thus, any mistakes or any issues related to project scheduling may affect the project positively or negatively.

For this section, the percentage of frequency was used for each item to identify the respondents' preferences. As the total number of respondents is 70, the data will be analysed based on these 70 respondents. The frequency of respondents that chose 'yes' for the statement were identified and its percentage was then identified as well. The summarize of the data analysis was shown as in Table 4.8 below.

No.	Items	Number of Agreed Respondent	Total Number of Respondents	Percentage (%)
1.	Does the contract claims affecting the project management process in construction industry?	67	70	95.71
2.	Does the schedule related claims give advantages in construction contract administration?	62	70	88.57
3.	Does the Critical Path Method helpful to be used in the schedule related contract claims?	65	70	92.86

Table 4. 8 Schedule Related Contract Claims in Contract Administration and Project Management

Based on the data analysis tabulated above, a percentage of 95.71 % of the respondents stated that the contract claims does affecting the project management in the construction industry. This high number of percentage means the contract claims is very crucial in determining a project smoothness and success.

While 88.57% of the respondents stated that the schedule claims give advantages in construction contract administration. It can be seen that the number of percentage was lower than the first item, which shows that the industrial practitioners do not really emphasize on the advantages of schedule related claims in construction contract administration.

Last question of this section was constructed to identify that a Critical Path Method (CPM) might be helpful to be used in the schedule related contract claims.

According to the data obtained, 92.86% of the practitioners itself stated that CPM does helpful in schedule related contract claims.

4.10 SUMMARY OF FINDINGS

This chapter of data analysis was showing the outcomes for this research which were used to answer all the research objectives and questionnaires. All 20 items in the questionnaire were able to meet this research's aims and hence the result obtained from the data analysis will be discussed further in the next chapter.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The purpose of this research is to study on the causes that might contribute to a schedule related contract claims and thus identifying the key elements to obtain a strong schedule related contract claims. As this research was targeted to study on schedule claims, the data obtained were extracted and analyze to obtain a finding that might be useful in constructing a schedule related contract claims, which will be explained further on this chapter.

Other than that, there is another limitations need to be considered in the process of data gathering and research development as it clearly might affect the findings obtained in this research.

5.2 LIMITATIONS

For this research, the main limitation is that it is focusing on the construction industry only. The potential causes and the key elements of strong schedule related contract claims that were determined in this research findings are mainly focused on the construction contract administration in construction industry. Besides, this research was conducted by studying schedule related contract claims in terms of time matter in project scheduling without involving price analysis of the contract claims. This research finding theoretically determines the causes and the key elements of schedule related contract claims.

Throughout the completion of this research, there are few limitations that negatively affect the data obtained for this research. These were mostly occurred during the period of questionnaire distribution and data gathering especially in the data collection process. It can be seen affecting the data gathering process by the low return rate of respondents, which in this research is 43.75 %. Moreover, this was due to few companies that had changed their corresponding address, companies that are no longer operate in the construction industry, and also few of the company in the list was a different company's name but same owner which operates their business in the same firm.

In addition, there is another limitation in this research that affects the research findings, which is the time constraints that cause a low respond rate of data gathered for this research. This was happened on the data collection process, where the data distribution and collection were scheduled accordingly to a certain period. As this research was conducted, it is not suitable to wait for all respondents returned the questionnaire fulfilled as required by research sample targeted. This may cause delay in the research completion.

5.3 SCHEDULE RELATED CONSTRUCTION CLAIMS IN CONTRACT ADMINISTRATION

As this research was aimed to find out the potential causes of schedule related contract claims and the key elements for a strong schedule related contract claims, the data analysis was conducted accordingly from the process of identifying and notifying the contract claims, followed by the determination of the causes of schedule related contract claims and lastly the determination of key elements for a strong schedule related contract claims.

Generally, the process of identifying and notifying the contract claims were taken mostly during the periodical meetings within the project's team members. Based on the research finding, it indicates that 32.86% of the respondents stated that the contract claims were identified during periodical meetings and 45.72% of the respondents stated that the contract claims were notified during periodical meetings. It

shows that the periodical meetings are very important in a project as it might be very helpful to identify and notify the construction contract claims earlier.

Next, the first objective in this research is to identify and rank the potential causes of schedule related contract claims. According to the data analysed, it shows that the delays in construction and completion of the contract itself is the main causes that usually lead to a schedule related construction claims. This may due to the incomplete contract, which is the main thing as an agreement in the project. The potential causes to the schedule related contract claims identified in this research are ranked as listed below:

1. Delays in construction and completion of the contract.
2. Incomplete and defective work.
3. Abnormal or unusual weather conditions.
4. Changes on programmes of work.
5. Defects in the design or documentation issued for a project.
6. Project progress acceleration.
7. Failure to adequately schedule and coordinate the work.

Identify and rank the key elements for a strong schedule related contract claims is the second objective for this research to be conducted. These elements are important in order to obtain a clear and good claim as it is the characteristics that need to be considered and implemented in constructing a schedule related contract claims. The data analysed find out that the outmost key element that need to be implemented in a strong schedule related contract claims is reviewing and understanding the contract itself in order to determine whether the contract allows for an extension of time and compensation. It means a clear understanding regarding the project's contract will definitely makes a contract claims stronger. While the other key elements identified are ranked as followed:

1. Review and understand the contract to determine whether the contract allows for an extension of time and compensation
2. Notice (either actual or constructive) of the delay must be given.

3. Determination of the critical path is often required for the calculation of delay damages.
4. Negotiate or adjudicate the claim.
5. Hold periodic progress reviews and inspections.
6. The delay must affect the overall construction and did not just eliminate the float.
7. A CPM analysis establishes whether or not delay has occurred on the critical path.

Lastly, this research was conducted to answer few research questions. First, does the contract claims affecting the project management process in construction industry? Second, does the schedule related claims give advantages in construction contract administration? Third, does the Critical Path Method helpful to be used in the schedule related contract claims?

As for the first question, the finding indicates that 95.71% of the respondents stated that the contract claims does affect the project management process in construction industry. It is clearly define that managing a project properly is vital in avoiding the negative impact of contract claims. Second, 88.57% of respondents stated that the schedule related claims do give advantages in construction contract administration, and it shows that both contractors and clients need to plan, schedule and manage any related claims regarding their project effectively as it may positively give advantages in their organization. Lastly, 92.86% of the respondents stated that the Critical Path Method (CPM) was helpful to be used in the schedule related contract claims, as it is the most suitable and effective tool to be used in project planning and scheduling .

5.4 RECOMMENDATIONS

The findings obtained from this research would be able to be used in preventing the schedule related contract claims arose in the project by considering and avoiding those potential causes of schedule related contract claims as identified in this research. The top raking causes need to be carefully monitored throughout the project

progress. Moreover, the key elements of strong schedule related contract claims obtained from this research might be very useful in handling the claims.

As there are few limitations that occurred in this research, a further research is required to fulfil the research objectives and questions with an appropriate sample size analysis. Furthermore, a study on the scheduling claims in terms of monetary value, which study on the losses from the CPM schedule, might be useful for the project management knowledge area.

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RESEARCH'S PROGRESS GANTT CHART (FYP 2)

No	Task to Perform	Week													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
	1 st Meeting: Briefing on the research														
	Questionnaires Coding														
	Data Analysis														
	Data Analysis Report writing (Chapter 4)														
	Meeting with supervisor and Data Analysis Alteration														
	Report Writing (Chapter 4 and 5)														
	Finalizing Report														
	Report Submission														
	Correction Period														
	Presentation														

* All the questionnaires have been distributed and collected during semester break. The data analysis have been started in Week 1

APPENDIX B

RESEARCH QUESTIONNAIRE

Changes that occur in construction projects such as delays in construction projects need to be monitored properly as it involves every party involved in the agreement and also may bring losses to them. As the changes in project may lead to contractual issues in their business, it needs a strong and valid solution in terms of contractual law in that particular industry. This survey of schedule related contract claims in construction industry will benefits construction contract administration practitioners as well as project-related practitioners especially in construction industry as it study varies causes of schedule related contract claim and hence obtaining the key elements of a strong and firm contract claim.

Section A: Demography Questions

Please tick only one category representing the most appropriate responses for you in respect of the following items.

1. Age

- Less than 21 year old
- 21 to 30 year old
- 30 to 40 year old
- 40 to 50 year old
- More than 50 year old

2. Number of years working in construction industry

- Less than 5 years
- 5 to 9 years
- 10 to 14 years
- 15 to 19 years
- More than 20 years

3. Current job position:

- Senior Manager Jobs
- Manager Jobs
- Senior Executive Jobs
- Junior Executive Jobs
- Fresh/Entry Level Jobs
- Non-Executive Jobs

4. Current working department:

- Executive Board
- Management Section
- Consultancy Section
- Technical & Operation Section
- Architecture & Estimation Section
- Procurement Section
- Accounts & Financial Section
- Human Resources or Personnel Section
- Sales and marketing Section
- Operational & Engineering Section
- Research & Development Section
- Market Development Section
- Business Development Section

Section B: Construction Contract Claims

For question 5 to 8, please choose only one answer which the most appropriate responses for you in respect of the following items.

5. How did you identify the construction claims?

- Discussions
- Periodical meetings
- By chance
- Other ways

6. When the construction claims are identified?

- Before construction
- During construction
- After construction
- Not identified

7. How construction claims are notified?

- discussions
- periodical meetings
- by chance
- other way

8. In your opinion, which own the highest potential to be the contribution factors to the sources of construction contract claims?

No.	Factors	Tick (√)
a.	Claims by the contractor against the owner	
b.	Claims by the owner against the contractor	
c.	Claims initiated by someone other than a party to the construction contract (consultant, architect, engineers.)	

For question 9 and 10, please select 5 most preferred answers for you regarding the question in respect of the following items.

9. In your opinion, what are the most common potential causes of schedule related contract claims?

No.	Causes	Tick (√)
a.	The owner's failure to adjust the construction schedule, or grant a time extension, even in the face of valid contractor claims.	
b.	Failure of one or more of the parties to perform in a timely manner, thereby delaying the other party.	
c.	Conditions known only by the owner that will adversely affect the contractor's performance.	
d.	Unilateral or uncompensated suspension of the contractor's work.	
e.	Abnormal or unusual weather conditions.	
f.	Defects in the design or documentation issued for a project	
g.	Changes in preferential engineering	
h.	Changes on programmes of work	
i.	Project prolongation	
j.	Project disruption	
k.	Project progress acceleration	
l.	Incomplete and defective work	
m.	Delays in construction and completion of the contract;	
n.	Changes which occur not at the request of the owner;	
o.	Poor management and administration of the construction site;	
p.	Termination of the contract by the owner or the contractor;	
q.	Failure to adequately schedule and coordinate the work; and	
r.	The owner's failure to adjust the construction schedule, or grant a time extension, even in the face of valid contractor claims.	

10. Based on your point of view, which are the best key elements of strong and successful schedule related contract claims?

No.	Key Elements	Tick (√)
a.	The delay must affect the overall construction and did not just eliminate the float.	
b.	It is not sufficient that the delay be troublesome; it must be critical. Critical delays are those that extend the overall project completion date.	
c.	A CPM analysis establishes whether or not delay has occurred on the critical path	
d.	Determination of the critical path is often required for the calculation of delay damages	
e.	The innocent party must prove that the delay is inexcusable and compensable (i.e. the responsibility of the party at fault)	
f.	Notice (either actual or constructive) of the delay must be given	
g.	A contractor should review the contract to determine whether the contract allows for an extension of time or both an extension of time as well as compensation	
h.	Negotiate or adjudicate the claim.	
i.	Read and understand the contract documents	
j.	Hold pre-construction meetings and reach agreements on key project objectives.	
k.	Prioritize the relative importance of each objective	
l.	Define clearly the roles and responsibility of each party	
m.	Hold periodic progress reviews and inspections	
n.	Maintain open communication throughout the project	

For question 11 to 13, please choose only one (either yes or no) which the most appropriate responses for you in respect of the following items.

No.	Question	Yes	No
11.	Does the contract claims affecting the project management process in construction industry?		
12.	Does the schedule related claims gives advantages construction contract administration?		
13.	Does the Critical Path Method helpful to be used in the schedule related contract claims?		

APPENDIX C

NORMALITY TEST RESULT (DATA DISPERSION GRAPH)

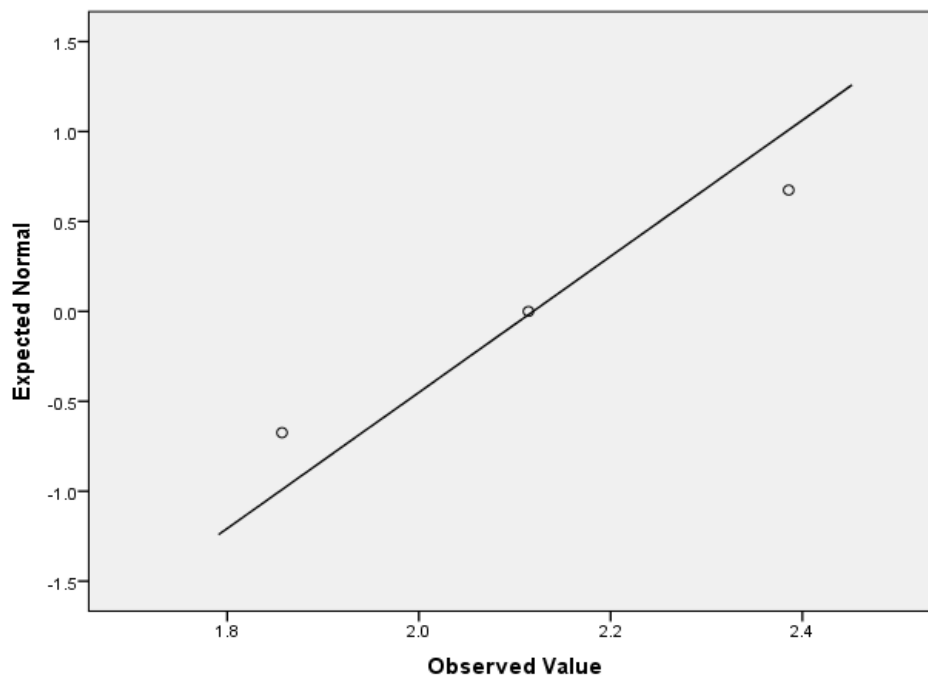


Figure 6.1 Construction Claims Identification and Notification

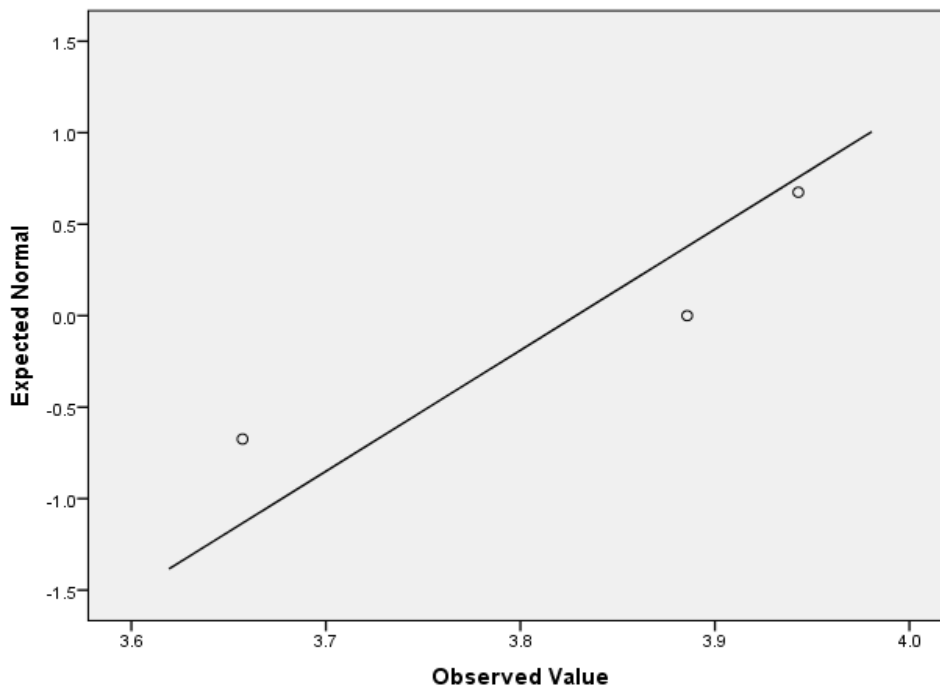


Figure 6.2 The potential Causes of Schedule Related Contract Claims

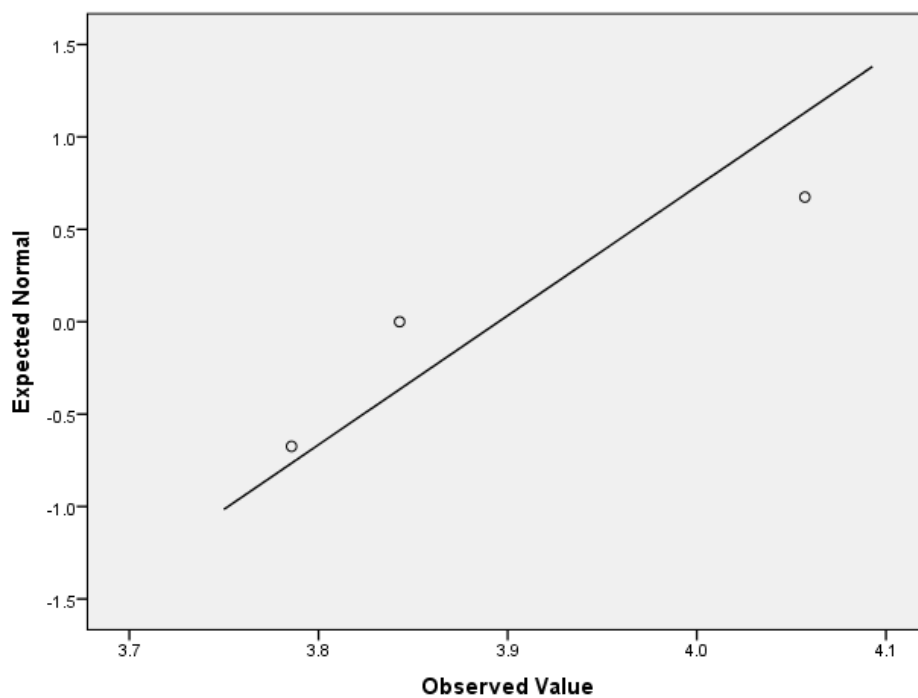


Figure 6.3 The Key Elements of Strong Schedule Related Contract Claims

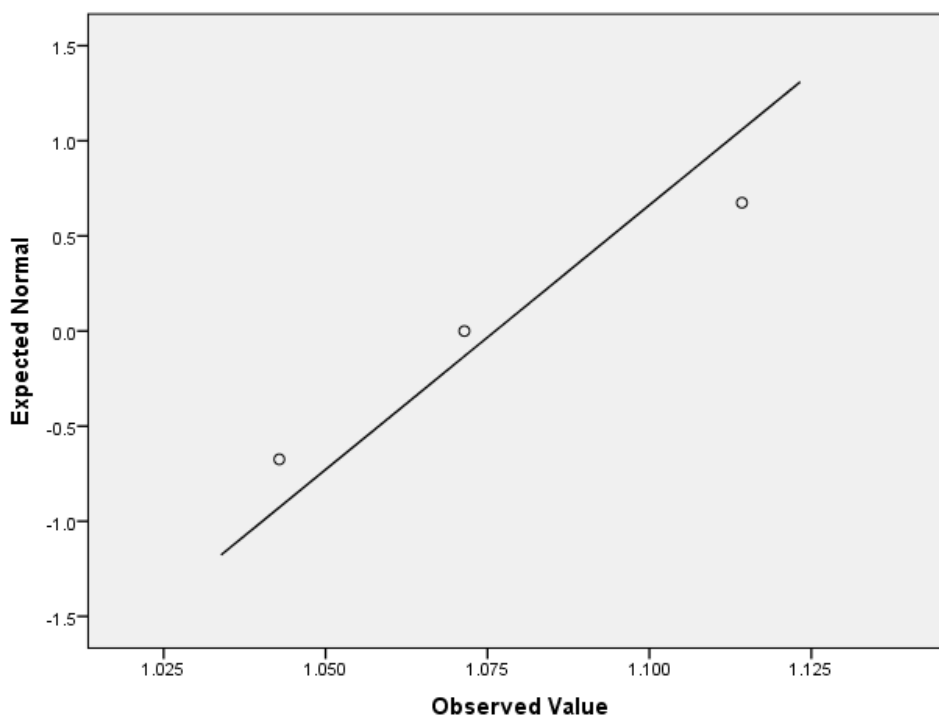


Figure 6.4 Schedule Related Contract Claims in Project Management