Cape Peninsula University of Technology

Operational framework to settle contractual claims in construction projects

By

Awad Saad Abdulla Saad

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Supervisor: Dr Ruben Ndihokubwayo

Co-Supervisor: Dr Julius A. Fapohunda

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ABSTRACT

Delays are frequent and recurring in construction projects, mostly in developing countries. Several factors pertaining to modes of operation in the local construction industry contribute to construction delays. Contractual claims are integral and an important feature of construction project's life. Often times, delay-related contractual claims in construction projects is a controversial issue that often leads to disputes and conflicts between contractual parties due to its ambiguity and complexity.

Literature have shown over the last decade a range of problems that have consistently resulted in construction delay and significant costs to all contractual parties due to contractual claims in almost all types of construction projects. Therefore, to achieve more time efficiency on construction projects, comprehensive studies on common problems resulting in routine delays due to contractual claims is essential. Such studies need to pinpoint the most relevant causes of delay that have to be monitored carefully in order to avoid the construction delays. Thus, this study adopted a quantitative research method. Closed ended and open ended questions were designed in the quantitative instrument for the quantitative survey. Descriptive and Principal Component Analysis was employed for data analysis to develop an operational framework for evaluating delay related claims in the South African construction industry. Findings from the analysis of data revealed several factors through which, when appropriately evaluated will reduce the incidence of contractual claim to minimum if not completely eliminated in construction project.

The study has found that delay-related claims are increasingly emerging and have become the most common and costly problem in construction projects which not only deny the client timely access to the completed facility but disrupt the overall performance of the building project. This study also concludes that the contractual claims that often lead to dispute during execution of building projects are; Change order claim, Variation order claim, Cost and expense claims and Dayworks claim. Therefore, evaluation of these claims must be given careful assessment during the construction phase of a building project to forestall its attendant consequence on project performance. Inconsistencies in the operational dealings with contractual claims in the South African construction industry showed that; release of payment emanating from claims, quality of management and design coordination, non-availability of specified materials and change in micro economic policy are the most significant in evaluation factors which must be considered in evaluation of accurate and undisputed contractual claims. This study also affirmed that the three principal components that lead to claim and dispute when combined explained 49% of the total variance. Also, it was concluded that arbitration is most appropriate for dispute due to; shortage of materials, claims in fluctuation of the materials price, physical environmental consideration, and conflict of interest among the project team. Litigation is most appropriate to resolve dispute due to access to the construction site. While mediation is most suitable for dispute due to; inability of the client to understand design, the choice of the procurement process, delay in release of payment emanating from claims, lack of prompt delivery of materials by the suppliers, interference with utility lines and extreme weather condition. Lastly, Negotiation is most suitable for dispute arisen from constructability of the design and non-availability of specified materials.

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DEDICATION

I dedicate this work to my mother: Nafalah Abdulnabi and my father Saad Abdulla. I ask Almighty ALLAH to grant you health and wellness.

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GLOSSARY OF TERMS

Terms	Definition	Source
Claims:	Request for extension of time or owed monetary value, including taking responsibility.	The researcher's own definition.
Contractual:	The relationship between contract and contractual parties designed to strengthen cooperation	The researcher's own definition.
Contractual claims:	Obligations group formulated within contractual context striving at project completion with minimum delay.	The researcher's own definition.
Contractual parties:	Stakeholders in the project and their direct and indirect roles in the success of the project.	The researcher's own definition.
Delay:	Defined as the time overrun, either beyond the date for completion specified by the contract or beyond the extended contract period where an extension of time has been granted	Fugar & Agyakwah-Baah, (2010: 104).
Disputes:	A dispute is considered to be in existence where one party does not accept the rejection of the claim by the other party	Younis, Wood & Malak, (2008: 729).
Operational framework:	Contains a group of practical guidelines and informatics formulated to effectively deal with the delay-related contractual claims	The researcher's own definition.

CHAPTER ONE
THE PROBLEM AND ITS SETTING

1.1 BACKGROUND

Delays are frequent and recurring in construction projects in developing countries. Although the principal reasons for construction delays are comparable across developing countries, several factors pertaining to modes of operation in the local construction industry and project characteristics contribute to construction delays. Contractual claims are integral and an important feature of construction project's life. Often times, a contractual claim occurs among the parties to the contract which may eventually cause delay in the entire project life. Moreover, delay-related contractual claim in construction projects is a controversial issue that often leads to disputes and conflicts between contractual parties due to its ambiguity and complexity.

There are several methods available for addressing delay claims in the construction industry, but no isolated preventive method can be applied to effectively address delay related to contractual claims. Though Aibinu (2009:47) indicates disputes among the project parties as trends that characterize construction project when contractors claim is rejected by the client representatives. The author, Aibinu (2006:45) further proposes negotiation of contractual claim by the parties to the contract as a means to ratify a contractor’s claim to avoid dispute. Moreover, delay-related claims are known to emerge increasingly and have become the most common, costly problem in construction projects resulting into extension of time. However, contractual parties have used many methods to substantiate their claims for extension of time (Kumaraswamy & Yogeswaran, 2003:27) but the contractor should adequately prove causation and liability to present a successful claim for extension of time (Alnaas, Khalil & Nassar, 2014:308).

Conversely, Shi, Cheung and Arditi (2001:60) opine that delay in settlements of claims due to contractor’s could delay completion of any activity of the project which may lead to the overall project delay. Odeh and Battaineh (2002:67) identify some factors causing delay and provide a ground prone to costly claims and contractual disputes. Odeh and Battaineh (2002:72) conclude that factors such as inadequate contractor experience, inadequate financing, default payments, non-optimal labour productivity, slow decision-making, improper planning and subcontractors’ inefficiency are the

causes of contractual claim. Dlakwa and Culpin (1990:237) assert lack of prompt payment to the contractor, increase in prices of plant and equipment, and cost of labour as the factors causing delay. Fenn, Lowe and Speck (1997:513) and Ceric (2014:931) opine that the strain contractual relationship between parties and conflicts of interest leads to cost and time escalation.

Assaf and Al-Hejji (2006:355) identify seventy-three causes of delay from extant literatures, these cause were grouped under nine factors. The authors conclude that; untimely release of progress payment, frivolous issuance of change order during construction, inaccurate assessment of contractor's technical and human expertise during tender evaluation, shortages and low productivity of labour, financial and cash flow problem, planning and scheduling, site management and supervision, reviewing and approving design documents, inflexibility, timely production of design documents, and mistakes and discrepancies in design documents are highly ranked factors causing delay in construction projects.

Similarly, Sambasivan and Soon (2007:517) assert the effects of delay as; time and cost overrun, disputes, arbitration, litigation, and total abandonment. Shaikh, Muree and Soomro (2010:11) posit four delay factors that cause increase of time and cost in construction projects as; client problems, contractor problems, resource problems and general problems.

Summarily, if a delay occurs in one of these claims highlighted in the during project execution, it will spur other claims from the owner to emerge. Likewise, claims by the contractor to increase time in order to complete the project as a direct consequence is anticipated to feature as a standard development. It however requires efficient contract administration and well organised record keeping for successful project management and settlement of contractual claims (Yusuwan, & Adnan, 2013:54). It is believed that the subject of the current study will significantly contribute to streamlining the construction process through development of framework to evaluate construction delay.

1.2 CONTEXT OF THE RESEARCH

Previous studies have shown over the last decade a range of problems that have consistently resulted in construction delay due to contractual claims in almost all types of construction projects (Faridi, & El-Sayegh, 2006:1167; Toor, & Ogunlana, 2008:395), resulting in overrun their contractual completion dates, and significant costs to all

contractual parties (Shehu, Endut, Akintoye & Holt, 2014:1471; Kaming, Olomolaiye, Holt & Harris, 1997: 83; Majid & McCaffer, 1998:42; Akintoye & Skitmore, 1991:311). Major problems which construction projects face are usually due to inadequate procurement system, lack of resources, discrepancies between design and construction, lack of project management practices, variation orders, communication lapses, cultural issues, and different interests of the participants (Odeh & Battaineh, 2002:71). The identification of causes and effects alone does not help the project managers to take appropriate remedial or preventive steps. The project managers need to understand, for example, what causes or factors result in time overrun or cost overrun. Once these factors become clear, the managers can take proactive steps to avoid such situations.

Therefore, to achieve more time efficiency on construction projects, comprehensive studies on common problems resulting in routine delays due to contractual claims seem more urgent. Such studies need to pinpoint the most relevant causes of delay that have to be monitored carefully in order to avoid the construction delays (Toor, & Ogunlana, 2008:396). Although there are lots of researches carried out in this area, only few studies attempt to identify the problems in managing delay related contractual claims in multiple projects environment. To cover this knowledge gap, this research addresses the research problem and sub problems identified in the extant literatures.

1.3 PROBLEM STATEMENT

All along, the contractual clauses have always been incorpoatate in the contruction projects with a genuine intention for minimising disputes in settling contractual claims between participants. However, the inconsistency in settlement of contractual claims hampers the steady execution of construction projects leading to cost overrun, delay, and string relationship among contractual parties. A comprehensive framework for settling contractual claims may eliminate inconsistencies in settling disputes.

1.3.1 Sub-Problems

In attempt to address the study research problem, the sub-problems were identified as follows;

1. Most prevalent features in settling contractual claims in which contractual parties fails to cooperate that results in disputes are not evident;

2. The reason claims are disputed are not evident;
3. The consistency of operational dealing with contractual claims is not known; and
4. The impact of disputed claims on project performance is not known.

1.4 RESEARCH QUESTIONS

In addressing fundamental problems the study will provide answers to the main research question and sub question:

1.4.1 Main Research Question

What are approaches that could be adopted to eliminate delays that occur due to contractual claims?

1.4.2 Sub Questions

1. What are the features of contractual claims that lead to dispute in construction contracts?
2. Why claims are disputed and not settled at prima facie?
3. What are the inconsistencies from operational dealing with contractual claims?
4. What is the impact of disputed claims on project performance?

1.5 AIM AND OBJECTIVES OF THE RESEARCH

1.5.1 Aim

The aim of this research study is to develop an operational framework to evaluate delay-related contractual claims in construction projects.

1.5.2 Objectives

The objectives of the study are:
1. To identify the perceptions on most prevalent contractual claim feature prone to disputes;
2. To identify the reasons why claims are disputed and not settled in the original form they are submitted;

3. To establish whether there are inconsistencies from operational dealing with contractual claims; and
4. To determine the impact of disputed claims on project performance.

1.6 THEORETICAL AND CONCEPTUAL FRAMEWORK

The theoretical framework of the current research study is based on theories that will be tested to ensure an effective approach that systematically evaluates common problematic factors causing delay claims. This investigation was done using the conceptual framework shown in Figure 1.1 to assess current practices in construction projects by contractual parties in assessing the delay-related contractual claims.

Thompson, Cox and Anderson (1998:31) developed a model of the optimum contracting strategies for a client organization. Jin and Ling (2005:685) developed a framework for reducing adversarial relationships while fostering trustworthy relationships reflecting the project progress and compliance. Cox and Thompson (1997:127) indicate that contractual relationships could be linked with positive measures and depicting the effects of the risks and responsibilities under the contract to ensure business success. Hamzah, khoiry and Arshad (2011:490) revealed reasons for delayed construction and pointed out two main types of delay, namely the excusable delay and non-excusable delay. The conceptual framework of the current research study is premised to address theories that reduces the delay-related contractual claims, as well as will provide directives and variables that are missing in the existing framework.

Mbachu (2008:471) collected information on project performance from 243 contractors and 307 subcontractors registered with the Gauteng Master Builders Association of South Africa and the information gathered from these professionals was used to develop a framework for the main contractors and consultants to assess performance of subcontractors at various stages of construction. The framework also indicated that the performance of the subcontractors enhance the delivery of the project within the time, quality and cost targets. Methodology for analysing delay claims is the key in obtaining a fair allocation of delay responsibility and settles claims without litigation (Kartam, 1999:409). Braimah and Ndekugri (2009:1279) posit that improvement in

programming and record keeping practices will strengthen the use of the more reliable methodologies and will facilitate in the smoother resolution of delay claims.

Although, Scott, Harris and Greenwood (2004:50) recommend the use of time impact analysis as the method to assess claims for extension of time, this study seeks to establish effective framework to evaluate delay related contractual claim for management of construction projects through proper and systematic methodology, which include the knowledge and experience of various construction stakeholders using the conceptual framework in Figure 1.1.

Figure 1.1 Conceptual framework to establish effective approach to eliminate delay claims

1.7 SIGNIFICANCE OF THE STUDY

Previous studies, such as, Bing, Tiong, Fan and Chew (1999:277) conducted research on three risk factors related to international joint construction projects and examine the most effective mitigation measures and revealed that the financial aspects are more risk factors to delay in projects. Conversely, Kululanga, Kuotcha, McCaffer and Edum-Fotwe (2001:309) conducted field survey about construction claim process framework; the research findings reveal a low awareness of the contractor's performance in fashioning a construction claim process-measuring instrument. However, this is perceived by Hodge (2004:37) as an indication to transfer risks associated with contractual claims by project parties the public sector and the private. The author further disclosed a range of risks in projects and showed differences in the project delivery arrangements.

Moreover, this study provides a group of guidelines and information to construction professional to effectively deal with the delay-related contractual claims. It also contributes in enhancing the performance of the construction industry effectively with regard to the following four benefits:

- Contribute in providing strategic recommendations to improve the delivery of a project;
- Contribute to the mitigation of disputes and conflicts between contractual parties;

- ❖ Contribute to complete the project within a specified time; and
- ❖ Contribute to avoid the emergence of other claims.

1.8 DELINEATION

The study was limited to construction and consulting companies who are engaged in construction projects in South Africa, who have office in Western Cape Province. The choice of Western Cape Province is born out of the fact that the province is one of the three largest provinces in South Africa and of the fact that, over 80% of construction firm on CIDB grade level 3 – 9 have office in Western Cape Province.

1.9 ETHICAL STATEMENT

Ethics of the research refers to the moral principles guiding research. The principal aim of ethics is to protect all parties who participate throughout the lifetime of the research and into dissemination; principles of research embrace four ethics:

- **Integrity and quality of data**

This research study was designed to ensure that accurate and quality data is collected, to enhance integrity and effectiveness of the research findings. All source of information used in the research were appropriately cited and acknowledged in the reference list. Quality assurance was undertaken in the accuracy of the data capturing. Data analysis was conducted using Statistical Package for Social Scientist (SPSS).

- **Voluntary participation**

The study participants were chosen using appropriate selection criteria and voluntary participation was ensured.

- **No harm to participants**

The information requested from the research participants does not present, nor constitute a threat or harm to participants.

- **Confidentiality**

Confidentiality and anonymity of information supplied by the research subjects and their names shall not be made known to a third-party under any circumstances.

1.10 CHAPTER OUTLINE

Chapter One – The problem and its setting

This chapter cover the background of the study, the context of the research, problem statement, research questions, aim and objectives, theoretical and conceptual framework, significance of the study, delineation, and ethical statement.

Chapter Two - Literature review

This chapter will build-up the theoretical underpinning for the research. Information from extant literatures were be put together in this chapter to advance appropriate course for the study thus the chapter present review on; South Africa Construction Industry, Cost overrun and time delay in construction project delivery, overview of effects of claims on a construction project, overview of disputes in construction project and contractual arrangements in construction projects.

Chapter three – Research methodology and methods

Chapter three presents the methodological approaches upon which social science research of this nature could be conducted. This chapter was presented in three sections; research philosophy, research methodology and research design. Also, the justification for the chosen research techniques adopted for this study were appropriately presented.

Chapter four – Data analysis and discussion of results

This chapter presents the research data, the results of data analysis using SPSS and discusses the results of the analysis amidst findings of previous researches.

Chapter five – Conclusion and recommendation

This chapter present; the conclusions emanating from the results of data analysis, the policy recommendation of the research and suggestions for further studies.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Delays are frequent and recurring in construction projects in developing countries. Although the principal reasons for construction delays are comparable across developing countries and the antecedent claims associated with the delay differs from one project to another. However, several factors pertaining to modes of operation in the local construction industry and project characteristics contribute to construction delays.
Thus, this chapter is dedicated to review of literatures on the subject of current research study by presenting and analyses the views of previous studies on the delay and associated claims in a construction project to provide theoretical underpinning for this research.

2.2 SOUTH AFRICA CONSTRUCTION INDUSTRY

The South African construction industry plays an important role in the country economy. Given its colonial past, the formal sector of the South African construction industry is rooted in British practice. More particularly, it largely follows UK practice with regard the professional roles and responsibilities, structuring of the industry, contractual law, and procurement (Bowen, Pearl, & Akintoye, 2007:191). The demand side of the industry is characterized by both public and private-sector clients. The former, functioning at local, provincial and national levels, accounts for 30% of the output of the construction industry with a further 13% from public corporations (parastatals). In contrast, the private sector is responsible for 58% (Construction Industry Development Board (CIDB), 2004:7; Bowen, *et al*., 2007:191).
According to CIDB (2004:6), investment in infrastructure is seen as a key driver of economic growth in that government spending to improve infrastructure and in doing so enables the efficient delivery of other services, reduces business costs, and acts as a catalyst for a higher economic growth and employment creation. Thus, the construction industry is regarded as the principal means by which much of this infrastructure is provided and a prime target where the preferred new equity and redistribution policies of government can be realised.

The construction industry accounts for some 5.1% of gross domestic product (GDP) (CIDB, 2004:11) and contributes about 30% to gross fixed capital formation (GFCF). The industry currently employs approximately 1 million people (520 486 formally and 470 514 informally), of which the formally employed constitute 5.1% of the total formally employed population (Van Wyk, 2003:9-10). The construction industry's contribution to capital formation is set to increase drastically if projections of future infrastructure provision are realized and this is expected to impact dramatically on employment. The government's own expectations are that 65% of the 1 million jobs that the government has committed itself to creating over the next five years will be generated through labour-intensive infrastructure development (Bowen, *et al.*, 2007:191). This development activity will be almost wholly construction-driven.

Since 1994, series of legislation has been passed by government as it has sought to redefine the social contract between government and the governed, much of which are non-sector specific, although a number of acts and regulations are specifically aimed at the construction industry, most notably the Construction Industry Development Board Act, 2000 (Republic of South Africa: Government Gazette, Act No. 38 of 2000a), which established a Board with a mandate to reconstruct, grow, and develop and transform the construction industry in line with the government's Growth, Employment and Redistribution (GEAR) strategy (National Treasury, 1996). At a more general level, a large number of acts and regulations have been gazetted, of which the two most important for the construction industry are as follows:

a) Broad Based Black Economic Empowerment Act, 2003 (Republic of South Africa: Government Gazette, Act No. 53 of 2003:1-6), which enables government to adopt practices that promote the empowerment of previously disadvantaged groups in society.

b) Preferential Procurement Policy Framework Act, 2000 (Republic of South Africa: Government Gazette, Act No. 5 of 2000b), which allows for a preference in the allocation of public-sector contracts to protect and advance the interests of previously disadvantaged groups in society.

The position taken by the government is that addressing unemployment and poverty requires the empowerment of disadvantaged individuals to equip the previously disadvantaged individuals with adequate knowledge and skills, which in turns boost investment in the development of human capital. This was achieved, through government affirmative action in the South African construction industry and other

industries. Affirmative action, a deliberate intervention on the part of government in its role of client, aims at facilitating the provision, directly and indirectly, of socioeconomic opportunities (for example skills development or employment) to individuals who, either historically or otherwise, have been denied those opportunities, and at preventing such discrimination from occurring in the future.

As other sector in every economy, South Africa construction industry has its challenges, some of which Emuze and Smallwood (2011:929) identify as poor time management, which could lead to delays and attendant delay claims to the client, and cost overrun in the project, client dissatisfaction, rework and defects. Despite the enormous task and challenges facing the industry, the construction industry of South Africa is in a position to play a key role in the social upliftment of the bulk of the South Africa's population. To do this, the industry's capability needs to be enhanced in the areas of its ability to execute and deliver construction project without any hindrance.

2.2.1 Unique features of construction projects

Construction is the process whereby designers' plans and specifications are converted into physical structures and facilities. It involves the organization and coordination of all the resources for the project; labour, construction equipment, permanent and temporary materials, supplies and utilities, money, technology and methods, and time to complete the project on schedule, within the budget, and according to the standards of quality and performance specified by the designer (Ahmad, & Sein, 1997:458).

Products of construction are large in scale and varied in kind. Each product or facility has its own design, and a distinct process of production or erection. The product is, in general, one of a kind, and the specific process is usually non-repetitive. Steps involved in the process are not always distinctly identifiable. Process segments overlap and the links between them are often non-uniform and non-standard. Measurement of progress in terms of percentage of completion of construction projects is difficult, and is often an arbitrary procedure that frequently gives rise to disagreements and disputes. Unlike the manufacturing context, construction is not a repetitive continuing process; `rework' or `repeated work' is costly. It is difficult to apply statistical quality measurement programmes in the process of construction. The outcome of the construction process is characterized by a high degree of uncertainty (Ahmad, & Sein, 1997:458). Construction is more vulnerable than manufacturing processes to the effects and impacts of external

factors, such as weather. Construction is one of the most regulated industries. Facilities must be built according to code. Proper safety measures must be followed before, during and after construction, according to governmental acts and regulations. The industry is traditionally fragmented, making implementation of construction projects prone to contractual claims and possibly disputes. Also, some of the construction industry norms, such as the practice of awarding projects to the low bidder, are also barriers in the way of implementing claim and dispute free construction project.

Construction project teams are formed with people from several entities with diversified and sometimes conflicting goals and interests. Owners, designers (architects and engineers), general and/or prime contractors, subcontractors, suppliers and vendors get involved in the process of construction for a considerably long period of time. As a result, the composition of the team cannot remain static; it changes as construction progresses. This instability in project teams makes the application of certain management techniques difficult in construction projects.

2.3 COST OVERRUNS AND TIME DELAY IN CONSTRUCTION PROJECT DELIVERY

Project performance in the construction industry is well researched. A study completed by the International Program in the Management of Engineering and Construction (IMEC) in 2000 reported by Miller and Lessard (2000:14) reveals that 18% of 60 large engineering and construction projects, with an average capital value of $ 1 billion undertaken between 1980 and 2000, incurred extensive cost overruns. Merrow, McDonnell and Argüden (1988) studied 47 megaprojects in the construction environment and found that only four were on budget with an average cost overrun of 88%. In addition, Morris and Hough (1987:9) also provide a comprehensive list of cost overruns on large projects. According to Flyvbjerg, Bruzelius and Rothengatter (2003:3-4), cost overruns are especially evident in infrastructure construction projects.

However, the relatively poor performance of construction projects prompted researchers to investigate and identify the factors that cause cost overruns and time delays. In the subsequent sections the literature is summarised and concluded with the identification of the most important and dominant factors.

2.3.1 Factors causing cost overrun in construction project

Various studies have investigated the causes of project cost overruns on construction projects. Notably, Kaming, *et al*., (1997: 87), studied 31 construction projects in Indonesia, found that from a contractor's point of view, cost overruns were mainly caused by; inaccuracy of material take-off, increases in material costs and cost increase due to environmental restrictions. Conversely, the cost overruns and delays on groundwater projects in Ghana was studied by Frimpong, Oluwoye and Crawford (2003:325), delay according to contractors was found to be; late in release of monthly payments from clients were the most important cost and time delay factors, while clients ranked poor contractor performance as the most important cost and time delay factor. Reviewing public sector construction projects in Nigeria, Dlakwa and Culpin (1990:239) found that the three main reasons for cost overruns are fluctuations in materials, labour and plant costs, construction delays and inadequate pre-planning.

In another study on construction projects in Nigeria, conducted by Okpala and Aniekwu (1988:238), it was found that architects, consultants and clients agreed that; shortage of materials, finance and payment of completed works and poor contract management were the most important causes of cost overruns. Mansfield, Ugwu, and Doran (1994:258) studied the performance of transportation infrastructure projects in Nigeria and concluded that material price fluctuations, inaccurate estimates, project delays and additional work contributed most to cost overruns. Similarly, study on construction projects in Nigeria by Elinwa and Buba (1994:698), assert's cost of materials, fraudulent practices and fluctuations in materials prices had the most significant impact on project costs. Similar studies on construction project performance in European countries reported by (Morris & Hough, 1987:9-10; Flyvbjerg, *et al*., 2003:3-4) found that; fluctuations in material cost and additional work contributed most to cost overruns.

In reviewing the literature an approach and trend towards the type of questions and results could be observed. In calculating the number of times specific types of causes for cost overruns under each category were observed, the following inferences could be drawn:

• The most significant factor causing cost overruns due to client action is additional work or changes to work. This cause was listed as a major factor in five of the seven (71%) reviewed articles.

• From a contractor's perspective the most significant contributor to cost overruns is 'time delays', listed in three of the seven (43%) reviewed articles.
• The most significant factor for cost overruns is evident from external factors and that is 'material price changes'. This factor was listed in six of the seven (86%) reviewed articles.
Other common factors listed among contractors, consultants and clients were 'poor estimates and material take-off' and 'delay in payments'.

2.3.2 Causes of time-delay in construction project

In construction, the word delay refers to something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project (Pickavance, 2005). Lo, Fung and Tung (2006:636) define delay as the slowing down of work without stopping construction entirely and that can lead to time overrun either beyond the contract date or beyond the date that the parties have agreed upon for the delivery of the project. Ahmed, Azhar, Castillo and Kappagantula, (2002:5-6) classify delays into non-excusable delays, excusable non-compensable delays, excusable compensable delays and concurrent delays. Non-excusable delays are delays which the contractor either causes or assumes the risk for. Excusable non-compensable delays are delays caused by factors that are not foreseeable, beyond the contractor's reasonable control and not attributable to the contractor's fault or negligence. Compensable excusable delays these are compensable delays are excusable delays, suspensions, or interruptions to all or part of the work caused by an act or failure to act by the owner resulting from owner's breach of an obligation, stated or implied, in the contract. Concurrent delays occur when both owner and the contractor are responsible for the delay.
Causes of time delays on construction projects are enormous. A research on the causes for cost overruns by Kaming, *et al*., (1997: 87) found that design changes, materials shortage and inadequate planning were the most significant contributors to time delays on construction projects. Similarly Sambasivan and Soon (2007:521) categorised delay causes findings into the client, contractor and consultant categories, with all three categories listing poor site management, inadequate contractor experience and poor subcontractors among the top five causes for time delays on construction projects. Ogunlana, Promkuntong and Jearkjirm (1996:44) investigated 12

high-rise buildings and categorised their findings into client/consultant related, contractor-related and external causes for time delays. The weighted findings among these three categories indicated that; material shortages, overstretching of technical personnel and design changes were the most important causes for project delays.

Assaf, Al-Khalil and Al-Hazmi (1995:50) used 56 questions in three categories, namely owner, architects/engineers and contractors, to determine the main causes of delays on large building projects in Saudi Arabia. The findings showed that contractors believed that preparation of shop drawings, delays in contractor's progress and payment by the owners, were the most important factors contributing to time delays. According to architects/engineers; cash flow, subcontractors, schedules and slowness of owner decision-making, caused most delays. Meanwhile, the owners were of the opinion that; design errors, excessive bureaucracy in project-owner organisation and labour shortages contributed most to time delays.

Walker (1995:269) surveyed Australian project representatives and found that the most important factors that affect time delays are; the ability of the organisation to manage risk, planning capabilities and effective resource coordination. Kumaraswamy and Chan (1998:25) studied time delays on Hong Kong projects and found that; unforeseen ground conditions, poor site management and slow speed of decision-making were the most prominent causes of time delays. The results from a study of 130 public projects in Jordan by Al-Momani (2000:58) indicated; poor design and negligence by the owner, change orders and poor weather and site conditions, contributed most to delays. In addition, Sweis, Sweis, Hammad and Shboul (2008:665) indicated that the contractor's financial incapacity, orders changed by the owner and severe weather conditions are the common causes of delay and changes in government laws are among the least causes of delay in Jordan.

A similar study by Ahmed, *et al*. (2002:33-34) identified ten most critical causes in Florida as building permits approval, change order, changes in drawings, incomplete documents, inspections, changes in specifications, decision during the development stage and shop drawings and approval. In the same vain, Al-Khalil and Al-Ghafly (1999:655) studied public utility projects in Saudi Arabia and found that contractors considered; delay in claim settlement, slow decision-making and delays in progress payments as the most important delay factors. The owners believed that; poor early planning, scope changes and financial difficulties by the contractors, were the major causes of delay. The consultants somehow supported the owners' views by indicating;

financial difficulties by the contractor, improper contract knowledge and ineffective planning as the most significant delay factors.

Odeh and Battaineh (2002:70) used only two points of view, namely contractors and consultants, to determine the causes of project delays in Jordan. The results showed that contractors believed that poor labour productivity, owner interference and inadequate contractor experience, were the three most important causes of delays. The consultants, however, indicated; inadequate contractor experience, late payment of completed work and poor subcontracting to be the main causes of delay. The inclusion of late payment of completed work as a cause for delay referred to the result of late payment on continuing site activities and contractors halting work unless payment for completed work had been processed after the agreed date.

Studying the significant factors that cause delay of construction projects in Malaysia, Alaghbari, Kadir, Salim and Ernawati (2007:200) used four categories for analysis, namely contractor, consultant, owner and external. As far as causes related to contractor actions are concerned, financial problems, shortage of materials and poor site management were ranked among the top three. Owner causes included; delayed payments, slow decision-making and contract scope changes. The top three consultant causes were poor supervision, slowness to give instructions and lack of experience.

Faridi and El-Sayegh (2006:1172) studied project delays in the United Arab Emirates and found that the three main causes of project delays were preparation and approval of drawings; inadequate early planning of the project and slowness of owner's decision-making processes. Furthermore Haseeb, Lu, Bibi, Dyian, and Rabbani (2011:41) point out that the most common factors of delay are natural disaster in Pakistan like flood and earthquake. Shebob and Dawood (2011:1005) indicate the delay factors in Libya to low skills of manpower, changes in the scope of the project, slowness in giving instruction, inefficiency of the consultant and the delivery delay construction site for contractor. Kikwasi, (2012:58) corroborating the assertion of previous authors opine causes as: design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done. Similarly the effects of these delays are: time overrun cost overrun, negative social impact, idling resources and disputes. The study also acknowledged others which are: financial and payment problems, improper planning, poor site management, insufficient experience, and shortage of materials and equipment.

Gardezi, Manarvi and Gardezi (2014:196) identified 27 key factors causing time extension, this includes domestic issues of the country is rated as the major factors delaying completion of projects in Pakistan. Khoshgoftar, Bakar and Osman (2010:53) indicate the reasons for the delay in Iranian construction projects include insufficient funding, delay of payment, improper planning by site management, and poor communication and coordination among the parties. As with factors causing cost overruns, multiple factors could have an impact on a single, final cause for time delays. For example, slow decision-making by the client could lead to late design finalisation and subsequent late ordering of materials.

2.3.2.1 Risks in construction projects and delays

Management of construction projects involves a great deal of managing risks. Managing risks involves: planning, identifying, analysing, developing risk handling strategies, monitoring and control. Project team members particularly clients, consultants and contractors should eliminate / mitigate delays when playing their respective roles. Cohen and Palmer (2004:11-15) identify sources of construction risks to include changes in project scope and requirements; design errors and omissions; inadequately defined roles and responsibilities; insufficient skilled staff; force majeure; and new technology.

Time related risks identified by Zou, Zhang and Wang (2006:1) that have influence on project delivery are: tight project schedule, design variations, excessive approval procedures in administrative government departments, variations by the client, incomplete approval and other documents, unsuitable construction program planning and inadequate program scheduling. Aiyetan, Smallwood and Shakantu (2008:19) point out that the three most significant factors that adversely impact construction project delivery time performance are: quality of management during construction; quality of management during design, and design coordination.

2.3.3 Delay mitigation in construction projects

The issue of construction project performance measurement has been an untiring one, especially, among client's representatives, consultant and contractors in the construction industry. This is primarily due to the continuous call for the industry to radically change and improve traditional design and construction processes in order to

mitigate delays in project completion and to enhance value for client's money. Improvement process starts with an objective measurement of project performance. This measurement is required to give an indication of how well an organisation or individual is performing in any given task, project or assignment.

Abdul-Rahman, Yahya, Berawi and Wah (2007:23) study proposes a conceptual based delay mitigation model. The delay mitigation model is designed specifically for use in construction projects and with an intention to deal with major delay factors caused by lack of knowledge and poor management of lessons learned. To ensure an effective project learning process throughout the project period, Abdul-Rahman, *et al*. (2007:23) assert that, the project manager, engineer or experienced personnel should act as a project learning supervisor to ensure all project activities are performed in a knowledge-based manner.

Anumba, Baugh and Khalfan (2002:264) have proposed integrated procurement approach as a way to ensure price certainty of construction projects. This, according to Ling and Khee (2000:139) and Ndekugri and Turner (1994:250) are achievable because, the method provided gives rise to fewer disputes and consequently future cost additions mainly from variations which may have resulted into project delay. Project costs are also managed more effectively in an integrated environment. Anumba, *et al*. (2002:266) also noted that duplication of work and errors resulting from a decision made without due consultation will lead to increased cost. Therefore an integrated product delivery environment will contribute to all the necessary components of the construction process which will lead to waste reduction, cost certainty and cost efficiency.

2.4 OVERVIEW OF EFFECTS OF CLAIMS ON CONSTRUCTION PROJECT

The Canadian Law Dictionary defines 'claim' as an 'assertion of the right to remedy, relief or property'. A claim as a general term is described as the assertion of a right to money, property or a remedy (Powell-Smith & Stephenson, 1993 cited in Kumaraswamy, 1997:96). Construction claims themselves usually arise as assertions for extra money or time. Claims on construction projects can be based on the contract itself, a breach of contract, a breach of some other common law duty, a quasi-contractual assertion for reasonable *(quantum merit)* compensation, or an *ex-gratia* settlement request.

Claims are common in construction projects and can happen as a result of several reasons that can contribute to delaying a project and/or increasing its costs. According to Kumaraswamy (1997:98), some construction claims are unavoidable and in fact necessary, to contractually accommodate unforeseen changes in project conditions or unavoidable changes in client's priorities. While such claims may be settled amicably, the prior presence of unhealthy conflict can trigger degeneration into unnecessary disputes. Such scenarios can in turn generate unnecessary and/or unreasonable claims that further escalate unhealthy conflicts and disputes. Thus Kumaraswamy (1997:98) illustrate the possible relationship between conflicts, claims and disputes in construction scenarios as shown in Figure 2.1. Disputes may arise from different perceptions as to the legitimacy and/or the quantum of the claim. Unhealthy tendencies to exaggerate claims - by contractors who under-price and are seeking quick gains, or who anticipate resistance to any claim can be as damaging as over protective rejection of claims by consultants who are apprehensive of being blamed for poor contract management, or for cost increases (Kumaraswamy, 1997:98).

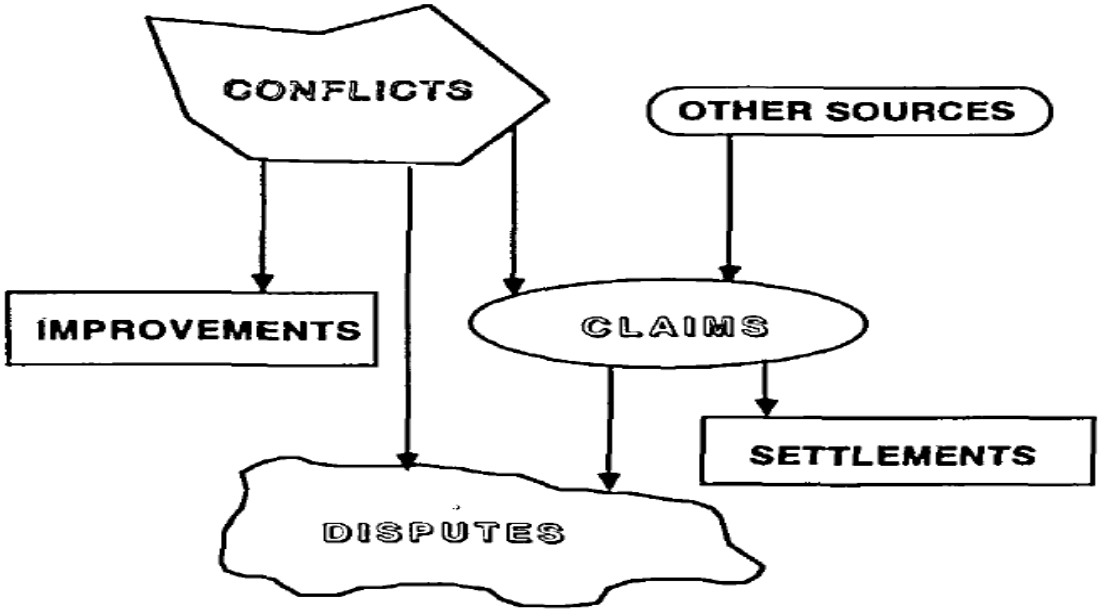

Figure 2.1: Basic relationships between conflicts, claims and disputes and potential outcomes (adapted from Kumaraswamy, 1997:98)

Furthermore, Jaffar, Tharim and Shuib (2011:193) identified conflict factors in construction projects in Malaysia depicting three types of conflict factors emanating from behavioural problems, contractual problems and technical problems. Senaratne and Udawatta (2013:158) in Sri Lanka disclosed intergroup conflicts leading to the disruptive effects upon construction projects and teams to be positive effects when

featuring at low levels. Yogeswaran, Kumaraswamy and Miller (1998: 283) indicated in the study for 67 construction projects in Hong Kong represent of claims in extending the time and claims related to inclement weather. Zaneldin (2006:454-455) summarized the types of construction projects claims in UAE as shown in Table 2.1.

Table 2.1 Ranking of each type of claims based on their frequencies

Types of claims	Importance index (%)	Rank
Changes claims	60.5	1
Extra-work claims	60.2	2
Delay claims	51.1	3
Different site conditions Claims	40.5	4
Acceleration claims	39.1	5
Contract ambiguity claims	32.7	6

Adapted from Zaneldin (2006:455)

2.4.1 Classification of construction claim

A classification of the construction claims encountered in a particular country can be influenced by the claim category heads that are permissible and 'popular' under the prevalent conditions of contract. 'Popularity' of usage of particular claim category heads, while supposedly based on justifiable causes, is also enhanced by the perceived potential of 'success' in obtaining compensation. This is borne out by anecdotal evidence of some claims being shifted from one category that yields only 'extra time' compensation to another which grants both 'time' and 'cost' compensation. However, the general categories and causes of common and significant claims that were observed in Kumaraswamy (1997: 95, 98) investigations in Hong Kong, were similar to observations in other countries reported by notable authors; such as Semple, Hartman and Jergeas (1994:785) in Canada, Rhys and Jones (1994:28) in the UK, Watts and Scrivener (1992:31-32) in Australia and Diekmann and Nelson (1985:74) in the USA.

Kumaraswamy (1997:99) study on claims in construction projects in Hong Kong examined the cost and time extension claims. In Kumaraswamy (1997:99) cost claims in a project were added together and the total value reflected as a percentage of the

original contract value (OCV). This standardization used by Kumaraswamy (1997: 99) was to facilitate comparisons of the relative magnitudes of grouped claims in a given category, in relation to contract values, rather than in terms of absolute values which may not indicate the relative impacts on the projects. A similar procedure was followed in combining and comparing the values of all 'paid out' (settled) cost claims in respect of each category and in each project. Similarly, all time claims (both made and granted) in a given category were aggregated for each project and shown as a percentage of the original contract period (OCP) (Kumaraswamy, 1997:100).

Zaneldin (2006:454) classified the types of claims in construction projects in the UAE into six main types: (1) contract ambiguity claims; (2) delay claims; (3) acceleration claims; (4) changes claims; (5) extra-work claims; and (6) different site condition claims. Zaneldin (2006:455) asserts that changes claims are the most frequent type of claims, Extra-work claims were ranked second while contract ambiguity claims were ranked last.

2.4.1.1 Extension of time claims

Projects are classically defined by the need to complete a task on time, to budget, and with appropriate technical performance/quality (Williams, 2003:19). In recent decades, projects have tended to become more time-constrained (Williams, 2003:19) and the ability to deliver a project quickly is becoming an increasingly important element in winning a bid. There is an increasing emphasis on tight contracts, using the prime contractor-ship to pass the time-risk onto the contractor, frequently with heavy liquidated damages (LDs) for lateness. Thus, it is becoming more important for a contractor, when faced with delays caused by the client, to ensure suitable claims is made for ‘‘Extension of Time’’ (EOT) to the contract finish-date, otherwise the contractor will find himself subject to LDs for reasons within the client’s control (Williams, 2003:20). In reference to USA case law, Cushman, Hoolyday, Coppi, and Fertitta, (1996:1-3) express that in a construction contract, time is not generally of the essence unless it is specifically and expressly provided, and a contractor’s failure to complete the work in accordance with the time requirements of the contract does not entitle the owner to terminate the contract or excuse non-payment, but it may expose the contractor to liability for delay damages.

2.4.2 Management and avoidability of claims on construction projects

Management of construction claims by Construction Managers, and Quantity Surveyors should focus not merely on the cost and time extension claims, but also on the avoidable ones, so as to minimize the damaging effects on a given project. Thus the 'claims management focus' (M) required on a given claims category can be said to be dependent on the significance (S) and the avoidability (A), i.e. M= f (S, A) (Kumaraswamy, 1997:102). However, to avoid arbitrary estimates of 'avoidabilities', it was felt necessary to identify the causes underlying different claims categories, on the premise that if the causes are identified, their controllability's and hence avoidabilities can be assessed more realistically. Difficulties in such identifications arose from most claims being generated from overlapping causes and/or cumulative cause-effect cycles. Jergeas and Hartman (1994:555) study on construction claims suggest as general guidelines: good record-keeping in case of a claim. Although in the complex situations of interacting effect contractors do not always know in advance what records to keep, knowledge of the contract, preservation of rights by filing notice of potential claims (for anything different from anticipated, congestion, owner-supplied equipment late, requirement to stop or accelerate. Semple, *et al*., (1994:785) gives the results of a pilot study of 24 construction companies in Canada, describing the amounts of claims and delays, and the main causes claimed.

However, EOT claims do happen, and they are often very difficult to prepare, both conceptually and practically. Scott (1993:143) describes a (UK) survey, and says that Claims for EOT appear on the majority of major civil-engineering contracts, although acceleration claims occur much-less frequently. Nonetheless, Arditi and Patel (1989:144) opine that any time-related claim situation needs to be resolved with regard to three basic elements of time impact; causation, liability and damages.

2.4.3 Causes of claims

An appraisal of the root causes of construction claims in a study by Kumaraswamy (1997:104) reveals the controllability of all causes of claims with exception of causes related to uncontrollable external events. Apart from the repercussions of this particular root cause, for example leading to changes by the client, it appears that almost all the proximate causes are also controllable to a certain extent. Of course it is unlikely that all potential causes can be adequately controlled simultaneously, given the multiple

interacting subsystems and variables in any project. The author noted a certain degree of agreement as to common claims categories. If there was no such disagreement, disputes would undoubtedly be fewer (Kumaraswamy, 1997:105).

Rowlinson and Yates (2003:854) note that gaps due to incomplete contract that characterised construction contract that needed to be filled during the construction phase is a major causes of claims. Therefore, client's requirements with regard to these issues frequently disrupt/delay the contractor's programme and impact upon the contractor's costs, giving rise to claims for extensions of time for completion and for additional payment. These claims are frequently rebutted by the client, on the grounds that they are excessive and unreasonable, which leads to conflict and disputes between the parties (Rowlinson, & Yates, 2003:854).

2.5 OVERVIEW OF DISPUTES IN CONSTRUCTION PROJECT

Many construction disputes are linked to claims or potential claims, although disputes can also arise directly from unresolved conflicts, as indicated in Fig. 2.1. For example, disputes as to the location or usage of certain site facilities may result from personality clashes between consultants' and contractors' representatives. Such unhealthy conflict and debilitating disputes can of course trigger further misunderstandings, and can lead to more claims and further disputes (Kumaraswamy, 1997:106).

According to Kumaraswamy (1997:106) dispute has a varying definition in different construction related documents. However, this study targeted the expanding dispute resolution and alternative dispute resolution in construction. However, it is necessary to note the perceptible shift towards dispute avoidance and minimization strategies, through techniques such as partnering. This perceived preference to avoid the avoidable disputes and minimize the intensity and impact of unavoidable or avoided disputes is a logical response to the high costs of resolving disputes that have affected construction industries in most countries. The Latham Report in the UK, for example, called for a reversal of the adversarial relationships and practices that dominated the industry, and for a replacement of these with team-working, collaborative working and partnership among the multiple participants on a construction project.

Every site is unique and is never the same as others, the nature of construction activities is varying and dynamic. Thus the preparation of the construction contract can be recognized as the formulation of risk allocation amongst the involving parties: the

client, the contractor, and the consultant. The risks involved include unforeseen ground conditions, site instructions, variation orders, the time of completion, the final cost, the quality of the works, client-initiated changes, engineer-initiated changes, errors and omissions in drawings, mistakes in specifications, inflation, inclement weather, delayed payment, changes in regulations, third-party interference, professional negligence, shortage of materials, shortage of plants, labour problems, defects in works, accidents, supplier delivery failure, delay of schedule by subcontractor, poor workmanship, and so forth (Chau, 2007:643).

The usual practice is that the involving parties will attempt to sort out the conditions of claims and disputes in the contract documents, well before the actual construction commences. However, since a project usually involves thousands of separate pieces of work items to be integrated together to constitute a complete functioning structure, the potential for honest misunderstanding is extremely high. In Hong Kong, the current setting of the dispute resolution is such that the processes of mediation, arbitration, and the courts should be followed successively (Chau, 1992:390)

2.5.1 Causes of dispute in construction contract

Conflict and dispute are seen as pathological state whose cause and treatment are worth studying. Brandt and Murphy (2000:128) note that, opportunities for conflict abound from different expectations of project participants, contractual complexities and unfair contracts, fragmented procurement systems, design changes, uncertainty, bids errors, community concerns, supply problems, site conditions, adverse weather, subcontractor problems, financial problems, etc. What then is the causes of disputes which the construction industry's actors might seek to avoid or forestall. Rowlinson and Yates (2003:854), posit that the major cause of conflict and disputes is the fact that construction contracts are incomplete contracts. Rowlinson and Yates (2003:854) made this assertion on the premise that, the true extents of the parties' obligations are not fully detailed, at the outset, in the contract documents which in most cases important details towards achieving critical requirements of client's are always left out. However, an attempt to achieve the client's requirements with regard to these issues frequently disrupt/delay the contractor's programme and impact upon the contractor's costs, giving rise to claims that are frequently been rebutted by clients (Rowlinson & Yates, 2003:854). Rowlinson and Yates (2003:854) state further that the hybrid model of

traditional lump sum procurement, used for construction project falls into the category of an incomplete contract. Hence summarising the causes of conflict and disputes as; (1) changed requirements due to the late completion of the design of the architectural and structural elements of the project, (2) late design of the M & E services frequently lead to coordination problems/clashes of the building services with the structure and architectural finishes; and (3) extensive variations emanating from late finalization of the client's requirements (Rowlinson & Yates, 2003:854).

The literature offers much theorizing about the causes of disputes. However, it seems that little empirical evidence has been structured to justify the theories presented. Conlin, Langford and Kennedy (1996:215) differentiate between research that seeks to establish the magnitude of disputes (a top-down approach), and research that seeks to examine disputes at a detailed level (a bottom-up approach). Either way, the result is a list of events or triggers which show some correlation with the occurrence of the dispute. Analysing construction projects *post factum* is difficult: did, for instance, a given dispute arises because one party was `unreasonable' or because of differing interpretations, both of which were reasonable in any single project, different reasons for a particular dispute may be advanced, depending on who is asked. Is the issue a single dispute or are confronted with two or more separate disputes? Is there both an unreasonable party and a variation? To cloud the issue further, could it be that the issue is one dispute with two causes?

The literature on sources of disputes demonstrates the problem of terminology and causation. An examination of each piece of research shows that conditions of contract, in one guise or another appear in each analysis. This confirms the work of Clegg (1992:138) who, from a sociologist's perspective, argued that contracts cause conflicts. This might intuitively be taken further: some contracts could cause more conflict than others. Fenn, Lowe and Speck (1997:515) work give a summarised classification of sources and disputes in construction projects as provided in Table 2.2. An opportunity exists to test this because, in the UK, companies and professionals often work in two sectors: construction and chemical processing. These two sectors are in many ways similar: they share features often held to be unique. These features are the physical nature of the product; the structure of the industry; the determinants of demand, and the method of price production. The chemical process industry often uses standard forms drawn up within the construction industry, but it also has its own forms, different from those of the construction industry.

According to Fenn, *et al*. (1997:517) the study of construction industry disputes, and the causes of those disputes is essential. In fact, it would seem that effective management action can be taken only if based on reliable evidence. It may be worth noting that, while the adjudicative techniques used for dispute resolution are based on firm rules and laws of evidence, the debate that surrounds construction industry disputes seems to require no such evidence. Fenn, *et al*. (1997:517) state that a party to a contract making claims for delay or expense or both is expected to prove its case. Commentators and researchers on construction disputes and conflict must expect to do the same.

Table 2.2 Summarised sources of disputes in construction projects

Sources of Dispute	**Authors**
Six areas: unrealistic expectations; contract documents; communications; lack of team spirit; and changes	Bristow and Vasilopoulous (1995)
Six areas: payment; performance; delay; negligence; quality; and administration	Conlin *et al*. (1996)
Three areas: people; process; and product	Diekmann *et al*. (1994)
Seven areas: contract terms; payment; variations; time; nomination; renomination; and information	Heath *et al*. (1994)
Six areas: change of scope; change conditions; delay; disruption; acceleration; and termination	Hewit (1991)
Two areas: root causes; and proximate causes	Kumaraswamy (1996)
10 areas: management; culture; communications; design; economics; tendering pressures; law; unrealistic expectations; contracts; and workmanship	Rhys Jones (1994)
Four areas: acceleration; access; weather; and changes	Semple *et al*. (1994)
Two areas: misunderstandings; and unpredictability	Sykes (1996)

Adapted from Fenn, Lowe and Speck (1997:515)

Assah-Kissiedu, Fugar, and Badu (2010:24) study identifies the factors that cause disputes within the Ghanaian construction industry and their relative importance from the perspectives of clients, consultants and contractors. However, Assah-Kissiedu, *et al*., (2010:24) reveal ten most important triggers of construction disputes in the Ghanaian construction industry from three categories of respondents as: (1) poor financial arrangements by clients leading to late payments; (2) failure of the client to honour payments as and when due; (3) unclear and incomplete description of items in the bills of quantities; (4) ineffective communication between the parties on the project; (5) contractor's failure to read the contract documents; (6) design and specification oversights; (7) award of contractors to incapable contractors; (8) contractors' failure to

price properly for the works; (8) disruptions and delays by the contractor that create deviation from initial programme of works; and (10) government policy, which encourages low evaluated tenders followed by claims.

2.5.2 Stakeholder perception to disputes in construction projects

People differ in their ways of thinking. Cultural background and other social variables affect the way individuals and groups perceive themselves, their behaviour, and the stimuli in their environment. If there were only one perspective, then there would be no conflict. However, people see themselves and their situation very differently from their opponents (Crawley, 1998). People adhere desperately to their version of events, they see and believe only what they want (Awakul & Ogunlana, 2002:366). Opposition to a development project often has its roots in concerns about the effects of a project on community life or ways of life, on people's relations with one another, and on how residents perceive and feel about their communities and project-related changes.

According to Ariyaratne (1986:369), development must evolve from the hearts and minds of the people. Neither government nor people can achieve the objective alone. Success depends on the formation of an effective partnership between the two that enables the people to express their opinion in the development process. When people feel that their needs are not being met through a development project, or their views are not receiving adequate attention, they develop negative attitudes that lead to conflict. Study by Awakul and Ogunlana (2002:374) reveal that the five groups have differences in attitude towards the factors leading to the interface conflicts encountered in the project, and it is the differences in attitude that were responsible for the conflicts experienced on the project. The study concludes that there is a wide gap in attitude between the project participants on the one hand and the NGOs and affected people on the other was responsible for the disputes experienced on the project (Awakul & Ogunlana, 2002:375).

Project conflicts were also described as a spiral between various parties in a design and construction project, as illustrated by how conflicts in design and construction projects arise and escalate. According to Ng, Peña-Mora and Tamaki (2007:53), an adversarial attitude is reflected in antagonistic relationships, 'win-lose' attitudes and general dissension, which often results to tendency to postpone the resolution of many disputes, especially those disputes involving money, until after construction is complete.

Unresolved problems that hold up payments create uncertainty as to the outcome and endanger of even more adversarial relationships, which cause delays and disruptions to the project. These delays and disruption adversely affect not only the project completion time. They cause added costs to the project participants, which in turn breeds new claims and disputes in an ever-increasing spiral of conflict (Ng, *et al*., 2007:53).

2.5.3 Dispute resolution strategies

The commonly used dispute resolution strategies in construction project have been identified to include negotiation, mediation, arbitration, and litigation (Merna & Bower, 1997:75). These can be further categorized under two general headings: adjudicative, like arbitration and litigation, and non-adjudicative, like negotiation and mediation. Although Cheung and Suen (2002:562) note that the alternative dispute resolution (ADR) process, including negotiation, mediation and others, has existed for some time, its current popularity is the result of the vigorous promotion of alternative dispute resolution by its proponents. Negotiation is the most common form of dispute resolution.

A survey conducted on the most common forms of dispute resolution adopted in the construction industry shows that more than 69% of respondents found negotiation to be the preferred method (Tam, 1998:105). The dispute resolution advisor (DRA) involves a hybrid process in which elements of negotiation, mediation and arbitration are included. In DRA, a neutral third party known as a dispute advisor (DA) is appointed to identify potential disputes, advise on the means of settlement of disputes, and assists in the resolution of disputes (Bateson, 1997:243). The system has been highly regarded by practitioners and researchers, including Tsin (1997:67), Cheung (1998:370) and Wall (1998:335). With the help of the same group of experts, dispute resolution strategies commonly used in the construction industry are negotiation, mediation, arbitration, litigation and Dispute Resolution Advisor (DRA). A brief definition of each dispute resolution strategy is provided as follows:

Negotiation: is the most common form of dispute resolution. It forms an important part of everyday life, not only for lawyers, but also for all people. It is an informal, speedy, and economical way of resolving disputes that are not complex in nature. Due to its simplicity, negotiation is often used by the parties as the first option before considering

other means of dispute resolution. A survey on the most common forms of dispute resolution for the construction industry reported that more than 70% of disputes are resolved by negotiation (Tam, 1998:105).

Mediation: is a voluntary, non-binding process in which a neutral party, known as a mediator, helps to guide the parties towards a mutually beneficial resolution. The mediator plays a facultative role in the resolution process by assisting the parties to decide for themselves whether to settle and on what terms.

Arbitration: is a procedure for the settlement of disputes under which the disputants agree to be bound by the decision of an arbitrator whose decision is final and enforced by the law.

Litigation: is the formal dispute resolution process in which the issues are pleaded and argued before and adjudicated by a judge in the court, whose decision is binding.

Dispute resolution advisor: is a non-binding hybrid ADR process in which a neutral third party known as a dispute advisor (DA) is appointed from the commencement of a contract to identify potential disputes, advise on the means of settlement, and assist in the resolution of disputes. The system is regarded as hybrid because it combines elements of negotiation, mediation, partnering, mini-trial and arbitration.

However, resolving construction disputes is a difficult task, especially when the available resources are limited and the dispute is of a complex nature. Systematic selection of a dispute resolution strategy is critical to dispute management.

2.6 CONTRACTUAL ARRANGEMENTS IN CONSTRUCTION PROJECTS

Construction and civil engineering projects are exceptionally complex, both in design and in implementation. The increasing complexity of buildings has brought about the development of management techniques in an effort to avoid some of the disruptions that may occur in the traditional contractual arrangement. According to Shohet and Frydman (2003:571), the three procurement protocols most frequently used in construction projects are:

2.6.1 Traditional procurement

The traditional procurement arrangement involves three main participants: Owner, design team, and general contractor. In this procurement protocol, the owner has a direct contractual relationship with most of the participants. In small, simple projects,

the traditional arrangement saves management resources. In complex building projects, however, longer procurement times are required and coordination deficiencies are suffered as a result.

2.6.2 Design-build contracts

According to this procurement protocol, the general contractor undertakes full or partial responsibility for the design and construction stages. This contractual arrangement differs from the traditional arrangement in the single line of responsibility that exists between the owner and the contractor. The principal advantages of this procurement scheme, from the owner's point of view, are the elimination of any claims by the contractor due to inadequate design or specifications, and the ability to begin construction of each separate phase of the project as soon as its design is completed, without having to wait for the completion of the overall project design. Fast-track construction was developed within the framework of the design-build procurement method; and

2.6.3 Construction management

The increasing complexity of projects has led to the development of the construction management procurement protocol, in which there is no main contractor interposed between the owner and the various specialist subcontractors. The construction manager becomes the principal consultant coordinating the entire procurement process, from the conceptual design through the commissioning of the project. Construction management firms do not perform any design or construction activities of their own, but rather act as the owner's representative, controlling and managing the flow of information during the life cycle of the project.

2.7 Chapter summary

In this chapter, previous researches on issues around contractual claims, delays and dispute have been exhaustively reviewed. The review present insight into the nature of the South Africa construction industry. Also, discussions on the subject of the research were presented under the following headings; cost overrun and time delay in construction project delivery, effects of claims on a construction project, disputes in the construction project and contractual arrangements in construction projects. However,

the literature have shown that; South Africa construction industry is faced with the challenges of; poor time management, which could lead to delays and attendant delay claims to the client, and cost overrun in the project, client dissatisfaction, rework and defects. Also, the fragmented nature of construction industry largely responsible for contractual claim and makes implementation of construction projects prone to contractual claims disputes. On cost overruns, the most significant factor causing cost overruns due to client action is additional work or changes to work. From a contractor's perspective the most significant contributor to cost overruns is time delays, while external factors showed material price changes as the most significant factor, other common factors among contractors, consultants and clients were; poor estimates and material take-off and delay in payments.

Claims are common in construction projects and can happen as a result of several reasons that can contribute to delaying a project and/or increasing its costs. To this end, unforeseen ground conditions, site instructions, variation orders, the time of completion, the final cost, the quality of the works, client-initiated changes, engineer-initiated changes, errors and omissions in drawings, mistakes in specifications, inflation, inclement weather, delayed payment, changes in regulations, third-party interference, professional negligence, shortage of materials, shortage of plants, labour problems, defects in works, accidents, supplier delivery failure, delay of schedule by subcontractor, poor workmanship are identified as the causes of contractual claim in construction contract, Therefore, the findings from literatures were used in the development of the survey questionnaire for the study.

CHAPTER THREE

RESEARCH METHODOLOGY AND METHODS

3.1 INTRODUCTION

The previous chapter purposely reviewed existing literature in conformity with the research objectives towards achieving the goal of the study. Dahlberg and McCaig (2010:64) noted methodology section as an extension of aim and objectives of a research that clearly states the details on the approach to undertaking a research. The research instruments are designed to achieve research objectives to proffer answers to research questions enumerated in chapter one of the study. This chapter combines both research methodology and research method adopted for this study. Hence, the chapter describes the various research approaches, the research design, the sampling techniques, procedures for data collection, techniques adopted for data analysis and ultimately testing the validity and reliability of research instruments.

3.2 RESEARCH PHILOSOPHY

3.2.1 Epistemological considerations

An epistemological issue concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline. A particularly central issue in this context is the question of whether the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences. The position that affirms the importance of imitating the natural sciences is invariably associated with an epistemological position known as positivism (Fellows & Liu, 2008: 75; Creswell, 2009:115; Bryman, 2012:29).

3.2.1.1 Positivism

The doctrine of positivism is extremely difficult to pin down and therefore to outline in a precise manner, because it is used in a number of different ways by authors. Neuman (1997:516) noted positivism as a research paradigm or framework that involves a deductive approach with an accurate measurement of quantitative data that allow the discovery and confirmation of casual laws to permit prediction of human behaviour. The approach is based on knowledge acquired through the scientific method or

experimental testing. Bryman (2012:29) noted a fairly sharp distinction between theory and research. Bryman (2012:29) stressed that the role of positivist researcher is to test theories and to provide material for the development of laws. But either of these connections between theory and research carries with it the implication that it is possible to collect observations in a manner that is not influenced by pre-existing theories. Moreover, theoretical terms that are not directly amenable to observation are not considered genuinely scientific; they must be susceptible to the rigours of observation. All this carries with it the implication of greater epistemological status being given to observation than to theory.

However, philosophers of science and social sciences differ quite sharply over how best to characterise scientific practice, and since the early 1960s, there has been a drift away from viewing it in positivist terms. Thus, when writers complain about the limitations of positivism, it is not entirely clear whether they mean the philosophical term or a scientific approach more generally. Bryman (2012:30) describes positivism is an epistemological position that advocates the application of the methods of the natural sciences to the study of social reality and beyond. The term stretches beyond this principle, though the constituent elements vary between authors. However, positivism is taken to entail the following principles:

- The principle of phenomenalism: phenomena and knowledge confirmed by the senses can genuinely be warranted as knowledge;
- The principle of deductivism: the purpose of theory to generate hypotheses that can be tested and that will thereby allow explanations of laws to be assessed;
- The principle of inductivism: knowledge is arrived at through the gathering of facts that provide the basis for laws;
- Objective: science must (and presumably can) be conducted in a way that is value free, and
- There is a clear distinction between scientific statements and normative statements and a belief that the former are the true domain of the scientist. This last principle is implied by the first because the truth or otherwise of normative statements cannot be confirmed by the senses.

Summarily, Kumar (2011:140) advocated that positivist research paradigm mostly involves a quantitative approach rather than qualitative. However, Struwig and Stead (2007:165) argued that every feature of quantitative research should not be attributed to positivism.

3.2.1.2 Interpretivism

According to Bryman (2012:30), interpretivism is a term given to a contrasting epistemology to positivism. Interpretivism is a term that usually denotes an alternative to the positivist orthodoxy that has held sway for decades. Interpretivism is predicated upon the view that a strategy is required that respects the differences between people and the objects of the natural sciences and therefore requires the social scientist to grasp the subjective meaning of social action.

The term interpretivism subsumes the views of writers who have been critical of the application of the scientific model to the study of the social world and who have been influenced by different intellectual traditions. Hence Interpretivist philosophical idea is directed towards allowing study participants to present information with own words (Henn, Weinstein & Foard, 2006:14). Interpretivism believes that, the study of phenomena in the natural environment is paramount to its philosophy, and scientist therefore cannot prevent affecting the phenomenon being studied. Interpretivism deals with subjective interpretation and involvement in reality by allowing the reality to be completely understood. The fundamental idea of Interpretivist research paradigm is to work with subjective meaning already in the social world by acknowledging its existence, reconstruct the meaning, avoid distortion, understand the meaning and incorporate in building block for theorising (Goldkuhl, 2012:5).

3.2.2 Ontological considerations

Ontology is concerned with the nature of social entities. The central point of orientation in ontology is the question of whether social entities can and should be considered objective entities that have a reality external to social actors, or whether they can and should be considered social constructions built up from the perceptions and actions of social actors. Ontological consideration is categorised into two common and central positions in social science research. These positions are frequently referred to respectively as objectivism and constructionism (Bryman, 2012:32).

3.2.2.1 Objectivism

Objectivism is an ontological position that implies that social phenomena confront us as external facts that are beyond our reach or influence. Bryman (2012:34) asserts objectivism as an ontological position that asserts that social phenomena and their

meanings have an existence that is independent of social actors. It implies that social phenomena and the categories that we use in everyday discourse have an existence that is independent or separate from actors. Discussing this from an organisation, organisation has rules and regulations; it adopts standardized procedures for getting things done, people are appointed to different jobs within a division of labour. There is a hierarchy and it has a mission statement, etc. The degree to which these features exist from organisation to organisation varies, but in objectivist thinking, we are tending to the view that an organisation has a reality that is external to the individuals who inhabit it. Moreover, the organisation represents a social order in that it exerts pressure on individuals to conform to the requirements of the organisation. The organisation is therefore a constraining force that acts on and inhibits its members. It has the characteristics of an object and hence having an objective reality.

3.2.2.2 Constructionism

Constructionism is an ontological position (also referred to as constructivism) that asserts that social phenomenon and their meanings are continually being accomplished by social actors. It implies that social phenomena and categories are not only produced through social interaction, but that they are in a constant state of revision (Bryman, 2012:33). In recent years, the term has also come to include the notion that researchers' own accounts of the social world are constructions. In other words, the researcher always presents a specific version of social reality, rather than one that can be regarded as definitive. The sense of constructionism is usually allied to the ontological position. Increasingly, the notion of constructionism in relation to the nature of knowledge of the social world is being incorporated into notions of constructionism.

3.3 RESEARCH METHODOLOGY

Methodology is the principles of the methods by which research can be carried out which lies at the heart of the research. The research methodology is defined as all-encompassing frameworks that offer principle of reasoning associated with paradigmatic assumptions that validate various schools of research (Fellows & Liu, 2008:48; O'leary, 2010:88). Research methodology offers both strategies and grounding for conducting a study. Hall and Hall (1996:29) stated that the philosophy and the general principle for conducting research are termed research methodology. It

is vital that the methodology gives careful consideration at the outset of the research so that the most suitable approaches and research methods are adopted

3.3.1 Quantitative research method

Quantitative research can be construed as a research strategy that emphasizes quantification in the collection and analysis of data. Quantitative approaches tend to relate to positivism and seek to gather factual data, to study relationships between facts and how such facts and relationships accord with theories and the findings of any research executed previously (Fellows & Liu, 2008:27). In quantitative research approach, scientific techniques are used to obtain measurements – quantified data. Analyses of the data yield quantified results and conclusions derived from evaluation of the results in the light of the theory and literature (Fellows & Liu, 2008:27). The quantitative methodological approach allows researchers to be away from the researcher's object of study and promotes scientific objectivity. This allows significant indicator of credibility, such as validity, reliability, generalizability, and reproducibility. This method is usually considered as an objective positivist search with large scale, but without much depth (O'leary, 2010:105). The development process of quantitative research method is required to present respondents with clear questions that can answer the research objectives (Dahlberg & McCaig, 2010:159). Moreover, Bryman (2012:36) opine that quantitative research:

- Entails a deductive approach to the relationship between theory and research, in which the accent is placed on the testing of theories,
- Incorporate the practices and norms of the natural scientific model and of positivism in particular, and
- Embodies a view of social reality as an external, objective reality.

The description of this research strategy as 'quantitative research' should not be taken to mean that quantification of aspects of social life. The very fact that it has a distinctive epistemological and ontological position suggests that there is a good deal more to it than the mere presence of numbers. Figure 3.1 outlines the main steps in quantitative research.

Figure 3.1 The process of quantitative research.

The fact that Figure 3.1 starts off with theory signifies a broadly deductive approach to the relationship between theory and research is possible in quantitative research. It is common for outlines of the main steps of quantitative research to suggest that a hypothesis is deduced from the theory and is tested. This is the notion denoted into Figure 3.1. However, a great deal of quantitative research does not entail the specification of a hypothesis, and instead theory acts loosely as a set of concerns in relation to which the social researcher collects data. The specification of hypotheses to be tested is particularly likely to be found in experimental research. Other research designs sometimes entail the testing of hypotheses.

The step-3 entails the selection of a research design, though this will be explored in detailed in subsequent sections. As we have seen, the selection of research design has implications for a variety of issues, such as the external validity of findings and researchers' ability to impute causality to their findings. Step 4 entails devising measures of the concepts in which the researcher is interested. This process is often referred to as operationalization, a term that originally derives from physics to refer to the operations by which a concept (such as temperature or velocity) is measured (Bridgman 1927 cited in Bryman, 2012:162).

Step 4 and 5 entail the selection of research subjects/respondents. In experimental research, researchers tend to call the people on whom they conduct research 'subjects', whereas social survey researchers typically they are referred to as 'respondents'. Thus, in social survey research an investigator must first be concerned to establish an appropriate setting for his or her research.

3.3.1.1 Advantages of quantitative research method

- The result has a high degree of generalisation.
- Quantitative approach allows the study of a large number of cases for certain aspect in a relatively short time.
- The design of quantitative research is specific, well-structured and can be clearly defined and recognised
- Quantitative approach has better clarity and distinction between design and method of data collection.

3.3.1.2 Disadvantages of quantitative research method

- The aspects of research studied are not necessarily the relevant aspect of the participants.
- The distance between the researcher and the study population is comparatively wide.
- Respondents may interpret questions differently from each other.

3.3.2 Qualitative research method

Qualitative approaches seek to gain insights and to understand people's perceptions of 'the world' as individuals or groups. In qualitative research, the beliefs, understandings, opinions, views, etc. of people are investigated, the data gathered may be unstructured, at least in their 'raw' form, but tend to be detailed, and hence 'rich' in content and scope (Fellows & Liu, 2007:27). Consequently, Fellows and Liu (2007:27) noted that the objectivity of qualitative data is often questioned, especially by researchers with a background in the scientific, quantitative, positivist tradition. Analyses of such data tend to be considerably more difficult than with quantitative data, often requiring a lot of filtering, sorting and other 'manipulations' to make them suitable for analytic techniques.

Analytic techniques for qualitative data may be highly laborious, involving transcribing interviews etc. and analysing the content of conversations. Clearly, a variety of external, environmental variables are likely to impact on the data and results and the researchers are likely to be intimately involved in all stages of the work in a more active way than usually is acceptable in quantitative studies.

3.3.2.1 Advantages of qualitative research method

- It allows for detailed and exact analysis of a few cases in which participants have much more freedom to determine issues that are relevant in the context.
- The main strength of qualitative research is the ability to study phenomena which is not available elsewhere.

3.4.2.2 Disadvantages of qualitative research method

- The analysis usually requires much time and the results are not broadly generalizable.

- The design of qualitative research is less specific, and do not have a consistent structural depth.

3.3.3 Mixed methods research

Mixed Methods research (also called Triangulated studies) employs two or more research techniques, qualitative and quantitative approaches to reduce or eliminate disadvantages of each individual approach whilst gaining the advantages of each, and of the combination in a multi-dimensional view of the subject, gained through the synergy that exist between the methods (Fellows & Liu, 2008:28). In a research study, both qualitative and quantitative approaches may adopt common research styles to work together with the (consequent) nature of the data collected and analytic techniques employed which determine whether the study may be classified as qualitative or quantitative. Thus, triangulation is used for studies by investigating the topic from several, alternative paradigms or/and research methodologies. It is also used for individual part(s) of a study, such as collecting quality performance data from archival records of defects, questionnaires administered to project participants, and results of participant observation. The Mixed research approach reduces the impact of personal bias and maximise validity in research (Henn, Weinstein & Foard, 2006:3). Jick (1979) cited in the Fellows and Liu (2008:28), notes that methodology triangulation enhances a study's external validity whilst within methodology triangulation seeks to enhance internal validity and reliability.

Whatever approach, style or category of research is adopted, it is important that the validity and applicability of results and conclusions are appreciated and understood. In particular, it is useful to be demonstrably aware of the limitations of the research and of the results and conclusions drawn from it. Such limitations, etc. are occasioned by various facets of the work – sampling, methods of collecting data, techniques of analysis – as well as the, perhaps more obvious, restrictions of time, money and other constraints imposed by the resources available. Hence, it is very helpful to consider the constraints, methods, etc. at an early stage in the work to ensure that the best use is made of what is available. In addition, Silverman (2006:68); Teddlie and Tashakkori (2009:85) summarised the fundamental purposes of combining both quantitative and qualitative approach as follows;

- Using qualitative research to explore a particular topic in order to set up a quantitative study.
- Initiation a study with quantitative approach purposely to establish a sample of respondents. Qualitative research can later be used to explore the in-depth of the key issue.
- Engaging a qualitative study that uses quantitative data to locate the result in a broader perspective.

3.4 RESEARCH DESIGN

In determining the most appropriate approach to adopt for a research, significant emphasis must be on the logic that links the data collection and analysis to yield results, thence, conclusions, to the main research question being investigated. The main priority is to ensure that the research maximises the chance of realising its objectives. Therefore, the research design must take into account the research questions, determine what data are required, and how the data are to be analysed (Fellows & Liu, 2008:21). Research methods can be quantitative or qualitative or a combination of both in a single study. According to Teddlie and Tashakkori (2009:67) a qualitative research is regarded as an organisational behaviour or social research, which generates results that cannot be obtained through statistical procedures or other methods of quantification. On the other hand, Creswell (2009:95) viewed quantitative research as a way of testing objective theories by assessing the association among variables. Integration of these two methods is thus regarded as mixed methods. This study involves the examination of effects of construction claims on successful delivery of construction projects to develop an operational framework to evaluate construction delay and dispute related claims. Hence it requires a robust research design to unravel the significance of these on construction projects delivery.

A research design as asserted by Saunders, Lewis and Thornhill (2009:121), is a general plan or blueprint on how a research will be conducted to provide answers to the earlier set research questions in a study. Therefore, this current research is empirical in nature and as such is hinged on observations and analysis of data as against the testing of theories. Kumar (2011:94) maintains that research design provides adequate information on the following questions:

- Who will constitute the study population?
- How will the study population be identified?
- Will a sample or the whole population be selected?
- If a sample is selected, how will it be contacted?
- How will consent be sought?
- What method of data collection will be used and why?
- In the case of the questionnaire, where will the responses be returned?
- How should respondents contact researcher in case of queries?
- In the case of the interview, where will they be conducted?
- How will ethical issue be taken care of?

However, Silverman (2006:275) contend that rather than adopting the most attractive research approach, research design should involve a careful thought of appropriate research approach capable of providing answers to research questions in a valid, objective, accurate and economical method. For example, the study involves developing an operational framework for evaluation of construction claims in construction projects. However, there is diversity in the adoption of a research approach to every study. Although the selection of a particular approach largely depends on the nature of the research topic, researcher experience, location of the study and the study participants. Many applied methods identified in literature have been used to measure and evaluate contractual claims, but cconsidering the pros and cons of qualitative and quantitative research approaches, this study use quantitative research approach, since this approach will enhance optimal and effective data gathering.

3.4.1 The Study Population

A study population, according to Bryman (2012:187) is the universe of units from which a sample is selected. The term units are used because it is not necessarily people who are being sampled, the researcher may want to sample from a universe of nations, cities, regions, firms, etc. Bryman (2012:187) citing the study of Flinch and Hayes (1994:425), shows that, the study is based upon a random sample of wills. Their population, therefore, was a population of wills. Thus, population has a much broader meaning than the everyday use of the term, whereby it tends to be associated with a nation's entire population. O'leary, (2010:161) defines population as the total

membership of a defined class, objects or events. For the purpose of this research, therefore, the population for the study is professionals who are working in Contracting and Consultancy Firms in the South African construction industry.

The population covers the Quantity Surveyors and Construction/Project Managers who undertake construction project in Western Cape Province of South Africa. Consequent upon this, the sampled population comprised a list of registered Quantity Surveyors practicing in Western Cape, which is provided on the register of professional in South Africa. In addition, the population for Construction/Project Managers were those construction firms contained in the Construction Industry Development Board (CIDB) contractors register that are on CIDB Grade Level 3-9. Flicks (2011:71) opine that the sample of a study should be a minimised representation of the population in term of heterogeneity of the elements and representativeness of the variables. Nonetheless, O'leary (2010:164) added that the larger the sample in a quantitative research, the better it is represented and therefore generalisable.

The sample frames for the study are randomly selected within the list of the aforementioned professionals practicing in Western Cape Province of South Africa. The majority of survey participants is construction professionals with vast construction skills and formal educational background. Site managers, contract managers, project managers, and quantity surveyors are the sample frame selected to represent construction professionals for the purpose of this study.

3.4.2 Sampling

Bryman (2012:187) categorises sampling techniques into two major groups: Probability or representative sampling and non- probability or judgmental sampling. Bryman (2012:187) defined probability sample as a sample selected using random selection so that each unit in the population has a known chance of being selected. It is generally assumed that a representative sample is more likely to be the outcome when this method of selection from the population is employed. The aim of probability sampling is to keep sampling error to a minimum. The probability sampling technique is most commonly related to a survey-based research approach, where a researcher needs to draw conclusions from the research sample about a population in order to provide questions with answers or to meet the study objectives. Non-probability sample is a sample that has not been selected using a random selection method. Essentially, this

implies that some units in the population are more likely to be selected than others (Bryman, 2012:187). Bryman (2012:188) argues that non-probability sampling gives every subject in the study population a non-zero probability of being included in the sample and also gives a range of alternative techniques to select samples based on researcher's subjective judgement.

Therefore, this study employs non-probability sampling technique in selecting the construction professionals which the researcher considers to be a good population that will assist in the achievement of the study's objectives. This technique was considered appropriate considering the vast concentration of construction practitioners in the Western Cape Province been the second largest province in South Africa and the volume of construction projects that have taken place in Western Cape Province. This is supported by the assertion by Saunders, Lewis and Thornhill (2009:79) who viewed that purposive sampling technique helps the researcher in selecting cases that will best answer the study research question in achieving its objectives.

3.4.3 Design and development of the study questionnaire

According to Adler and Clark (2008:216), a questionnaire is a data collection instrument containing the questions and statements designed to solicit information from study respondents. The process of questionnaire design requires a consideration for future analysis of every question. Poorly designed questionnaire leads to obtaining insufficient data or useless data that could not be properly interpreted (Dahlberg & McCaig, 2010:179). Similarly, a well-planned, structured and carefully designed questionnaire afford increased response rate and vehemently enhance summarization and analysis of collecting data (Burns, 2000:574). Authors notably (Babbie, 1990:256) underscored the importance of question wordings as paramount in questionnaire design. Wrong wordings of a question may lead the respondent to provide unintended answers and ultimately affect the reliability of a research. According to Neuman (1997:260), essential detail of a study may be missing when an individual is constrained by researchers to a set of response. In order to guide against the constraining the respondents' responses, open ended questions were included in the questionnaire to enable respondents provide additional professional inputs that is helpful to the study.

Moreover, the questionnaire was designed in sections, where each section aims at achieving a particular objective of the study. The first section of the questionnaire seeks

the biographical information of survey respondents. The second section addresses the first objective of the research with the aim to explore the perceptions of respondents on the severity of most prevalent contractual claims factors prone to disputes. The third section seeks to identify the reasons why claims are disputed and not settled in the original form they are submitted. The fourth section establishes the inconsistencies from operational dealing with contractual claims. Finally, the last section explores the impact of disputed claims on project performance.

3.4.4 Procedure for data collection

A researcher can adopt several methods in obtaining research data. This study employed dual sources of data in order to achieve the aim of this study. Teddlie and Tashakkori (2009:98) opine that collection of data is the most vital process in a research most especially when the study seeks to obtain two types of data set: the primary data and the secondary data.

3.4.4.1 Primary data

Primary data is any type of data which a researcher has collected 'first-hand' from its original source as components of the applied aspect of the study. Therefore, primary data sources used in this study is through the administration of closed and open-ended questionnaire survey to the study participants. The research instrument for the study was administered to the surveyed respondents through 3 different ways; Survey Monkey, emails and hand delivery. The responses were retrieved through the same medium.

Survey Monkeys and emails were used concurrently in order to ensure wider coverage of the survey to all the selected construction professionals and firms whose contact emails are provided on the Professional Register list and CIDB list of registered companies. Also, the hand delivery of the study questionnaire was undertaken by the researcher within the city of Cape Town. Construction sites were located through the presence of "gantry crane" on premises. Any premise where the gantry - crane is cited was visited and the questionnaire is handed in to the project engineer/manager after a brief explanation on the objectives of the study to the project engineer/manger.

3.4.4.2 Secondary data

Secondary data as viewed by Flicks (2011:182) is the type of data which a researcher has not been responsible for it is a collection on a first-hand basis. It thus entails all the data obtained by someone else and presented in different forms, such as journal articles, reports, archive materials, company's annual reports, newspapers and magazines, conference papers, the internet and books, etc. For this study, the secondary data collected centres on the archival data on the total cost of construction, amount of contractual claims, final project cost, initial contract duration and final contract duration. This information was, however, requested from the respondents as a part of the questions to be filled by the respondents on the study questionnaire.

3.4.5 Methods of data analysis

In order to accurately process, the data obtained on a research it is necessary to use appropriate methods of data analysis. However, Fellows and Liu (2008:187) opine that data analysis could comprise the use of multiple analytical techniques to facilitate the ease of communicating the research results while at the same time improving its validity. Drawing from this suggestion thus, three methods of data analysis were employed for this study. Descriptive statistical techniques were employed to analyse the background information of the respondents and to analyse the severity of the variable contributing to the constructs identified under each of the study objectives. Further to this, Principal Component Analysis (PCA) was employed to establish the underlying factors contributing to the constructs.

3.4.5.1 Descriptive Statistics

One of the most important initial analysis is to describe the participant of study and the finding must present the characteristics of the sample (Russel & Purcell, 2009:141). Descriptive statistics are used for describing the basic feature of the data set and to summarise the key variables. The basic summary of each variable is presented by showing a proportionate breakdown of categories for each variable. The purpose of this statistical tool is to provide the characteristics of respondents, check the variables for any violation of the assumptions underlying the statistical techniques that will be used to address specific research questions; to have an overall and straightforward picture of a large amount of data (Henn, Weinstein & Foard, 2006: 206; Struwig & Stead,

2007:158; Pallant, 2011:53). Henn, Weinstein and Foard (2006) identified the three measures of central tendency as; mean median and mode.

3.4.5.2 Principal Component Analysis (PCA)

Principal Component Analysis (PCA) is a data reduction technique that takes a large set of variables and looks for a way the data may be reduced or summarised using a smaller set of factors or components, which can then be used for further analysis (Pallant, 2011:181). There are two main approaches to factor analysis as described in the literature: exploratory and confirmatory. Exploratory factor analysis is often used in the early stages of research to gather information about (explore) the interrelationships among a set of variables. Confirmatory factor analysis, on the other hand, is a more complex and sophisticated set of techniques used in this research to test (confirm) specific hypotheses or theories concerning the structure underlying a set of variables.

Factor analysis encompasses a variety of different, although related, techniques. One of the main distinctions is between what is termed principal components analysis (PCA) and factor analysis (FA). These two sets of techniques are similar in many ways and are often used interchangeably by researchers. However, both attempts to produce a smaller number of linear combinations of the original variables in a way that captures (or accounts for) most of the variability in the pattern of correlations. They do differ in a number of ways, however. In principal components analysis the original variables are transformed into a smaller set of linear combinations, with all of the variance in the variables being used. In factor analysis, factors are estimated using a mathematical model, whereby only the shared variance is analysed (Pallant, 2011:182). Consequent upon the distinction between Factor Analysis (FA) and Principal Component Analysis (PCA) Tabachnick and Fidell (2007:635) posits that; “If you are interested in a theoretical solution uncontaminated with unique and error variability… FA is your choice. If on the other hand, you simply want an empirical summary of the data set, PCA is the better choice”.

Therefore, the focus of this research is to establish an operational framework to evaluate delay related to contractual claims, hence the need for empirical analysis of the data set with a view to use the findings in the development of the framework.

To use this technique, the data will first undergo a suitability test that involves an examination of the determinants of the correlation matrix for multicollinearity and

singularity. Other necessary tests according to Kaming *et al.,* (1997:88) and Pallant (2011:182) are:

(i) Kaiser–Meyer–Olkin (KMO) =

----------3.1

Where rij is the simple correlation coefficient between variables and , and is the partial correlation coefficient between variables and .

KMO is a measure of sampling accuracy, which ranges from 0 to 1, and a value below 0.50 is unacceptable. Bartlett Sphericity test is a test of the identity matrix, which is particularly useful when relatively small samples of data are involved (e.g. m <100).

(ii) Bartlett's chi-square test statistic

----------3.2

Where n denotes the number of matrix variables in R; m denotes the sample size, and Ln /R/ denotes the natural logarithm of the determinant of the sample correlation matrix in R. The computed value is compared to the tabular for a selected & risk with 0.5 (n^2-n) degrees of freedom.

Principal Components Regression was used in this study to extract the smallest number of variables that account for interrelationships among the variable sets considered in this study. The total number of principal component factors that can be extracted from any factor analysis is equal or less than the number of variables involved. The important factors are those whose eigenvalues are more than the average of the eigenvalues, , where p is the number of principal components extracted from the data, and λ is the eigenvalues of component of factors identified indicates the number of sub-models to be accommodated by the main model. Factor loadings and the commonalities (h^2) of the determinants of the variables are then evaluated. Factor loadings are the correlation coefficient between an original variable and an extracted factor while commonality is the variance in the variables that have been accounted for by the factors extracted. For instance, the higher the absolute value of the factor loading, the more the variable contributes to the component extracted. In order to minimise the number of components in which the determinants have a high factor loading, a varimax rotation is carried out and the factor scores, results obtained using the principal component extraction method (Pallant, 2011:182). In conclusion, the principal component factor analysis was carried out using SPSS 22.0 software package.

3.4.6 Validity and reliability

Validity and reliability are significant to the result of a research project. Validity refers to the ability of research instrument to demonstrate that the instrument fulfils the desired purpose it is designed, while reliability refers to the consistency in findings of a measure of a concept when the concept is used continually (Struwig & Stead, 2007:158; Bryman, 2012:169). However, it is essential to address reliability and validity issues to maintain the originality of the research project.

3.4.6.1 Research validity

According to Bryman (2012:171), validity refers to the issue of whether an indicator (or set of indicators) that is devised to gauge a concept really measures that concept. In addition, it refers to the trustworthiness of research findings (Struwig & Stead, 2007:159). The logic that underpins the formulation of research tools and the statistical evidence gathered through the use of research instruments are the basis of establishing validity of research instruments (Kumar, 2011:179). Validity is described as the quality of research to reflect the true report of phenomenon that is being researched and ultimately portrays an accuracy of the result (Plowright, 2011:135).

Several ways of establishing validity are: face validity; concurrent validity; predictive validity; construct validity; and convergent validity.

- Face validity**:** Face validity is a validity measure when the researcher reflect on the content of the concept in question. Face validity might be established by asking other people, whether the measure seems to be getting at the concept that is the focus of attention.
- Concurrent validity: Here the researcher employs a criterion on which cases (for example, people) are known to differ and that is relevant to the concept in question. A new measure of job satisfaction can serve as an example.
- Predictive validity**:** whereby the researcher uses a future criterion measure, rather than a contemporary one, as in the case of concurrent validity. With predictive validity, the researcher would take future levels of absenteeism as the criterion against which the validity of a new measure of job satisfaction would be examined. The difference from concurrent validity is that a future rather than a simultaneous criterion measure is employed.

- ❖ Construct validity: of a measure. Here, the researcher is encouraged to deduce hypotheses from a theory that is relevant to the concept.
- ❖ Convergent validity: In the view of some methodologists, the validity of a measure ought to be gauged by comparing it to measures of the same concept developed through other methods.

This study thus employs the use of face validity to validate the findings of the research.

3.4.6.2 Reliability

Research reliability refers to the ability of future researchers to undertake the same research project and come up with the same results, interpretations and claims. Reliability in quantitative research approach implies the extent to which an experiment, test or measurement provide the same result or regular measurement on continual trials (Silverman, 2006:282). The following are three prominent factors involved when considering the reliability of a measure (Fellows & Liu, 2012:169);

- ❖ Stability: This consideration entails asking whether a measure is stable over time, to enhance researchers confident that the results relating to that measure for a sample of respondents will not fluctuate. This means that, if an instrument is administered to a group and then re-administer it, there will be little variation over time in the results obtained.
- ❖ Internal reliability: The key issue is whether the indicators that make up the scale or index are consistent in other words, whether respondents' scores on any one indicator tend to be related to their scores on the other indicators.
- ❖ Inter-observer consistency. When a great deal of subjective judgement is involved in such activities as the recording of observations or the translation of data into categories and where more than one 'observer' is involved in such activities, there is the possibility that there is a lack of consistency in their decisions. This can arise in a number of contexts.

However, stability measure was used to measure the reliability of the study instrument. This was done through selection of small group among the target respondents and the questionnaire instrument for the study was re-administer to the group and the results show no variation in the results.

3.5 CHAPTER SUMMARY

The chapter provides an overview of the research methodology and justification was provided for the specific research method adopted for this study. The participants for the study were; the Quantity Surveyors and Construction/Project Managers who undertake construction project in Western Cape Province of South Africa. The sampled population was drawn from a list of registered Quantity Surveyors practicing in Western Cape that are on the register of professional in South Africa. The population for Construction/Project Managers were those construction firms contained in the Construction Industry Development Board (CIDB) contractors register that are on CIDB Grade Level 3-9. The study adopted a quantitative research method. Quantitative questionnaire was used to gather data. Closed ended and open ended questions were designed in the instrument for the quantitative survey of this study. Descriptive and Principal Component Analysis was employed for data analysis to develop an operational framework delay related claims in the South African construction industry, the results of which is presented and discussed in the succeeding chapter.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

The research methodology has been exhaustively discussed in chapter three and the methods adopted for this study was also presented and justified. Thus, this chapter presented the results of data analyses and discuss the results amidst previous researches on claims in construction projects. The main sectional headings that make up the chapter is as follows: demography of respondents, particulars of projects investigated, establishment of contractual claim prone to dispute, identification of factors impacting on building project delivery, inconsistencies in dealing with claims, impact of dispute arisen from claim on project performance and discussion of findings.

4.2 DEMOGRAPHY OF THE RESPONDENTS

Analysis of respondents' demographic information is presented in Table 4.1. The result in Table 4.1 shows that approximately 68% of the respondents work in Building Construction Company and 33% works with consultancy firm. The results of analysis on Professional affiliation of the respondents showed that 68% of the respondents are Construction / Project manager, approximately 16% were Engineers, 10% were Quantity Surveyors and 6% were Architects. Information regarding the position of the respondents in their various organisations was also requested and the results of the analysis revealed that 39% are Manager in their company, 26% are Director / Chief Executive Officer (CEO), 24% were Site/Project Engineer and approximately 12% were Supervisor. To probe further into the expertise of the respondents, the study also sought information on their years of working experience, the results of frequency analysis in Table 4.1 shows that over 90% of the respondents have above six years of working experience.

Apart from information relating to the expertise and competency of the respondents, this study sought information on the strength of the company where the respondents are working. The results shows that 31% of the organisations execute projects for only the Public Sector Clients, 13% executes projects for Private Sector Clients only and 56% of the organisation representing the majority executes projects for both the Public

and Private Sector Clients. Figure 4.1 presents the results on the size of organisation revealed that 93% of the respondent company are on “CIDB grade level 4 – 9”, while approximately 7% of the organisations are on “CIDB grade level 1 – 3”.

From the foregoing discussion of the analysis results in Table 4.1, the results have shown that the respondents are qualified professionals in the construction Industry who have the requisite experience and competencies in the main subject of this research. However, it can be inferred that the information provided by these sets of respondents is adequate and their opinions are good judgement of the subject of “Claims” in construction projects.

Table 4.1: Frequency distribution of respondents’ demographic information

Respondents Information		**Frequency**	**Percent**
Type of Organisation	Consultancy firm	32	33.3
	Building contractor	64	66.7
	Total	**96**	**100.0**
Professional affiliation	Quantity Surveyor	10	10.4
	Construction/Project manager	65	67.7
	Architect	6	6.3
	Engineer	15	15.6
	Total	**96**	**100.0**
Position in the Organisation	Supervisor	11	11.5
	Manager	37	38.5
	Engineer	23	24.0
	Director	25	26.0
	Total	**96**	**100.0**
Years of working experience	0 - 5 years	2	2.1
	6 - 10 years	47	49.0
	11 - 15 years	32	33.3
	16 - 20 years	9	9.4
	above 20 years	6	6.3
	Total	**96**	**100.0**
Company regular client	Public Sector	30	31.3
	Private Sector	12	12.5
	Servicing all of the clients	54	56.3
	Total	**96**	**100.0**

Figure 4.1: Size of respondents’ organisation (CIDB grade).

4.3 PARTICULARS OF THE PROJECTS INVESTIGATED

The results of frequency analysis in Table 4.2 present the type of building being constructed by the respondent organisation and the period of time spent to complete the project. The dominating type of building that respondents have been involved in is residential building which is approximately 13% of the respondents' organisations are specialised on. Following closely is the institutional-educational building, which is approximately 12% and commercial office building which stood at approximately 6%. The result shows further that 60% of the respondents' organisations are engaged in the construction of more than one of the building type.

Also, the results of analysis on Project duration showed that over 80% of the projects have duration more than 10 months. The breakdown of the project duration showed that 51% and 35% of the projects have their duration ranges between 11 – 20 months and above 20 months respectively. It can be deduced from the analysis that respondents have been involved in the construction of different types of building facilities that have a long duration. As a result, the wealth of experience of the respondents to answer the questions contained in the questionnaire is undoubted.

Table 4.2: Descriptive results of project type and construction duration

		Frequency	Percent
Building Types	Residential Building	12	12.5
	Commercial-office	6	6.3
	Commercial rental	1	1.0
	Hotel	1	1.0
	Industrial building	2	2.1
	Institutional - Educational	11	11.5
	Industrial	2	2.1
	Parking	3	3.1
	More than one building type	58	60.4
	Total	**96**	**100.0**
Project Duration	0 - 10 months	12	12.5
	11 - 20 months	49	51.0
	above 20 months	34	35.4
	Project duration not released	1	1.0
	Total	**96**	**100.0**
Duration at time of Tender	0 - 10 months	29	30.2
	11 - 20 months	41	42.7

	above 20 months	25	26.0
	Project duration not released	1	1.0
	Total	**96**	**100.0**

Table 4.3 presents the frequency analysis of the project's initial costs, final costs and additional costs due to contractual claims. The initial costs results indicated that 63% of the projects have an initial cost range between ZAR5 – 10 million; 16% have an initial cost above ZAR10 million. While the results for final cost shows that 57% of the projects were completed at a cost ranges between ZAR5 – 10 million and 23% were completed at a cost above ZAR10 million. The results on percentage of additional costs that arose due to claims on the projects executed by the respondents showed that 29% of the project had cost increase less than 5%, 24% have cost increase of ranges from 11 – 15% and approximately 22% of the projects have cost increases between 6 – 10 % and above 15%. This, however, indicates that projects the respondents are involved with are large and that the respondents are well experienced practitioners on matters of contractual claims.

Table 4.3: Analysis of cost information of the building projects

		Frequency	Percent
Initial Cost	0 - 5 million ZAR	20	20.8
	5 - 10 million ZAR	60	62.5
	above 10 million ZAR	15	15.6
	Cost information not provided	1	1.0
	Total	**96**	**100.0**
Final Cost	0 - 5 million ZAR	18	18.8
	5 - 10 million ZAR	55	57.3
	above 10 million ZAR	22	22.9
	Cost information not provided	1	1.0
	Total	**96**	**100.0**
Percentage of Additional Cost from Claims	0 - 5 %	28	29.2
	6 - 10%	21	21.9
	11 - 15%	23	24.0
	above 15%	21	21.9
	no information	3	3.1
	Total	**96**	**100.0**

Figure 4.2 presents the results of analysis on the contractual claims that causes the additional cost incurred on the projects executed by the respondents. The results showed “Change order claim” as the predominating claims that causes additional cost on 39% of the building projects considered in this study, followed by “Variation order claims” (33%) and “Cost and expense claim” (18%).

Figure 4.2: Types of contractual claims that cause additional cost on the project executed by the respondents.

4.4 ESTABLISHMENT OF CONTRACTUAL CLAIMS PRONE TO DISPUTE IN CONSTRUCTION PROJECTS

One of the cardinal objectives of this study is to identify and ascertain the most frequently occurring contractual claims that often lead to disputes. In Table 4.4, the results of a descriptive analysis on the identified construction claims were presented and the claims were ranked using the mean score value. The ranking was done to ascertain the prevalence level of the claims on construction projects. From the results, claims that emanated due to; Change order claim has the mean score value of (3.564), the Variation order claim has a mean score (3.407), Cost and expense claims have mean score (3.404) and Dayworks claim means score value (2.740). Thus, the Change order claim was ranked 1st, Variation order claim ranked 2nd, Cost and expense claim ranked 3rd and Dayworks claims were ranked 4th.

It is pertinent to state that, these results conform to the results of analysis discussed in section 4.3 (Figure 4.2) of this thesis.

Table 4.4: Prevalence of construction claims leading to dispute

	Frequency (%)					Mean	Std. Deviation	Ranking
	Not at all	Least prevalent	Somewhat prevalent	Prevalent	Highly prevalent			
Change Order Claim	5.2	16.7	21.9	26	28.1	3.564	1.223	1
Variation Order	12.5	15.6	21.9	18.8	31.3	3.406	1.396	2
Cost and Expense Claims	4.2	21.9	25	27.1	21.9	3.406	1.175	3

Dayworks Claim	25	20.8	21.9	19.8	12.5	2.740	1.363	4
Contract Ambiguity Claim	21.9	25	19.8	25	8.3	2.729	1.285	5
Extra Work Time Claim	19.8	31.3	20.8	18.8	9.4	2.667	1.254	6

4.5 REASONS WHY CLAIMS ARE DISPUTED AND NOT SETTLED AS SUBMITTED

As the quest to establish an operational framework for evaluation of delay related claims on building contracts continue, it is important to identify factors that influence the construction project delivery and to identify salient reasons why contractual claims are disputed when they occurs in construction projects.

4.5.1 Identification of factors that Influence project delivery

Table 4.5 presents the results of descriptive analysis conducted on the six identified factors that influence building project delivery from the literature review. However, these factors were presented to the research respondents to rate the level of influence of the factors to speedy delivery of the building projects which they have executed. The results showed that client's ability to make appropriate decision have the highest mean score value (3.375) and it's ranked as the most influential among all the factors considered. The second most influential factors are client understanding of the procurement process with a mean value (3.135) and client contribution to pre-contract process is ranked 3rd having a mean score (3.083). The ranking of these three factors implies that, the factors are possible impediments to speedy delivery of construction project.

Table 4.5: Analysis of factors influencing building project delivery

	Frequency (%)					**Mean**	**Std. Deviation**	**Ranking**
	No influence	Less influence	Unsure	Somewhat influential	Highly influential			
Client ability to make Appropriate Decision	12.5	13.5	24	24	26	3.375	1.340	1

Client Understanding of Procurement	8.3	29.2	24	17.7	20.8	3.135	1.278	2
Client Contribute to Pre-contract Process	7.3	24	35.4	19.8	13.5	3.083	1.130	3
Client Understand Construction	10.4	27.1	32.3	14.6	15.6	2.979	1.214	4
Making Conflicting Decisions	15.6	26	28.1	10.4	19.8	2.927	1.340	5
Client Understanding of Design process	12.5	29.2	33.3	7.3	17.7	2.885	1.255	6

4.5.2 Identification of factors that contribute to project claims due to delay

Several factors were identified from the literature as contributing factors to project claims as a result of the delay. These factors were grouped as Design related, Construction related and Management related factors. The results of analysis in Table 4.6 showed that among the Design related factors; Dimension inaccuracies have the highest mean score (3.083), followed by Missing information on the drawing (mean score = 3.073) and Conflicting design information (mean score = 2.927). These factors were thus ranked 1st, 2nd and 3rd respectively, among the design related factors.

Among the identified construction related factors, competency of subcontractors and suppliers ranked first with mean score (3.281), change order by client during construction is ranked second (mean score = 3.271) and contractor experience and control is ranked third (mean score = 3.177). Also, the three most contributing factors to claim due to project delays among management related factors were; cost of financing (mean score = 3.729), government interference (mean score = 3.406), and conflicts among project parties (mean score = 3.177).

4.6 INCONSISTENCY IN DEALING WITH CLAIMS

Another focus of this research is to establish the inconsistencies in operational settlement of contractual claims so as to enable the development of a holistic framework through which contractual claims can be resolved without necessarily resulting to dispute and delay in the regular progress of work on the construction project.

4.6.1 Identification of delay factors that lead to claims and dispute

In Table 4.7, the results of descriptive analysis on delay factors that lead to claims and dispute in construction projects are presented. The results show that many of the factors were adjudged by the respondents that delay on construction projects due to the factors often lead to contractual claims and dispute. Quantitatively, the results showed that release of payment emanating from claim is the most ranked factor (mean score value = 3.260), design coordination and quality of management have equal mean score (2.969) and both ranked 2nd and 3rd respectively. Furthermore, change in micro economic policy and non-availability of specified materials has a mean score (2.906) and they were ranked 4th and 5th respectively. The mean score of the other factors was from 2.885 to 2.333.

However, to ascertain the delay factors that lead to claim and dispute, there is the need for a linear combination of the variables to capture the variability in the correlation pattern of the factors. To achieve this Principal Component Analysis (PCA) was performed on the delay factors with a view to have an empirical summary of the factors.

Table 4.6: Factors that contribute to project claims due to delay

	Frequency (%)				Mean	Ranking	
	No contribution	Less influence	Somewhat influential	Highly influential			
Design Related							
Dimension inaccuracies	13.5	15.6	21.9	14.6	3.083	1.228	1
Missing Information on Drawings	12.5	27.1	32.3	13.5	3.073	1.283	2
Conflicting Design Information	18.8	25	30.2	12.5	2.927	1.347	3
Inaccurate Site Investigation	18.8	24	16.7	16.7	2.885	1.352	4
Frequent Revision of Drawings	15.6	27.1	12.5	16.7	2.875	1.300	5
Construction Related							
Competency of Subcontractors and Suppliers	5.2	25	28.1	17.7	3.281	1.176	1
Change Order by Client During Construction	10.4	22.9	29.2	20.8	3.271	1.310	2
Contractor Experience and Control	5.2	25	28.1	12.5	3.177	1.105	3

Forecasted Activity Planning	4.2	35.4	22.9	4.2	2.875	0.954	4
Construction Methods	13.5	25	20.8	5.2	2.792	1.085	5
Weather Condition	21.9	32.3	13.5	5.2	2.479	1.133	6
Management Related							
Cost of Financing	4.2	14.6	31.3	32.3	3.729	1.183	
Government Interference	11.5	13.5	22.9	27.1	3.406	1.326	12
Conflicts among Project Parties	10.4	17.7	20.8	17.7	3.177	1.223	3
Lack of Coordination by Contractor	11.5	34.4	13.5	9.4	2.750	1.124	4
Poor Project Management	27.1	20.8	22.9	13.5	2.750	1.422	5
Bureaucracy	22.9	18.8	17.7	6.3	2.656	1.195	6

Table 4.7 Descriptive results of delay factors that lead to claim and dispute

	Percentage				Mean	Ranking	
	Not at all	Least time	Often	Very often			
Release of Payments Emanating from Claims	7.3	19.8	22.9	18.8	3.260	1.190	1
Design Coordination	5.2	35.4	21.9	10.4	2.969	1.100	2
Quality of Management during Construction	8.3	31.3	24	10.4	2.969	1.147	3
Change in Micro Economic Policy	10.4	28.1	12.5	13.5	2.906	1.170	4
Non Availability of Specified Materials	12.5	28.1	14.6	14.6	2.906	1.232	5
Physical Environment Considerations	7.3	36.5	25	7.3	2.885	1.094	6
Constructability of Design	8.3	33.3	14.6	7.3	2.792	1.035	7
Client Understanding of Construction	13.5	36.5	18.8%	11.5	2.781	1.233	8
Procurement Processes							
Lack of Prompt Delivery of Materials	12.5	33.3	17.7	6.3	2.719	1.093	9
Interference With Utility Lines	13.5	42.7	11.5	14.6	2.708	1.264	10
Extreme Weather Conditions	27.1	32.3	8.3	6.3	2.344	1.150	11
Access to Site	25	35.4	6.3%	6.3	2.333	1.111	12

4.6.1.1 PCA analysis for factors leading to inconsistency in claims settlement

In order to ascertain the underlying delay factors that lead to claims and dispute, Principal Component Analysis (PCA) was performed, to reduce and classify the variables for the development of the operational framework to evaluate delay claims in construction project. PCA is an integral technique under Factor Analysis though PCA is often used interchangeably with FA by many researchers, since both techniques attempt to produce a smaller number of linear combinations of the original variables in a way that captures the variability in the pattern of correlations within the variables (Pallant, 2011:182).

The first step in PCA analysis is to test the appropriateness of a study's data for PCA, hence the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's test of Sphericity were performed on the data set. Table 4.8 shows the results of KMO and Bartlett's test of Sphericity. These tests provide the basis for measuring the minimum standard that the data must meet before being considered adequate for further analysis. The KMO index ranges from 0 to 1, with 0.6 suggested as the minimum value for a good PCA. The Bartlett's test of Sphericity indicates the strength of the relationship among variables and it should be significant at $p<0.05$ for the PCA to be considered appropriate (Pallant, 2012; Tabachnick, & Fidell, 2012). However, the results on Table 4.8 display KMO value of 0.691 which is greater than 0.6 and less than 1, while the Bartlett's Sphericity value p = 0.000 (i.e. p<. 5). Therefore, the data are adequate and suitable to be used for PCA.

Table 4.8: Results of data adequacy and suitability test on delay factors

Test		Value	Remarks
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.691	Significant and adequate for PCA
Bartlett's Test of Sphericity	Approx. Chi-Square	216.540	
	df	66	
	Sig. (p<0.5)	0.000	Significant and suitable for PCA

The next step after showing the appropriateness and suitability of the research data is a component (factor) extraction. This is a process to ascertain the number of components to retain, based on their contribution to the construct, since not all factors

are to be kept. The most commonly used methods of factor extraction in PCA include: Kaiser's criterion; using eigenvalue greater than 1 rule; Catell's scree test; retaining all factors above the elbow in the structure and Horn's parallel analysis; comparing the eigenvalue with those randomly generated from a data set of the same size (Pallant, 2012:184). In this thesis, "Kaiser's criterion using eigenvalues" was adopted to extract the components and varimax rotation was used to extract the variables that load on each identifiable component. The significant factors, according to Kaiser's criterion, are those factors with eigenvalues above 1. In Table 4.9, three components with initial eigenvalues of greater than 1 were extracted from the delay factors that cause claims and dispute on construction projects. The eigenvalues of the three components extracted are 3.257, 1.385 and 1.295; the result shows that the first component is explained approximately 27% of the variance, the second explained approximately 12%, while the third component explained approximately 11% of the variance. However, the three components combined explained 49% of the total variance.

Table 4.9: Variance explained by the components

	Initial Eigenvalues			**Extraction Sums of Squared Loadings**		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.257	27.139	27.139	3.257	27.139	27.139
2	1.385	11.541	38.680	1.385	11.541	38.680
3	1.295	10.794	49.474	1.295	10.794	49.474
4	1.036	8.634	58.108			
5	.975	8.125	66.233			
6	.810	6.748	72.981			
7	.766	6.380	79.360			
8	.717	5.972	85.332			
9	.553	4.605	89.937			
10	.491	4.088	94.025			
11	.391	3.260	97.285			
12	.326	2.715	100.000			

Extraction Method: Principal Component Analysis.

To affirm the number of components to retain, Catell's scree test was performed on the variable and the results in Figure 4.3 (scree plot) show that three components be retained. These components are the point which is above the elbow with arrow mark on the scree plot shown in Figure 4.3. These components, however, contribute the most to the variance in the data set, and this agrees with the results displayed in Table 4.9.

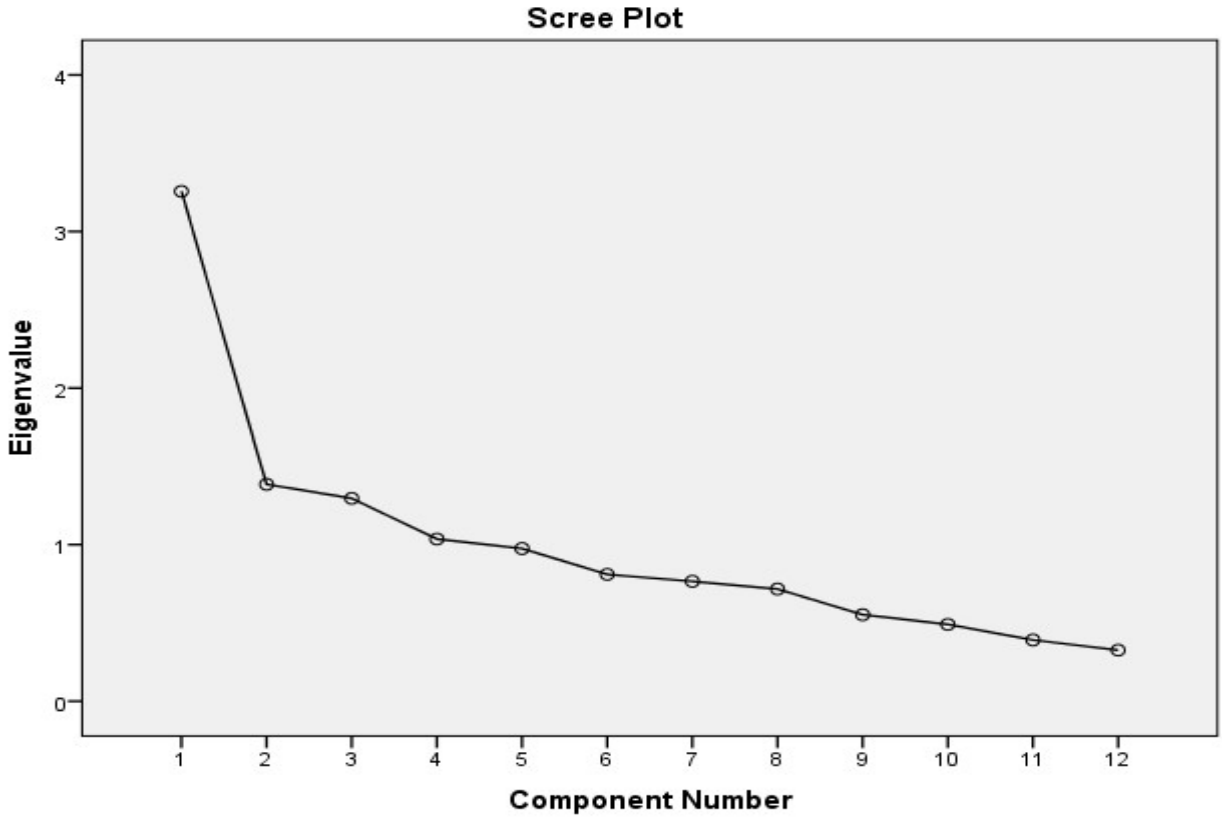

Figure 4.3 Catell's scree plot for delay factor that cause claims and dispute.

In summary, the result obtained through Kaiser's criterion analysis is in agreement with the results of the Catell's scree test. However, Pallant (2012) and Tabachnick & Fidell (2012) have noted that the results of Catell's scree test are necessary to confirm the results of the Kaiser's criterion analysis to ensure that appropriate decisions are taken on the number of components to be retained. Therefore, this study accepted and retained three components, some of the variables have positive and negative effects on claims and dispute on building construction projects. The results in Table 4.10 revealed all the three components, showing a number of strong loadings. All variables loaded substantially above 0.3 on the Component Matrix (Table 4.10). The commonalities values show that the variables fit well into the component with all the variables having

above 0.25. Considering the loading pattern the variables, the variables that converge on component 1 represent construction process, component two represent; supply chain management while component three could be regarded as; construction finance management.

Table 4.10: Component Matrix of Delay Factors

	Component			Commonalities
	1	2	3	
Client Understanding of Construction	0.664			0.548
Procurement Processes	0.657			0.497
Extreme Weather Conditions	0.633		0.408	0.572
Access to Site	0.603	0.608	-0.359	0.500
Quality of Management during Construction	0.518			0.336
Design Coordination	0.391	0.303		0.251
Non Availability of Specified Materials	0.466	0.590		0.604
Lack of Prompt Delivery of Materials	0.414	0.558		0.486
Constructability of Design	0.492	-0.529		0.522
Interference With Utility Lines	0.430	-0.499	0.499	0.478
Release of Payments Emanating from Claims	0.469		-0.681	0.679
Change in Micro Economic Policy	0.403		0.546	0.464
Physical Environment Considerations				

Extraction Method: Principal Component Analysis.
a. 3 components extracted.

4.6.2 Identification of Dispute Resolution Methods to Resolve Contractual Claims

4.6.2.1 Partnering as a dispute resolution method

Several factors have been identified as predominating factors in the choice of contractual claims. The results in Table 4.11 display the results of descriptive analysis on the appropriateness of Partnering as a dispute resolution method for contractual dispute that may arise due to the identified factors leading to dispute in construction projects. The results in Table 4.11 show that partnering is best used to resolve disputes due to; Choice of procurement process (mean score = 3.031), Conflict of interest among project team (mean score = 2.833), Interference with public utility (mean score = 2.823) and Claims due to fluctuation in price (mean score = 2.677). Thus, these factors were ranked first, second, third and fourth respectively.

Table 4.11: Appropriateness of Partnering as Dispute Resolution Method

	Percentage				Mean	Ranking	
	Not appropriate	Least appropriate	Appropriate	Highly appropriate			
Choice of Procurement Processes	16.7	21.9	25	16.7	3.031	1.349	1
Conflict of Interest among Project Team	21.9	28.1	21.9	16.7	2.833	1.427	2
Interference With Utility Lines	17.7	27.1	30.2	7.3	2.823	1.248	3
Claims due to Fluctuation in Prices	24	26	20.8	10.4	2.677	1.326	4
Constructability of Design	18.8	38.5	13.5	9.4	2.563	1.212	5
Lack of Prompt Delivery of Materials by Suppliers	26	29.2	13.5	11.5	2.552	1.321	6
Delay in Release of Payments Emanating From Claims	18.8	41.7	15.6	8.3	2.531	1.205	7
Physical Environmental Considerations	37.5	18.8	14.6	13.5	2.479	1.458	8
Non Availability of Specified Materials	24	28.1	17.7	3.1	2.479	1.133	9
Dispute due to accessibility to Construction Site	19.8	45.8	8.3	5.2	2.333	1.053	10
Dispute due to Material Shortage	28.1	39.6	6.3	8.3	2.271	1.183	11
Inability of the Client to Understand Design	40.6	26	14.6	2.1	2.115	1.160	12
Extreme Weather Condition	42.7	37.5	4.2	1	1.833	0.902	13

4.6.2.2 Negotiation as dispute resolution method

Similarly, descriptive analysis on Negotiation as a dispute resolution method was performed using the thirteen identified factors as in Table 4.11. The results in Table 4.12 thus showed that dispute due to; Choice of procurement process (mean score = 3.417), non-availability of specified materials (mean score = 3.302), constructability of the design (mean value = 3.073) and lack of prompt delivery of materials by suppliers (mean score = 2.948) are the dispute factors which are most resolved using negotiation strategy.

4.6.2.3 Arbitration as dispute resolution method

Test on suitability of Arbitration showed that dispute due to; Delay in release of payment (mean value = 3.323), contractual claims due to fluctuation in prices (mean value = 3.188), interference with utility lines (mean score = 3.146) and choice of the procurement process (mean value = 3.125) disputes are best resolved using Arbitration. However, the details of descriptive analysis results on Arbitration are displayed in Table 4.13.

4.6.2.4 Mediation as dispute resolution method

Table 4.14 presents the descriptive results of analysis on Mediation as a dispute resolution method. The results in showed that dispute due to; Delay in release of payment (mean score = 3.427), the choice of the procurement process (mean score = 3.229), inability of the client to understand design (mean value = 3.208) and claims due to fluctuation in price (mean score = 3.125) are the dispute factors which are most resolved using Mediation strategy.

4.6.2.5 Litigation as dispute resolution method

Results of analysis on the suitability of Litigation to resolve dispute displayed in Table 4.15 showed that; Access to the construction site (mean value = 3.083), delay in release of payment (mean value = 3.052), physical environmental consideration (mean

score = 3.031) and choice of the procurement process (mean value = 2.990) disputes are best resolved using Litigation.

Table 4.12: Appropriateness of Negotiation as Dispute Resolution Method

	Percentage					Mean	Ranking	
	Not appropriate	Least appropriate	S	Appropriate	Highly appropriate			
Choice of Procurement Processes	8.3	13.5	2	26	22.9	3.417	1.220	1
Non Availability of Specified Materials	9.4	24	1	35.4	18.8	3.302	1.282	2
Constructability of Design	10.4	20.8	2	32.3	8.3	3.073	1.136	3
Lack of Prompt Delivery of Materials by Suppliers	8.3	25	3	21.9	7.3	2.948	1.050	4
Claims due to Fluctuation in Prices	13.5	32.3	2	13.5	19.8	2.938	1.344	5
Interference With Utility Lines	7.3	29.2	3	19.8	8.3	2.938	1.084	6
Delay in Release of Payments Emanating From Claims	12.5	29.2	2	14.6	15.6	2.917	1.254	7
Dispute due to accessibility to Construction Site	22.9	18.8	2	15.6	14.6	2.802	1.350	8
Inability of the Client to Understand Design	8.3	36.5	2	20.8	5.2	2.781	1.038	9
Physical Environmental Considerations	20.8	26	2	19.8	12.5	2.771	1.326	10
Dispute due to Material Shortage	8.3	35.4	3	15.6	5.2	2.740	0.997	11
Conflict of Interest among Project Team	15.6	34.4	2	16.7	9.4	2.698	1.198	12

Extreme Weather Condition	26	47.9	1	7.3	4.2	2.156	1.029	13

Table 4.13: Appropriateness of arbitration as dispute resolution method

	Percentage				Mean	Ranking	
	Not appropriate	Least appropriate	Appropriate	Highly appropriate			
Dispute due to Material Shortage	16.7	26	13.5	13.5	2.813	1.259	11
Dispute due to accessibility to Construction Site	9.4	17.7	24	7.3	3.021	1.046	6
Inability of the Client to Understand Design	17.7	16.7	15.6	17.7	2.990	1.326	7
Choice of Procurement Processes	11.5	28.1	19.8	21.9	3.125	1.348	4
Claims due to Fluctuation in Prices	10.4	22.9	29.2	16.7	3.188	1.259	2
Constructabil	17.7	14.6	13.5	16.7	2.969	1.293	8

ity of Design							
Physical Environmental Considerations	11.5	27.1	20.8	16.7	3.042	1.273	5
Delay in Release of Payments Emanating From Claims	7.3	17.7	20.8	21.9	3.323	1.210	1
Conflict of Interest among Project Team	12.5	26	14.6	15.6	2.948	1.243	9
Lack of Prompt Delivery of Materials by Suppliers	10.4	39.6	10.4	16.7	2.833	1.254	10
Non Availability of Specified Materials	15.6	36.5	18.8	5.2	2.615	1.118	12

Interference With Utility Lines	9.4	27.1	18.8	20.8	3.146	1.289	3
Extreme Weather Condition	22.9	44.8	10.4	1	2.219	0.954	13

Table 4.14: Appropriateness of mediation as dispute resolution method

	Percentage				Mean	Ranking	
	Not appropriate	Least appropriate	Appropriate	Highly appropriate			
Delay in Release of Payments	2.1	19.8	20.8	22.9	**3.427**	1.112	**1**
Emanating From Claims Choice of Procurement	14.6	15.6	26	20.8	**3.229**	1.341	**2**
Processes Inability of the Client to	16.7	14.6	29.2	19.8	**3.208**	1.368	**3**
Understand Design Claims due to Fluctuation in	17.7	14.6	29.2	16.7	**3.125**	1.348	**4**
Prices Interference With Utility Lines	11.5	16.7	16.7	15.6	3.083	1.194	5
Dispute due to accessibility to	21.9	15.6	29.2	14.6	2.990	1.388	6
Construction Site Lack of Prompt Delivery of	4.2	36.5	15.6	13.5	2.979	1.114	7
Materials by Suppliers Non Availability of Specified	11.5	32.3	15.6	14.6	2.896	1.235	8
Materials Constructability of Design	17.7	26	21.9	13.5	2.875	1.316	9
Conflict of Interest among Project	13.5	33.3	16.7	14.6	2.854	1.273	10
Team Dispute due to Material Shortage	18.8	33.3	18.8	14.6	2.771	1.349	11
Physical Environmental	16.7	24	14.6	9.4	2.760	1.176	12
Considerations Extreme Weather Condition	20.8	39.6	16.7	11.5	2.583	1.303	13

Table 4.15: Appropriateness of litigation as dispute resolution method

	Least appropriate	Somewhat appropriate	Highly appropriate	**Mean**	**Std. Deviation**	**Ranking**
Dispute due to accessibility to Construction Site	16.7	18.8	19.8	**3.083**	1.419	**1**
Delay in Release of Payments Emanating From Claims	22.9	12.5	26	**3.053**	1.517	**2**
Physical Environmental Considerations	24	15.6	19.8	**3.032**	1.410	**3**
Choice of Procurement Processes	15.6	19.8	18.8	**2.990**	1.440	**4**
Claims due to Fluctuation in Prices	17.7	25	17.7	2.885	1.406	5
Inability of the Client to Understand Design	20.8	20.8	15.6	2.875	1.386	6
Constructability of Design	28.1	20.8	15.6	2.785	1.338	7

Interference With Utility Lines	28.1	22.9	13.5	4 2. 84	1.292	8
Conflict of Interest among Project Team	16.7	24	14.6	4 2. 82	1.392	9
Lack of Prompt Delivery of Materials by Suppliers	21.9	19.8	15.6	3 2. 74	1.416	10
Non Availability of Specified Materials	22.9	11.5	15.6	0 2. 70	1.472	11
Dispute due to Material Shortage	25	17.7	16.7	8 2. 61	1.439	12
Extreme Weather Condition	32.3	20.8	7.3	5 2. 18 8	1.182	13

4.6.2.6 Establishment of appropriate dispute resolution method

Further to the individual descriptive analysis performed on the dispute resolution methods, cross tabulation analysis was carried out on all the dispute resolution methods using their respective mean score value. The average mean score was calculated across the variables and the calculated average mean was used as the benchmark for selection of most appropriate dispute resolution method that could be used to resolved disputes arisen from each of the dispute variables. The results in Table 4.16 thus show that: Arbitration is most appropriate for dispute due to; shortage of materials, claims in fluctuation of the materials price, physical environmental consideration, and conflict of interest among the project team. Litigation is most appropriate to resolve dispute due to access to the construction site. While Mediation is most suitable for dispute due to; inability of the client to understand design, the choice of the procurement process, delay in release of payment emanating from claims, lack of prompt delivery of materials by the suppliers, interference with utility lines and extreme weather condition. Lastly, Negotiation is most suitable for dispute arisen from constructability of the design and non-availability of specified materials.

Table 4.16: Identification of most appropriate dispute resolution method

	Mean score				Average of Mean score	Selected method	
	Partnering	Negotiation	Mediation	Litigation			
Choice of Procurement Processes	3.031	3.417	3.229	2.990	3.158	1	Mediation
Delay in Release of Payments	2.531	2.917	3.427	3.052	3.050	2	Mediation
Emanating From Claims							
Interference With Utility Lines	2.823	2.938	3.083	2.844	2.967	3	Mediation
Claims due to Fluctuation in Prices	2.677	2.938	3.125	2.885	2.963	4	Arbitration
Constructability of Design	2.563	3.073	2.875	2.854	2.867	5	Negotiation
Dispute due to accessibility to	2.333	2.802	2.990	3.083	2.846	6	Litigation
Construction Site							
Conflict of Interest among Project	2.833	2.698	2.854	2.823	2.831	7	Arbitration
Team							
Physical Environmental	2.479	2.771	2.760	3.031	2.817	8	Arbitration
Considerations							
Lack of Prompt Delivery of Materials	2.552	2.948	2.979	2.740	2.810	9	Mediation
by Suppliers							
Non Availability of Specified Materials	2.479	3.302	2.896	2.708	2.800	10	Negotiation
Inability of the Client to Understand	2.115	2.781	3.208	2.875	2.794	11	Mediation
Design							
Dispute due to Material Shortage	2.271	2.740	2.771	2.615	2.642	12	Arbitration
Extreme Weather Condition	1.833	2.156	2.583	2.188	2.196	13	Mediation

4.6.3 Identification of contractual claims associated with dispute factors

The results of the analysis presented in Table 4.17 showed the cross tabulation analysis performed on five identified contractual claim type commonly occurred during execution of building projects. The mean score value of the dispute variables was calculated and average mean across the claim types was also determined. Thereafter, the selection of most likely claim type associated with each of the dispute variables. Change order claims were most prevalent with; dispute due to shortage of materials, inability of clients to understand design, claims due to fluctuation in the price of materials, physical environmental consideration, conflicts among project teams and lack of delay in delivery of materials by suppliers. Conversely, cost and time claim is associated with; dispute due to access to sites, constructability of design, interference with utility lines and extreme weather condition. Also, loss and expense claim is associated with; choice of the procurement process and delay in release of payment emanating from claims, while variation order is most associated with non-availability of specified materials.

Table 4.17: Descriptive analysis to establish most significant claim in construction projects

	Mean score				Average of Mean score	Selected claim	
	Variation Order Claims	Contract Ambiguity Claims	Cost and Time Claims	Change Order Claims			
Delay in Release of Payments Emanating From Claims	3.010	2.865	3.333	3.333	3.152	1	Loss & expense
Choice of Procurement Processes	2.813	3.198	3.125	3.073	3.085	2	Loss & expense
Non Availability of Specified Materials	3.104	2.792	3.063	3.198	3.023	3	Variation order
Dispute due to Material Shortage	2.500	2.479	3.250	3.729	2.977	4	Change order
Constructability of Design	2.385	3.010	3.167	3.094	2.960	5	Cost & time
Conflict of Interest among Project Team	2.656	2.927	2.885	3.198	2.956	6	Change order
Lack of Prompt Delivery of Materials by Suppliers	2.646	2.781	3.010	3.250	2.956	7	Change order
Dispute due to accessibility to Construction Site	2.615	2.875	3.052	2.990	2.910	8	Cost & time
Claims due to Fluctuation in Prices	2.635	2.667	2.906	3.219	2.888	9	Change order
Physical Environmental Considerations	2.469	2.760	3.000	3.219	2.846	10	Change order
Inability of the Client to Understand Design	2.490	3.010	2.854	3.094	2.840	11	Change order
Interference With Utility Lines	2.406	2.823	2.885	2.760	2.735	12	Cost & time
Extreme Weather Condition	1.875	2.063	2.646	2.375	2.281	13	Cost & time

4.7 ASSESSMENT OF IMPACT OF DISPUTE ARISEN FROM CLAIM ON PROJECT PERFORMANCE

To ensure effective evaluation of contractual claims and to have dispute free construction projects, it is incumbent to assess the frequency of occurrence of the claims arisen due to these factors on project performance. Apart from the frequency of occurrence of these claims, a number of delay which construction professionals have experience on the projects they have executed in the past were also evaluated. Therefore, the results in Table 4.18 shows the descriptive statistics on frequency of occurrence while Table 4.19 presents the results on number of delay caused to building construction projects due to dispute arisen from claims.

In Table 4.18, showed that “disagreement on valuation of work” (mean score = 3.385) is ranked first been the most occurring claims disputes that affects project performance greatly. This is followed by “high cost of finance” (mean score = 3.281), “delay in release of payment due to contractor” (mean score = 3.188), “changes in design” (mean score = 3.188), “lack of prompt delivery of materials by suppliers” (mean score = 3.135) and “release of payment emanating from claims” (mean score = 3.073). On the number of delay caused by the claim factors, the results in Table 4.18 showed that “design changes” caused the highest number of delay in building construction projects, followed by “high cost of finance”, “client understanding of procurement process", "delay in delivery of materials by suppliers” and in the order of ranking as displayed in Table 4.19.

Table 4.18: Results of impact of dispute on project performance

	Percentage					Mean	Std. Deviation	Ranking
	Not at all	Least frequent	Sometimes	Most often	Very often			
Disagreement on Valuation of Work	9.4	15.6	28.1	20.8	26	3.385	1.284	1
High Cost of Finance	9.4	13.5	30.2	33.3	13.5	3.281	1.149	2
Design Changes	5.2	24	29.2	30.2	11.5	3.188	1.089	4
Delay in Release of Payment to Contractor	9.4	28.1	20.8	17.7	24	3.188	1.332	3
Lack of Prompt Delivery of Materials by Suppliers	8.3	22.9	27.1	30.2	11.5	3.135	1.148	5
Release of Payments Emanating from Claims	14.6	16.7	32.3	19.8	16.7	3.073	1.275	6
Non Availability of Specified Materials	11.5	25	25	25	13.5	3.042	1.230	7
Change In Micro Economic Policy	8.3	29.2	33.3	19.8	9.4	2.927	1.098	8
Compensation Issues	14.6	29.2	25	14.6	16.7	2.896	1.302	9
Undue Interference by the Client	21.9	33.3	27.1	9.4	8.3	2.490	1.179	10
Client Understanding of Procurement Processes	13.5	50	20.8	8.3	7.3	2.458	1.065	11
Poor Project Management	41.7	16.7	14.6	10.4	16.7	2.438	1.520	12
Fraudulent Practices Among Project Team	29.2	44.8	16.7	4.2	5.2	2.115	1.045	13
Access to Site	53.1	28.1	10.4	4.2	4.2	1.781	1.068	14

Table 4.19: Number of Delays caused due to Claims Factors

	More than1		Std. Deviation	Ranking
Design Changes	62	1.625	0.487	1
High Cost of Finance	46	1.479	0.562	2
Client Understanding of Procurement Processes	46	1.458	0.501	3
Lack of Prompt Delivery of Materials by Suppliers	44	1.438	0.499	4
Change In Micro Economic Policy	38	1.417	0.610	5
Non Availability of Specified Materials	42	1.417	0.496	6
Delay in Release of Payment to Contractor	36	1.375	0.508	7
Disagreement on Valuation of Work	38	1.372	0.486	8
Release of Payments Emanating from Claims	35	1.354	0.481	9
Compensation Issues	34	1.333	0.496	10
Undue Interference by the Client	27	1.271	0.447	11
Access to Site	23	1.219	0.440	12
Fraudulent Practices Among Project Team	16	1.156	0.365	13
Poor Project Management	17	1.146	0.410	14

4.8 DISCUSSION OF FINDINGS

This study was set out to develop an operational framework for evaluation of delay related contractual claims in the construction industry. It is against this background that the focus of this study was outlined.

The first task of this study was to identify the most prevalent contractual claims that are prone to dispute in the South African construction industry. The findings from the results of data analysis showed that; Change order claim, Variation order claim, Cost and expense claims and Dayworks claims are the most prone to a contractual dispute in the South African construction industry. This finding is corroborated by the assertions of notable researchers such as (Kumaraswamy, 1997:98; Cushaman, *et al*. 1996:3; Williams, 2003:19). Further to the aforementioned, reasons why claims are disputed and not settled in the original form they are been submitted was investigated. The findings from the results of the analysis revealed that lack of construction knowledge by the client to make appropriate decisions regarding their project is largely responsible for most disputes arisen from contractual claims.

Other findings on the reason why claims are disputed bothered on the inability of the client to understand the procurement process and contribute to the pre-contract process.

Findings on the modalities for settlement of claims identified several contributing factors to project claims as a result of the delay. These factors were grouped as; Design related, Construction related and Management related factors. Findings on design related factors showed; Dimension inaccuracies, Missing information on the drawing and Conflicting design information. Construction related factors revealed; competency of subcontractors and suppliers, change order by client during construction and contractor experience and control. While the three most contributing factors to claim due to project delay among management related factors were; cost of financing which is could be the prevailing interest rate form capital market, government interference, and conflicts among project parties.

On the inconsistencies in the operational dealings with contractual claims in the South African construction industry, both descriptive statistics and Principal Component Analysis (PCA) was used. The findings from the descriptive statistics revealed that; release of payment emanating from claims, quality of management and design coordination, non-availability of specified materials and change in micro economic policy are the most significant in the evaluation of contractual claims. Further analysis to affirm the delay factors and to have an empirical summary of the variable that capture the variability in the correlation pattern of the factors, PCA was used. Thus the findings from the PCA results revealed the establishment of three components that lead to the claim and dispute and the components are; construction process, supply chain management and construction finance management. However, these three components when combined explained 49% of the total variance.

The findings on the impact of disputed claims on project performance showed that disagreement on valuation of work is the most occurring claims disputes that affect project performance. This is followed by the high cost of finance, delay in release of payment due to contractor, changes in design, lack of prompt delivery of materials by suppliers and release of payment emanating from claims. This study also revealed that design changes, high cost of finance, client understanding of the procurement process, and delay in delivery of materials by suppliers caused the highest number of delays in building construction projects in South Africa.

4.9 CHAPTER SUMMARY

This chapter has presented and discuss the results of empirical analysis on the qualitative data gathered from the field survey. Appropriate inferences were deduced from the analysis results and justified amidst assertion of previous researchers on the subject of this study.

CHAPTER FIVE

CONCLUSIONS, RECOMMENDATIONS AND SUGGESTION FOR FURTHER STUDIES

5.1 INTRODUCTION

This study has dealt with the various aspects of Operational framework to evaluate delay related contractual claims in construction projects with specific reference to building projects in Western Cape Province, South Africa. The findings from analysis of the research data have been summarised based on the objectives in the previous chapter. Subsequent upon the analysis and exhaustive discussions of the results, conclusions and recommendations were drawn, as well as suggestions for further studies are presented in this chapter.

5.2 ACHIEVEMENT OF THE STUDY OBJECTIVES

This study was set out to develop an operational framework for evaluation of delay related contractual claims in the construction industry. It is against this background that the focus of this study was outlined through the formulation of the study objectives, on the basis of which the data for this study were sourced and analysis of the data was conducted. Figure 5.1 displays how the gap has been closed.

Figure 5.1 Closing the gap in knowledge as research objectives are achieved

Objective One: The first objective of this study was to identify the most prevalent contractual claims that are prone to dispute in the South African construction industry. To achieve this objective, extensive literature review was conducted to identify numerous

contractual claims that often resulted into dispute in construction projects. These claims were presented to the professionals in the construction industry through a quantitative survey and data gathered from the survey was analysed using descriptive statistical techniques. The findings showed that; Change order claim, Variation order claim, Cost and expense claims and Dayworks claims are the most prone to contractual dispute in South African construction industry.

Objective two: This was to identify the reasons why claims are disputed and not settled in the original form they are been submitted. Literature on disputes and related issues in construction projects were reviewed, a summary of information gathered from the literature form the basis for questions raised in the study questionnaire instrument. Sequel to data collection, descriptive statistical technique was used to analyse the data, mean scores were used to rank the variables determine the significant level of each variable. The findings revealed lack of construction knowledge by client to make appropriate decision regarding their project is largely responsible for most disputes arisen from contractual claims. Other findings on the reason why claims are disputed bothered on the inability of the client to understand procurement process and contribute to pre-contract process.

Objective three: this objective was to establish the inconsistencies in the operational dealings with contractual claims in the South African construction industry. To achieve this objective, both descriptive statistics and Principal Component Analysis (PCA) were performed on the quantitative study. In all, three components were established through the PCA results and these three components explained 49% of the total variance when combined. Also a dispute resolution method most appropriate to resolve contractual claims was established using the mean score on descriptive statistics for ranking.

Objective four: this objective was to determine the impact of disputed claims on project performance. This objective was, however achieved using descriptive statistical technique, the calculated mean score form the basis for the ranking of the factors. The finding showed that construction process, supply chain management and construction finance management., changes in design, lack of prompt delivery of materials by suppliers and release of payment emanating from claims. This study also revealed that design changes, high cost of finance, client understanding of procurement process, and delay in delivery of materials by suppliers caused the highest number of delay in building construction projects in South Africa.

5.3 CONCLUSIONS

Based on extensive review of relevant literatures on contractual claims and dispute in construction projects and the results of the empirical analysis conducted on the data retrieved from competent, experienced and qualified construction professionals, the following conclusions were made:

Investment in infrastructure is a key driver of economic growth, hence government spending to improve infrastructure have enjoyed a tremendous improvement to enable the efficient delivery of other services, reduces business costs, and acts as a catalyst for a higher economic growth and employment creation. The construction industry is the principal means by which infrastructure projects are provided and a prime target where the preferred new equity and redistribution policies of government can be realised. The study has found that delay-related claims are increasingly emerging and have become the most common and costly problem in construction projects which not only deny the client timely access to the completed facility but disrupt the overall performance of the building project.

This study also concludes that the contractual claims that often lead to dispute during execution of building projects are; Change order claim, Variation order claim, Cost and expense claims and Dayworks claim. Therefore, evaluation of these claims must be given careful assessment during the construction phase of a building project to forestall its attendant consequence on project performance.

On the factors that influence building project delivery, it is inferred that; client ability to make appropriate decisions, client understanding of the procurement process and client contribution to the pre-contract process are the most influential among all the factors considered. Thus, adequate awareness of the client on construction knowledge cannot be overemphasised to enhance speedy delivery of building projects

Inconsistencies in the operational dealings with contractual claims in the South African construction industry showed that; release of payment emanating from claims, quality of management and design coordination, non-availability of specified materials and change

in micro economic policy are the most significant in evaluation factors which must be considered in evaluation of accurate and undisputed contractual claims. This study also affirmed that the three principal components that lead to claim and dispute are; construction process, supply chain management and construction finance management. These three components when combined explained 49% of the total variance.

Several factors have been identified as predominating factors in the choice of dispute resolution method for dispute arisen due to contractual claims. This study showed that “Partnering” is suitable as a dispute resolution method for contractual dispute that may arise due to; Choice of procurement process, Conflict of interest among project teams, Interference with public utility and Claims due to fluctuation in price. Similarly, “Negotiation” as a dispute resolution method can be used to resolve due to; Choice of procurement process, non-availability of specified materials, constructability of design and lack of prompt delivery of materials by suppliers. While dispute due to; Delay in release of payment, contractual claims due to fluctuation in prices, interference with utility lines and choice of procurement process are best resolved using Arbitration. On “Mediation” as a dispute resolution method, it is concluded that it is best used for dispute due to; Delay in release of payment, choice of the procurement process, inability of the client to understand design, and claims due to fluctuation in price. Also, results of analysis on the suitability of “Litigation” to resolve dispute showed that; Access to construction site, delay in release of payment, physical environmental consideration and choice of procurement process disputes are best resolved using Litigation.

Further to the individual descriptive analysis performed on the dispute resolution methods, cross tabulation analysis was carried out on all the dispute resolution methods using their respective mean score value. From the results, it was concluded that: Arbitration is most appropriate for dispute due to; shortage of materials, claims in fluctuation of the materials price, physical environmental consideration, and conflict of interest among the project team. Litigation is most appropriate to resolve dispute due to access to the construction site. While Mediation is most suitable for dispute due to; inability of the client to understand design, the choice of the procurement process, delay in release of payment emanating from claims, lack of prompt delivery of materials by the suppliers,

interference with utility lines and extreme weather condition. Lastly, Negotiation is most suitable for dispute arisen from constructability of the design and non-availability of specified materials.

To ensure effective evaluation of contractual claims and to have dispute free construction projects, it is concluded that; disagreement on valuation of work must be avoided if not totally eliminate. Also, delay in release of payment due to the contractor, frivolous changes to building design, release of payment emanating from claims, lack of prompt delivery of materials by suppliers and the cost of finance such as (interest rates and inflation) must be guided against in all building projects.

5.4 RECOMMENDATIONS

Based on the research findings, the following recommendations are proposed;

1. Building clients should evaluate the quality performance, technical and financial performance of contractors using the factors highlighted in this study as a benchmark. This will result into a better understanding of the contractor's capabilities
2. The construction industry professionals should provide holistic management guidelines that will provide much needed construction knowledge to the client. The management guideline must be made available on all construction sites and should be enforced by consultant on projects.

5.5 SUGGESTION FOR FURTHER STUDY

This research study recommends, among other issues, the need for evaluation of factors that influence contractual claims and dispute in Civil and Infrastructure projects other than building in the South African construction industry.

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APPENDICES

Appendix A: The research questionnaire

Construction Management and Quantity Surveying Department,
Faculty of Engineering,
Cape Peninsula University of Technology
Symphony way Bellville, 7535.
E-mail:214129667@mycput.ac.za / awadsaad203@yahoo.com
August 2016.

Dear Sir/Ma,

Questionnaire for a research title: Operational framework to settle contractual claims in construction projects in South Africa

The above title is a Master of Construction research in the Department of Construction Management & Quantity Surveying, Faculty of Engineering, Cape Peninsula University of Technology. The research is aimed to develop an operational framework to evaluate delay-related contractual claims in construction projects.

This questionnaire is a significant part of the research project. We do appreciate that the questionnaire will take approximately 15-minutes of your precious time, but without your kind and expert input, the research objectives cannot be realised.

Kindly accept our utmost assurance that all answers and information's provided shall be treated with utmost confidentiality and used for academic purposes only.

Should you have any question(s) or would like further information, please do not hesitate to contact me on 074-802-8969 or email at: 214129667@mycput.ac.za / awadsaad203@yahoo.com.

Thank you very much for your valuable time to answer the questions and for your kind assistance.

Awad Saad Abdulla Saad
MTech Research Student
Tel (cell): 074-802-8969 / 214129667@mycput.ac.za / awadsaad203@yahoo.com.

Section A: General background information of the respondent (please tick √ appropriate option)

A.1. What type of Organisation do you work for? (Please √ thick appropriate option) Consultancy firm ☐ Building Contractor ☐ Others (Please specify)……
A.2. What is your professional affiliation? (Please √ thick all that is applicable) Quantity Surveyor ☐ Construction/Project Management ☐ Architect ☐ Engineer ☐ Others (Please specify)……..
A.3. Please give an indication of the size of organisation where you work in terms of cidb rating? (Please specify) ……
A.4. Your company regular client type? (Please √ thick all that is applicable) Public Sector ☐ Private Sector ☐ Private Client ☐
A.5. What is your position in the organisation where you work (please specify): ……
A.6. Kindly indicate your actual years of working experience in the construction industry: ……...

Section B: Particulars of the project

1. Kindly indicate the type of Building project being constructed (tick all that is appropriate)

Residential building		Institutional - Educational	
Commercial - office		Institutional - Health	
Commercial - retail		Industrial	
Hotel		Parking	

Industrial building		Others (please specify) ……..……..….. ……... …… ……..

2. Project scope (kindly specify in the space provided)

2.1	Project monetary value	a) Initial cost	
		b) Final cost	
2.2	Project duration	a) construction start date	
		b) Final completion date	
		c) Construction period as at tender award	
2.3	What percentage of the additional cost emanates from “Claims”?		
2.4	Kindly state the type(s) of the Claim that causes the additional cost		

Section C: Contractual claims prone to dispute

C1. Kindly rate the prevalent of the following Claims in construction project

Construction Claims		Not at all ……..… Highly prevalent				
		1	2	3	4	5
C1.1	Variation order Claim					
C1.2	Cost and expenses Claims					
C1.3	Change order Claim					
C1.4	Extra-work time Claims due to crashing of project schedule based on client request					
C1.5	Dayworks Claim					
C1.6	Contract ambiguity Claim					
C1.7	Other Claims …… ……					

Section D: Factors that impact on construction project delivery and reasons claims are disputed

D1. Kindly rate the client understanding of the following factors as it influences the construction project delivery process

Factors		No influence ……high influence				
		1	2	3	4	5
D1.1	Client understanding of Design process					
D1.2	Client understanding of procurement process					
D1.3	Client understanding of construction process					

D1.4	Client ability to contribute to the pre-contract process					
D1.5	Client ability to make authoritative decision at the appropriate time					
D1.6	Client making conflicting decisions					

D2. Kindly rate the contribution of these design, construction and managerial factors to project claims due to time delay

Factors		No contribution…….. high contribution				
		1	2	3	4	5
Design Related						
D2.1	Conflicting design information					
D2.2	Frequent revision of project drawings					
D2.3	Dimensional inaccuracies					
D2.4	Missing information on drawings					
D2.5	Inaccurate site investigation					
Construction Related						
D2.6	Analysing construction methods					
D2.7	Forecasted planning date, e.g. activity duration, resource scheduling, etc.					
D2.8	Local weather condition					
D2.9	Change order by client during construction					
D2.10	Contractor experience and control					
D2.11	Competency of subcontractors and suppliers					
Management Related						
D2.12	Government interference					
D2.13	Lack of coordination by contractor due to multiple projects					
D2.14	Poor project management					
D2.15	Bureaucracy					
D2.16	Conflicts among project parties					
D2.17	High cost of financing					

Section E: Inconsistences when dealing with contractual claims

E1. How often does the delay due to these factors lead to claims and dispute in construction projects?

Factors		Not at all …….. very often				
		1	2	3	4	5
E1.1	Access to site					
E1.2	Client understanding of the design, procurement and construction processes					

E1.3	Design coordination					
E1.4	Change in Micro-Economic policy					
E1.5	Constructability of design					
E1.6	Physical environmental considerations					
E1.7	Release of payments emanating from claims					
E1.8	Quality of management during construction					
E1.9	Lack of prompt delivery of materials by nominated suppliers					
E1.10	Non-availability of specified materials					
E1.11	Interference with utility lines					
E1.12	Extreme weather conditions					

E2. On a scale where 1 = Not appropriate; and 5 = highly appropriate, kindly rate the appropriateness of each of the dispute resolution method arising to due to the under-listed factors on a project (complete each box).

Factors		**Dispute Resolution method** **1**=Not appropriate …… **5**=highly appropriate				
		Partnering	Negotiation	Arbitration	Mediation	Litigation
E2.0	Example	3	4	5	1	2
E2.1	Dispute to shortage of materials					
E2.2	Dispute due accessibility to construction site					
E2.3	Inability of the Client to understand the design					
E2.4	Choice of Procurement processes					
E2.5	Claims due to fluctuation in prices					
E2.6	Constructability of design					
E2.7	Physical environmental considerations					
E2.8	Delay in release of payments emanating from claims					
E2.9	Conflict of interest among the project team					
E2.10	Lack of prompt delivery of materials by nominated suppliers					
E2.11	Non-availability of specified materials					
E2.12	Interference with utility lines					

E2.13	Extreme weather condition					

E3. On a scale where 1 = Not likely to arise; and 5 = highly likely to arise, kindly rate of the likeliness for arising of claims under following factors on a project (complete each box).

Factors		**Type of Claim** **1**=Not likely ..……..**5**= highly likely				
		Variation order claim	Contract ambiguity claims	Loss and expense claims	Cost and time claims	Change order claim
E3.0	Example	3	4	5	1	2
E3.1	Dispute to shortage of materials					
E3.2	Dispute due accessibility to construction site					
E3.3	Inability of the Client to understand the design					
E3.4	Choice of Procurement processes					
E3.5	Claims due to fluctuation in prices					
E3.6	Constructability of design					
E3.7	Physical environmental considerations					
E3.8	Delay in release of payments emanating from claims					
E3.9	Conflict of interest among the project team					
E3.10	Lack of prompt delivery of materials by nominated suppliers					
E3.11	Non-availability of specified materials					
E3.12	Interference with utility lines					
E3.13	Extreme weather condition					

Section F: Impact of dispute arisen from claim on project performance

F1. Kindly indicate the frequency of the following factors causing delay and state the number of delay caused to the projects you have executed due to these factors

Factors		Not at all ……..... very often					Number of delay caused
		1	**2**	**3**	**4**	**5**	
F1.1	Access to site						
F1.2	Client understanding of the design, procurement and construction processes						
F1.3	Design changes						

F1.4	Change in Micro-Economic policy						
F1.5	Funding problem due to high cost of finance						
F1.6	Release of payment due to contractor's						
F1.7	Release of payments emanating from claims						
F1.8	Compensation issues						
F1.9	Lack of prompt delivery of materials by nominated suppliers						
F1.10	Non-availability of specified materials						
F1.11	Disagreement on the valuation of work done						
F1.12	Poor project management						
F1.13	Un-due interference by the client						
F1.14	Fraudulent practices among the project team						

Thank you very much for sparing your valuable time for participating in the survey

Signed;
Awad Saad Abdulla Saad
Master Research Student
Tel (cell): 074-802-8969 / 214129667@mycput.ac.za / awadsaad203@yahoo.com