KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI, GHANA

COLLEGE OF ART AND BUILT ENVIRONMENT

DEPARTMENT OF BUILDING TECHNOLOGY

ALLOCATION OF RISK FACTORS ASSOCIATED WITH CONSTRUCTION CONTRACTS IN GHANA

BY

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A Dissertation Submitted to the Department of Building Technology, College of Art and Built Environment, in partial fulfilment of the requirements for the award of

Master of Science (MSc) in Construction Management

NOVEMBER, 2015

DECLARATION

I hereby declare that this submission is my own work towards the MSc. and that, to the best of my knowledge, it contains no material previously published by another person or material which has been accepted for the award of any other degree of the University, except where due acknowledgement has been made in the text.

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ABSTRACT

Risk is innate and broad in the construction industry. It cannot be ignored but managed, minimised, shared, transferred or accepted. Therefore the efficient management of risk is fundamental to the success of all construction projects. Risk identification is the first step of managing risk; however its allocation to any of the contracting parties tells whether or not it can be successfully controlled. In Ghana, some studies of risk in the construction industry have been conducted. However, none directed towards allocation of risk factors in construction contracts has been done. This study therefore was aimed at optimizing the allocation of risk factors associated with construction contracts in Ghana.

Hence the study sought to explore the current risk allocation practices in construction contracts, identify the effects of the current practices of risk allocation on contracting parties and project objectives, identify the obstacles to optimal risk allocation and further provide solutions to remedy the effects of current risk allocation practices in construction contracts.

In light of this, literature was reviewed and seventeen (17) current risk allocation practices, thirteen (13) clauses that unfairly allocate risk, ten (10) effects of the current risk allocation practices, eleven (11) obstacles to optimal risk allocation and nine (9) remedies to the effects of current risk allocation practices in construction contracts were found. A survey was conducted on clients, contractors and consultants in the Greater Accra and Ashanti regions with the aim of finding the efficient way of allocating risks among construction project contracting parties in Ghana.

The data collected were analysed using relative importance index and Spearman's rho correlation. Based on the analysis of the data, it was found that the four (4) main current risk allocation practices were: owners allocate risk by aversion; higher-tier parties use disclaimer clauses to prevent contractors from making genuine claims; sufficient time is not allowed at the tendering stage for risk assessment before risks are allocated and contractors assume high risks in order to secure jobs due to competitive markets. No damages for delay; consequential damages; differing site conditions and waiver of claims were also identified as the four main contract clauses that unfairly allocate risk among contracting parties. The four (4) main effects of current risk allocation in construction contracts found were: disputes between contracting parties; adversarial project environment and aggressive relationships between contracting parties; additional resources (time and funds) to manage the misallocated risks and more

construction claims leading to escalated final project account. The four (4) obstacles to optimal risk allocation that were found were: differing risk attitudes and perceptions among project participants; aversion to risk by project participants; lack of a joint risk management mechanism which include all project participants at the early stage of the project and static risk allocation for a dynamic construction industry.

The survey concluded that , current risk allocation practices in construction contracts are sub-optimal. And can be improved through:

- Effective negotiation and communication between contracting parties at all stages of the project life cycle
- Building trust and teamwork among contracting parties.
- Allocation of risks to the party that has the resource and expertise to manage them.
- Use of unambiguous language in writing contract terms.
- Any choice of a procurement route should be made in cognisance of the terms of agreements that will be used in the contract.

DEDICATION

I whole heartedly dedicate this research work to the Almighty God through whose exceeding abundance mercies and strength, I have bee 8n able to reach this height in my education.

Secondly, to my parents whose finance I have relied on for this project.

ACKNOWLEDGEMENT

"Bless the Lord, Oh my soul" (Psalm 103:1)

Many thanks to God Almighty for his boundless mercies and protection bestowed upon me throughout this research work.

My special gratitude goes to:

My supervisor, Mr. Joe Kingsley Hackman, a lecturer at the Department of Building Technology, KNUST. For his detailed supervision and constructive criticisms throughout this research expedition.

Finally, to my parents to whom I forever remain indebted for their prayers and financial support which has seen me succesfully through this programme. Not forgeting my bosom friend Miss Sheritah Manu for typing this project report.

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CHAPTER ONE – INTRODUCTION TO THE RESEARCH

1.1 Background of the study

A lot of studies point out that the construction industry is the backbone of both developed and developing economies. This is an undisputable fact since the industry provides infrastructure and employment for socio-economic growth (Anaman & Osei-Amponsah, 2007) and accounts for more than 60% of the Gross National Capital (Laryea, et al., 2010).

Irrespective of how small the construction business may be its contribution to the national economy in this regard is irrefutable (Amoah, et al., 2011).Therefore the industry is probable to stay as the key area of development activity as far as the provision and replacement of infrastructure becomes more imperative in the future. However, this is an industry where risk is innate and broad. The sources of construction project risks are numerous and one cannot attempt to have a total list of them all. But the key ones can be seen as: the complexity of the project, its location, technology, communication challenges, the type of client, type of contract, the procurement route, external influence (Syed, et al., 1999).

1.1.1 Risk defined

Risk in everyday use can be defined as "the possibility of loss, injury, disadvantage or destruction" (Britannica online dictionary, 2015) or "exposure to the chance of injury or loss; a hazard or dangerous chance" (Dictionary.com, 2015). However, its meaning is different in various disciplines. For instance the Business Dictionary (2015), defines risk as a likelihood or threat of damage, injury, liability or any other negative event that results from external or internal weaknesses and that may be escaped through proactive action. Whereas risk in the perspective of safety, health and environment can be defined as the likelihood that a substance or situation will cause harm under specified circumstances (Omenn, 1997).

Nonetheless, this study adapts a definition of risk that is cognisant with construction projects and contractual risks. Thus risk is an uncertain event or condition that if occurs can either create a negative or positive effect on at least one of the project objectives (PMBOK, 2008). Simply put the “effect of uncertainty on objectives” (ISO 31000:2009). And contractual risk as the possibility of risk emerging as a result of failure in contract performance (The Law Dictionary, 2015).

From the foregoing it is clear that risk cannot be ignored but managed, minimised, shared, transferred or accepted (Latham, 1994). This suggests that the management of risk in construction projects is vital to achieve the objectives of the said project. And a proper management of the major risks on a project will certainly lead to a successful project outcome.

Currently in Ghana, many projects have been abandoned (Twumasi-Ampofo, et al., 2014) and those that are even completed only meet fewer of the objectives (BaidenAmissah, 2000) that were set before their commencement; with a chunk of these in the public sector. The foregoing is evident that risks are ill-managed on such projects and consequentially all resources used on such projects have gone waste.

To curb this situation all stakeholders in a project should partake in the identification, assessment and planning for the risks specific to the project (PMBOK, 2008). This should be done at the initial stage of the project so as to make the various stakeholders aware of their responsibilities as far as the management of risk is concerned. And the management of risk in the project should be an on going process that continues throughout the project to ensure project success (PMBOK, 2008).

1.2 Problem statement

The Ghanaian construction industry is very vibrant and contributes immensely to the national economy, however it suffers from numerous risks that has forced many construction businesses to fold up and surviving ones running business at loss or making fewer profits.

Over the years it has been identified that risks have been informally managed (Yirenkye-Fianko & Chileshe, 2015) and allocation of risk improperly done in the industry. As a result there is no known records that contractors can rely on to improve their performance with regards to risk management. And therefore improve profitability to the contractor and satisfaction to the client and other stakeholders.

The key risks that construction companies are exposed to in Ghana are: financial risks, economic risks, change of government and government policies, operational risks, security risks, resources risk, technical and legal risks (Chileshe & YirenkyiFianko, 2011). Out of these risks, Chileshe & Yirenkyi- Fianko (2012), mentions that financial risk is most likely to occur in construction projects in Ghana and they have a great impact should they occur.

Similarly, Frimpong & Osei (2013), contends that most investors shun from investing in the local construction industry because of high financial risks. This is very true because the environment in which local contractors operate is constantly changing in the face of erratic economic environment, shifting political climate and highly competitive market (Ayirebi-Dansoh, 2005).

Indeed Ghana's constant changing economic environment is very challenging for construction activities which is seen to be capital intensive. Inflation and fuel prices keep increasing coupled with high exchange rate. Currently the exchange rate of the Ghana Cedi (GHC) to its major trading counterpart; the US Dollar (USD) is 4.2694 (Bank of Ghana, 2015) and inflation at 16.9% (Ghana Statistical Service, 2015).

However, in the midst of all these crisis the procurement route and form of contract which is the vehicle for allocating risk among contracting parties (Peckiene, et al., 2013) is still the traditional procurement system (Ren, et al., 2012) and the contract form; the Articles of Agreement and Conditions of Contract for Building Works (1988) commonly called the "Pink Form" (Tuuli, et al., 2007).

The traditional procurement system which separates design from construction has received numerous criticism for being susceptible to disputes and adversarial relationships, time consuming, fragmentation of project team, cost overruns, impaired quality and poor customer satisfaction (Ren, et al., 2012; Baiden, et al., 2005; Pesamaa, et al., 2009).

Furthermore, the industry is still inefficient with regards to contract management (Ahadzie & Amoa-Mensah , 2010; Tuuli, et al., 2007).For example there is a rampant delay in honouring Interim Payment Certificates (Fugar & Agyakwah-Baah, 2010) which significantly leads to time overruns (Dadzie, et al., 2012). Therefore the need for a procurement route and form of contract that will effectively apportion risks among contracting parties is long over due.

Studies of risk allocation have been done by (Roumboutsos & Anagnostopoulos, 2008; Jin & Doloi, 2008; Alexanderson, et al., 2008; Jin & Zhang, 2011; Perera, et al., 2009). A review of these studies reveals that risk must be allocated or apportioned to the contracting parties that can best manage it (Valipour, et al., 2014) and the choice of any procurement route for a construction project should be guided by the nature of the project and the client's attitude to risk (Latham, 1994).

However the Ghanaian situation is different. Clients are risk averse and push a lot of risk to the contractor, who in turn passes it onto a subcontractor. Hence the risk lands on the hands of the party who lacks the expertise to manage it (Alsalman & Sillars, 2013). The result is the rampant delays, cost overruns, work completed behind schedule, abandoned projects, sub-quality of completed projects and disputes.

This suggests that there exist problems in Ghana's procurement system and form of contract that is supposed to efficiently allocate risk among parties to ensure successful project implementation. It was against this background that this research work was carried out to assess the optimal way of allocating risk in the Ghanaian construction industry.

1.3 Research questions

The following are the research questions for this study:

- What are the current risk allocation practices in construction contracts?

- What are the effects of the current risk allocation practice on construction project objectives?
- What are the obstacles to optimal risk allocation in construction contracts?
- What solutions can best remedy the effect of the current risk allocation practices in construction contracts?

1.4 Aims and Objectives of the study

The aim of this study was to find an optimum way of allocating risk in the Ghanaian construction industry.

1.4 .1 Objectives of the study

To achieve the research aim the study focused on the following specific objectives to:

1. Explore the current risk allocation practices in construction contracts.
2. Identify the effects of current risk allocation practices on contracting parties and project objectives.
3. Identify the obstacles to optimal risk allocation in construction contracts.
4. Provide solutions to remedy the effects of the current risk allocation practices in construction contracts.

1.5 Significance of the study

The outcome of construction projects depend on how well risks are managed on the project. Efficient risk management is where the total cost of the particular risk to the project has been reduced, not necessarily the costs to any party separately (CII, 1993). This indicates that the object of risk management is to reduce the impact of risk on the overall project objective; time, cost and quality. And not how any party may benefit from it. However this is not the case in Ghana's construction industry.

It is therefore essential that an in-depth research is carried out on this subject. Clients, Contractors, Consultants and Academicians will benefit from the outcome of this study. The findings will provide; the Client more insight on the type of contract and procurement route that can help in the management of risks in a particular project at hand; Consultant and Contractors will gain knowledge on how to deal with risks at one of the critical stage of the project; the construction stage.

1.6 Outline methodology

Stage 1: Literature review and pilot study

A review of literature was done on risk allocation, focusing on current practices and examining their effects on project objectives. This was followed by a pilot study in the form of structured questionnaires to five clients and five contractors who have commissioned and experienced the management of large construction projects.

Stage 2: The main study

The pilot study was a fore runner which prepared the ground for designing the main study questionnaire. Thus the pilot study ascertained whether the questions were simple to understand, right for the research and unambiguous (Fellows & Liu, 2008). A quantitative data collection approach was adopted and the opinions or views of large number of respondents; collected and statistically analysed.

Stage 3: The write up

This was the stage where the actual write up of the report was done and it covered the chapters listed in the next section.

1.7 Proposed structure of the dissertation

Chapter 1 – Introduction

Chapter 2 – Literature review

Chapter 3 – Methodology

Chapter 4 – Analysis and discussion

Chapter 5 – Conclusions and recommendations

1.8 Scope of the study

This research study was conducted within the scope of the various contracting parties as far as construction projects are concerned. This includes Clients (both cooperate and public), D1K1 Building Contractors and Consultants comprising mostly Quantity Surveyors, Engineers and Architects in the Greater Accra and Ashanti regions.

CHAPTER TWO – LITERATURE REVIEW

2.1 Introduction

Key words: The construction industry, Sources of risk, Risk Management, Risk allocation

This chapter reviews and discuss a vast literature on the subject of risk in the construction industry. First a general overview of risk in the construction industry is discussed. The discussion is then focused on the objectives of the study considering the following areas: risk and uncertainty, the concept of risk and the construction industry's position on risk, current practice of risk allocation in the industry, problems with the current practice of risk allocation and obstacles to optimal risk allocation.

The construction industry is one of the world's largest industries, it is not surprising that its contribution to the global gross domestic product (GDP) is about 13% and likely to hit 15% by year 2020 (Schilling, 2013). Locally it contributes 11.8% of Ghana's GDP (Ghana Statistical Service, 2014). And provide employment to both skilled and unskilled labour. Thus it is a source of income to people of little education or skill many of them coming from poorer part of society. (International Labour Organization, 2001). Therefore an improvement in the industry will impact positively on the lives of many and on the world's economy at large.

However construction projects suffer from a myriad of risks and uncertainties compared to any other industries (Rashid, et al., 2008). The sources of risks are infinite and one cannot attempt to have a list of them all. Nonetheless, according to (Syed, et al., 1999)the key ones can be seen as:

- Complexity of the project,
- Its location, technology,
- Communication challenges,
- Type of client,
- Type of contract,
- Procurement route,
- External influence

These sources of risk are present and unavoidable at almost all of the stages of the project life cycle (Rashid, et al., 2008).

From the brief through the feasibility to the conceptual design stage; political, financial, choice of technology, procurement route are some risks at the first stage of a project. At the design stage; design errors, design changes, and technical risks are some risks at this stage. The construction phase is characterised by the following risks; occupational health and safety issues, financial risks, environmental risks, uncertainty in cost estimates and schedules, acts of God, scarce resource and site condition problems to mention a few. As a result one could realise that risks and uncertainties are inevitable at each stage of the project life cycle. So a planned risk management process is required to be wield them (El-sayegh, 2008).

2.1.1 Risk Management

Risk management practices encompasses risk management planning, identification, analysis, response, monitoring and control of risk on the project with the object of increasing the probability and impact of positive events and decreasing the probability and impact of negative events in the project (PMBOK, 2008). Risk management planning refers to steps taken to come up with a guide that defines how the conduct of risk management activities will be done; Risk analysis refers to estimating the likelihood and impact of the risk; Risk response is concerned with establishing alternatives and actions to improve opportunities and decrease threats to project objectives; monitoring and controlling of risk means implementing risk response plans, tracing identified risks, monitoring residual risks, identifying new risks and examining risk process efficacy throughout the project (PMBOK, 2008;

Zavadskas, et al., 2010).

2.1.2 Risk Allocation

Allocation of risk is a central part of the risk response process with the aim or object of assigning responsibility and accountability of risks to various parties involved in the project. There are numerous ways of risk response or allocation strategies that construction managers can opt for namely: risk avoidance, transfer, mitigation, acceptance, and sharing (El-sayegh, 2014). Studies suggest that equitable risk allocation is the best and fair means of dealing with risk allocation. However Peckiene, et al., (2013), contends that this seldom exist because risk allocation lies solely in the bosom of only one party, the client. The foregoing is quiet true because usually it is the client that prepares the contract agreement. However, it can be argued that the contractor also has a role to play as far as the contract is concerned. Thus the onus is on the contractor to scrutinise the clauses in the contract and bring to the notice of the client any errors, clauses he does not understand and clauses he will wish to be added.

The actual problem with fair risk allocation is that contractors fear that they may be branded as litigants and therefore be blacklisted for future projects if they point out errors, object certain clauses in the contract and even want to exercise their right to certain claims in the contract as the project progresses. For instance in Ghana, contractors are usually unwilling to take action concerning delayed payments for fear of being blacklisted or shunned for future jobs (Tuuli, et al., 2007; Chileshe & Yirenkyi-Fianko, 2011) .This as a result, negatively influence the attitude of the parties and impact on project objectives; time, cost, quality (Zaghloul & Hartman, 2003).

Risk allocation in the construction stage will be dealt with in this study, because construction projects are progressively elaborative as such it is at the construction stage that risk is more critical. Thus at this stage the project is strongly exposed to higher risks as it is no longer a proposed plan or concept (Keith, 2006).

2.2 Risk and Uncertainty in construction projects defined

This section discusses risk and uncertainty from different views starting from their everyday usage, their meanings in different industries and then focusing finally on their meaning in the construction industry. With the object of making the reader understand their similarities and differences.

Risk and Uncertainty though have different meanings have been used interchangeably by different authors in different disciplines. It is therefore significant that these two terms are discussed in depth from the perspectives of different industries to show their distinct nature.

2.2.1 Meaning of risk in everyday use

The Britannica online dictionary defines risk as “the possibility of loss, injury, disadvantage or destruction” and uncertainty as “the quality or state of being uncertain; lack of certainty” (Britannica online dictionary, 2015). Dictionary online also defines risk as the “exposure to the chance of injury or loss; a hazard or dangerous chance” and uncertainty as the state of being uncertain; doubt; hesitancy” (Dictionary.com, 2015).It is therefore clear there is a distinction between risk and uncertainty in everyday use; the former is used to denote a positive likelihood that a hurtful event might take place, whereas, the later denotes a state of doubt but does not imply any probability (Rose, 2001). However, there is similarity in the common usage of these terms; they both imply the future cannot be precisely defined or determined.

2.2.2 Meaning of risk in economics and business

One author who have done extensive work in economics with regards to risk and uncertainty is Frank H. Knight. He defines risk as a future event that occur with quantifiable or measurable probability and uncertainty as future events that may occur but cannot be calculated or defined (Knight, 1921). Based on these definitions one can confidently say that risk is measurable and uncertainty is unmeasurable.

The Business Dictionary (2015), defines risk as a likelihood or threat of damage, injury, liability or any other negative event that results from external or internal weaknesses and that may be escaped through proactive action and uncertainty as a situation where the present state of information is such that:

- The nature of things is anonymous
- The impact, scope or magnitude of event cannot be anticipated and
- Reliable probabilities cannot be apportioned to possible outcomes

2.2.3 Meaning of risk in safety, health and environment

Risk in the perspective of safety, health and environment can be defined as the likelihood that a substance or situation will cause harm under specified circumstances (Omenn, 1997). This definition is closely related to construction safety and considers two factors; the likelihood of occurrence of an adverse event and its effect should it occur.

2.2.4 Meaning of risk in construction projects

Making a shift towards the construction industry and reviewing some definitions of risk and uncertainty will be helpful. The following are some of definitions of risk and uncertainty as far as the construction projects are concerned:

- The Project Management Institute (PMI) defines risk as an uncertain event or condition that if occurs can either create a negative or positive effect on at least one of the project objectives (PMBOK, 2008).
- Akintoye & Macleod, (1997) define risk as the possibility of unexpected events occuring which can badly affect the successful execution of the project with regards to time, cost and quality
- Risk is a probable future event whose manifestation and impact are unknown however can affect the company's ability to obtain its project goals (Loosemore, et al., 2006).
- According to (Mahendra, et al., 2013) risk is any event or action which may hinder the realisation of project goals.
- The International Standards Organisation (ISO) defines risk as the "effect of uncertainty on objectives" (ISO 31000:2009).

The foregoing clearly gives a distinction between risk and uncertainty though the definitions from various disciplines are of diverse views. Additionally they propose that there is some similarity between the two terms. Thus the risk event is as a result of the uncertain situation.

The definition provided by the Project Management Institute (PMI) and the International Standards Organisation (ISO) denotes that risk is as a result of uncertainty. Uncertainty in this regard is closely linked to the project performance criteria or objectives; time, scope, cost and quality. However, the PMI's definition considers in a broader perspective, that risk is calculable from events that can impact negatively or positively on project performance.

To this end one can say that risk is a state or condition in which the decision maker is handicapped as far as adequate data, information and past experience are concerned. This makes decision making tougher. The researcher therefore defines risk as a situation or condition in which project participants lack the knowledge to take effective decision on project variables at the outset or during project implementation which can negatively or positively affect project goals.

2.3 The concept of risk: the stand of the construction industry

This section discusses the two main concepts of risk: the objective and subjective concepts giving the distinction of both concepts and further points out the position of the construction industry as far as these concepts are concerned. Risk has always been part of the human race, arguably each significant breakthrough in human civilization has been possible through people's readiness to take risk and challenge or confront the state of affairs. This implies that risk and survival in man's history have a correlation.

There is a vast literature or knowledge on risk; all affirm that there are two concepts of risk; Objective and Subjective concepts of risk (Zhang, 2011; Holton, 2004). The former is of the view that risk is an objective or material fact which can be elaborated, forecasted and managed by science. And is devoid of people's perception and subjective values (Bradbury, 1989). Thus risk is real, factual and quantifiable through statistical analysis. In this concept, risk is often analysed as a product of the probability of the risk occurring and its impact (Thompson & Dean, 1996). The latter concept assumes or considers risk analysis not to be an objective fact but rather based on the influence of people's interest, values, culture and organizations (Busby & Zhang, 2008; Dimitroff, et al., 2005).

A critical assessment of these two concepts reveals that risk cannot be defined or conceptualized in isolation of either concept. Both concepts must be integrated to give a more concise meaning and understanding. Risk is a very complex subject and trying to conceptualise it solely on either views is just an attempt to deny an intricate concept its intricateness or complications (Hansson, 2010).

The construction industry attests or affirms this argument. Even though the industry's management of risk could be to a large extent seen as an acceptance of the objective concept, the myriad of risks in the industry is managed by people. Hence the subjective aspect is present. Construction managers are likely to make a trade off in decision making with regards to risk without following the standardized rationality of project risk management (Kutsch & Hall, 2009). Thus the subjective part is in the bosom of the decision maker, here the project manager (Turvey, et al., 2013).

Considering the conflicted nature of project success risk management in construction projects cannot be done relying solely on one concept but rather both if a proper management of the risk is desired. However there is little work on the concept of subjectivity of risk (Zhang, 2011). This as a result has given room to the widespread use of the objective concept of risk in many industries inclusive of the construction industry.

It is therefore encouraged that more work is done in both areas of the two concepts with an attempt of unifying both because the benefits that may be reaped is insurmountable.

2.4 Current practice of risk management in the construction industry

This section defines risk management in the perspective of the construction industry, elaborates on the risk management processes and discusses the practice of risk management in the Ghanaian construction industry.

Max Abrahamson, the renowned construction lawyer, viewed risk management as "the most delicate and dangerous subject I could find" (Abrahamson, 1984). This statement affirms the intricate nature of risk in the construction industry and further denotes how tough it is to manage risk (Potts, 2008).

All construction projects are progressively elaborative. This means that work on the project becomes broader as it progresses, for that matter there is little information at the inception stage to take certain decisions. However as the project progresses more data and information become available and risk reduces because of the increase level of certainty (Goh & Abdul-Rahman, 2013). It is important to also note that risk sources may change as well. All these contribute to the industry being noted for its appalling attitude in managing risk.

Risk management is a process which unravels project risks, analyse them and find actions to solve the consequences on any project (Mahendra, et al., 2013). According to (Loosemore, et al., 2006) risk management is an anticipatory or proactive decision making process which entails accepting known risks and taking actions to reduce their effect and probability of occurrence in order to minimise threats and maximise opportunities.

From these definitions of risk management one could realise that the objective of managing risk is not to eliminate it but to reduce its probable occurrence and impact on project objectives (Potts, 2008). This is true for risks that have negative impact on the project but for risks that provide opportunities or impacts positively on the project; they need to be exploited.

Irrespective of the numerous risk management processes proposed in literature (PMBOK, 2008; Loosemore, et al., 2006; Chapman, 1997; Tah & Carr, 2001) the five major risk management processes used extensively in the industry include: risk planning, risk identification, risk analysis, risk response and risk monitoring and control.

A proper execution of a risk management system on projects alerts the parties of the threat of risk on the project, places the risk in the grips of the parties and creates a proper medium of transferring risk information between parties.

The project risk management processes are explained below.

- *<u>Risk planning</u>*: entails putting in place as a team a blue print or laid down procedure that foretells how any risk inherent in the project will be dealt with. Indeed if you fail to plan you have already plan to fail therefore this first stage of the risk management process is very vital as it provides enough resources and timing requirements for managing the risks and sets the stage for the other processes.

- *Risk identification*: this involves searching or identifying inherent threats that are prominent in the project using tools and techniques like: checklists, brainstorming, root cause analysis, Delphi techniques, charts, cause and effect diagrams, influence diagrams, SWOT analysis and interviewing. This identification process is an art not science (Barkley, 2004) based on years of experience and gut feelings.
- *Risk analysis*: this involves evaluation and prioritisation of risks identified. It takes two forms; first Qualitative risk analysis followed by Quantitative risk analysis. The Qualitative risk analysis aims at assessing the priority of risks identified taking cognisance of their relative likelihood of manifestation, their resultant threat on project objectives should they occur, without ignoring other factors like time period of response and the tolerance level of risk by the organization with regards to project objectives (PMBOK, 2008).Some techniques used in Qualitative risk analysis are: expert judgement, probability and impact matrix and risk data quality assessment. It also prepares the ground for the Quantitative risk analysis. The Quantitative risk analysis focus on risks that were prioritised by the qualitative risk analysis making use of techniques like probability distributions, sensitivity analysis and expected monetary value analysis (decision tree diagrams) to quantitatively analyse the effect of those risk events.
- *Risk response*: this refers to the set responses that were outlined by the project team regarding the various risk events at the initial stage of the project. This is a proactive attitude towards risk events as contended by Loosemore, et al.,(2006) and will do the project team a lot of good as far as the management of risk is concerned on the project.There are a number of risk response approaches that the project team can rely on; risk avoidance, acceptance, mitigation,

transfer and sharing, however the decision is best arrived at through the use of decision tree to compare alternative outcomes (El-sayegh, 2014).

- *Risk monitoring and control*: The monitoring aspect deals with observing changes that has taken place as the project progresses with regards to risk whilst the control deals with the risk responses as risks emerges and are dealt with on the project. This is accomplished through the updating of the risk register and through frequent meetings (Webb, 2003). Monitoring and control of risk makes use of trend and variance analysis which requires data collected as the project is being executed. Another object of risk monitoring and control is to check whether the project assumptions are still valid, risk has change or can be removed, the risk management plan is being adhered to and contingency reserves are in alignment with regards to cost and schedule (PMBOK, 2008).

These risk management processes need to be constantly reviewed because of the dynamic and diverse nature of risk and the construction industry respectively.

2.4.1 Risk Classification in construction

Risk classification has been viewed by many authors as one of the significant steps in project risk management. Risk classification equips the project team with the ability to identify risks and thereafter chose the best risk management strategy (Huchzermeier & Loch, 2001; Walke, et al., 2011). It is not possible to identify all risks that are inherent in the project at its inception stage. This makes it clear that new risks are likely to be identified or may emerge as the project progresses (Schieg, 2006). Therefore classification of the risks help the project team to know where to place the newly found risk with respect to their initial classification and to a large extent inform them on what response action to take.

Classification of risk in the construction industry can be done according to their sources, consequence or impact, frequency of occurrence and the mitigation measure required. A review of literature reveals that there is no consensus as to which particular method of classification of risk is unanimously accepted.

Tah & Carr, (2001), suggests a two level hierarchical approach to risk classification; external and internal as shown in figure 2.1

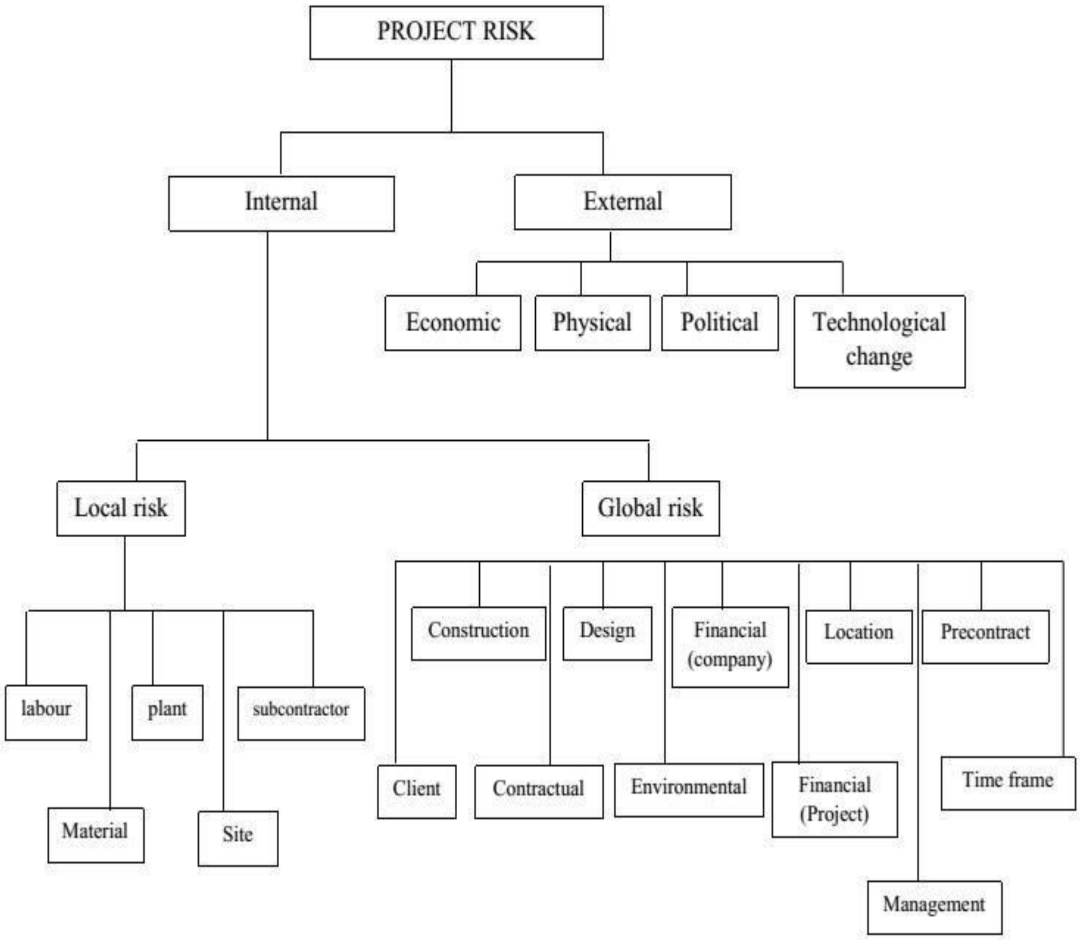

Figure 2.1: Hierarchy Classification of project by (Tah & Carr, 2001)

Shen, et al., (2001) classifies risk into six groups based on the nature of the risk; financial, legal, management, market,policy and political as well as technical. (Flanagan & Norman, 1993) classify risks into three namely: consequence, type of risk and impact of the risk as shown in figure 2.2

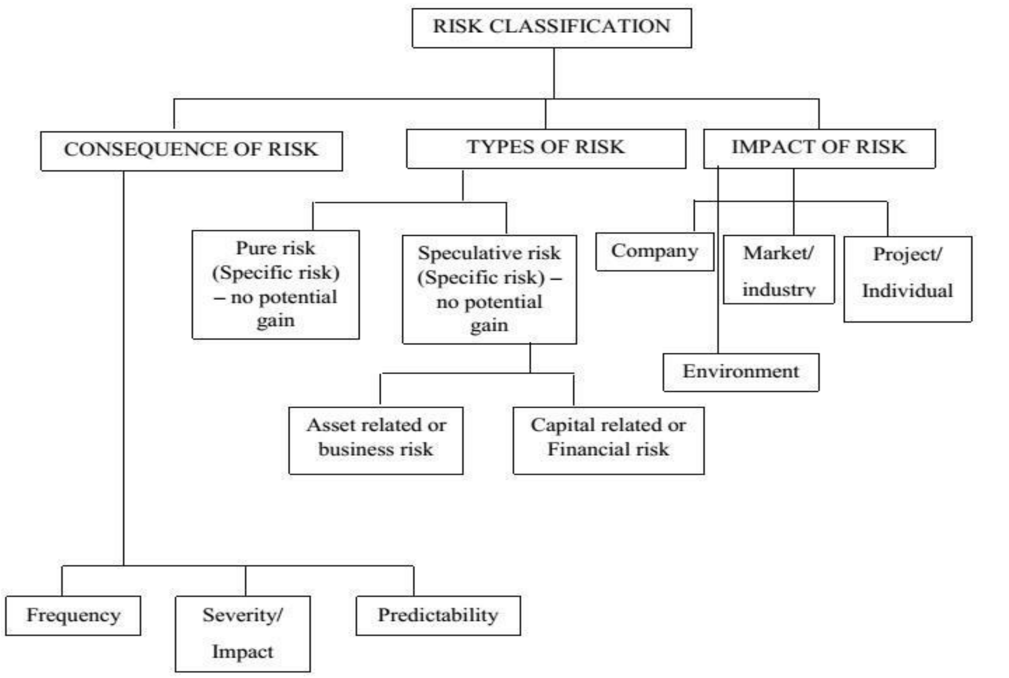

Figure 2.2: Classification of Risks by (Flanagan & Norman, 1993)

Zavadskas, et al., (2010) also suggested three levels of risk classification; external, internal and project risks along with the source of each level as shown in figure 2.3

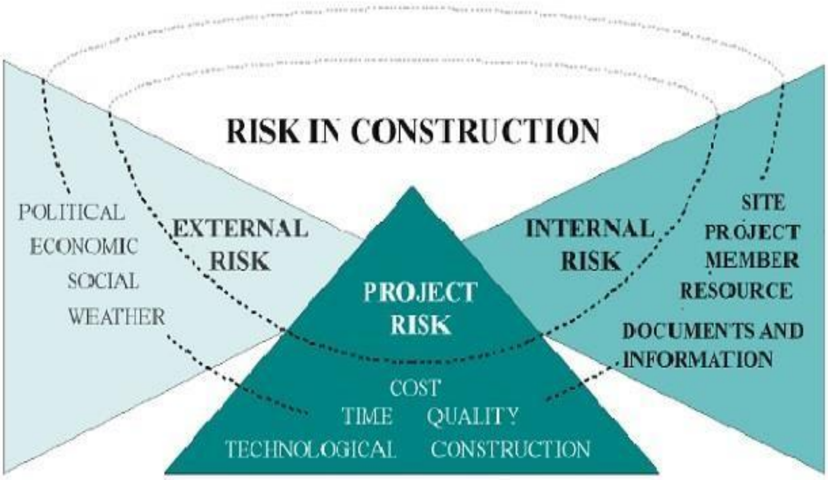

Figure 2.3: Risk Classification by level in construction projects (Zavadskas, et al.,2010)

Even though there is no particular accepted method for risk classification in the construction industry, the source-based approach is one of the significant approaches (Baloi & Price, 2003) and this may be attributed to its simplicity, logic and ability to cover a wider scope.

In short, any choice of a particular classification method should service the object of the project. Hence the classification of risk by Zavadskas, et al., (2010) will be considered in this study. However, the internal risk level suggested in this model will be extended to include risks that are perculiar to the enterprise; risk atitude of management, financial and technological ability and size of company. These will be considered because it is believed that the type of enterprise and how it is being run is also a source of risk to the project.

This classification will be used throughout the study to identifty risk allocation problems and the obstacles to optimal risk allocation.

2.4.2 Risk Allocation in construction

Risk allocation is essential to the management of risks in any construction project. Managing risk in the construction industry requires that risks are identified and efficiently allocated among contracting parties (Andi, 2006). Risk allocation in construction refers to the determination of which of the contracting parties in the project is responsible to deal with a particular risk (Wibowo & Mohammed, 2010). It is therefore clear that the vehicle or medium for allocating risk on any construction project is the contract. Thus the object of construction contract agreement is to aportion rights, duties, responsibilities and risk between contracting parties (Peckiene, et al., 2013).

The subject of risk allocation among contracting parties in the construction industry have been studied by (Roumboutsos & Anagnostopoulos, 2008; Jin & Doloi, 2008; Alexanderson, et al., 2008; Jin & Zhang, 2011; Perera, et al., 2009). A review of these studies reveals that risk must be allocated or apportioned to the contracting parties that can best manage it (Valipour, et al., 2014). The party who can best manage the risk should be one who have the capacity to precisely examine the risk (Loosemore & McCarthy, 2008) and the resources to satisfy the threat of the risk, the requisite intruments and the expertise to use those intruments (Abednego & Ogunlana, 2006; Loosemore & McCarthy, 2008). However it is difficult to correctly measure the risk tolerance level of each contracting party at the inception stage of the project so that it could guide in the allocation of the project risks (Shenfa-fa & Xiaoping, 2009).

The contract cannot be the only medium to manage or apportion risk in construction projects, the procurement route also play a key role in the allocation of risk as well. This is because usually it is the procurement route that informs the contracting parties on the type and form of contract to be used as well as the terms and conditions to be considered in writing the contract aggreement.

Basically, literature confirms that the Traditional and Integrated procurement systems are the two main procurement routes for project delivery (Onosakponome, et al., 2011; Harris & McCuffer, 2005). The Traditional Procurement System is sequential in nature; thus design preceeds production (Kwakye, 1997). The foregoing suggests that design is completed by the client's design team before contractors bid for the project. Whereas the Integrated Procurement system attempts to put together both the design and construction process (Kwakye, 1997). Many variants of the Integrated procurement system exist. These are not limited to: Design and Build, Management contracting, Construction Management and Aliancing.

Onosakponome, et al., (2011), posit that the Traditional Procurement System grants maximum cost certainty for a well defined project. However, Kwakye, (1997) argues that the time used to finish design before tendering escalates the overall project time and cost.

The foregoing suggests that for a Traditional Procurement System, the client takes the risk factors associated with design whereas the contractor takes that associated with construction. However, in the Integrated Procurement System, the risk factors associated with both design and construction is placed in either of the parties. For example a design and build procurement route places the risks of both design and construction on the contractor. However in the case of a construction management route, the client is exposed to higher risks due to the direct contract which exist between the client and a number of trade contractors; coupled with the absence of an overall contract programme or contract sum until design is complete and all packages are let (Langdon & Rawlinson, 2006).

A study by Seng & Yusof, (2006) depicts how procurement routes allocates risk between the client and contractor as shown in Figure 2.4

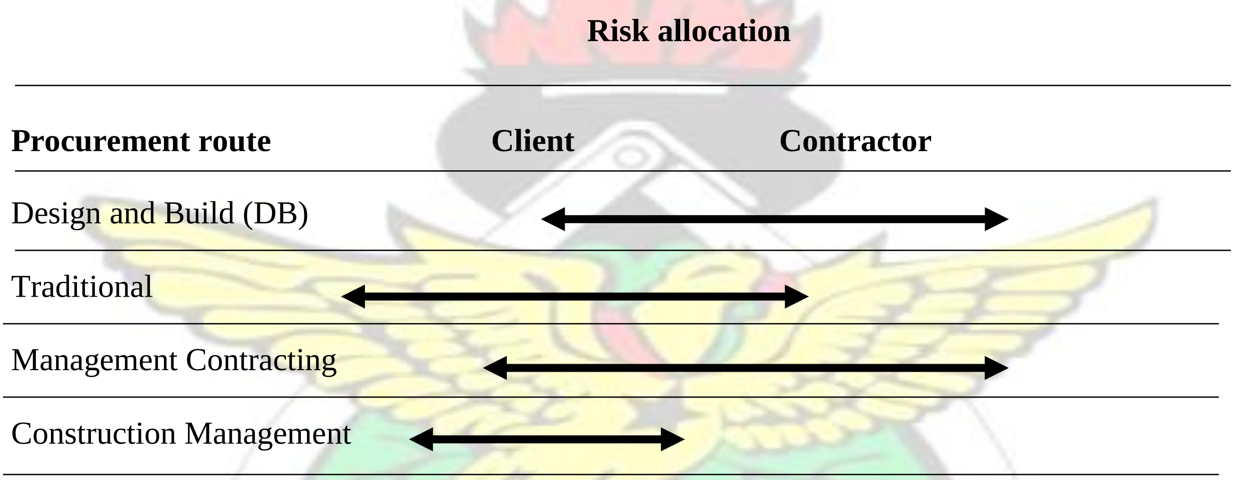

Figure 2.4: Risk Allocation in each type of procurement route

(Seng & Yusof, 2006)

The choice of any procurement route for a construction project should be guided by the nature of the project and the client's attitude to risk (Latham, 1994). Therefore unknowledgeable clients will need to be advised on their choice of any procurement route.

Studies have shown that equitable risk allocation is the best way to allocate risk among contracting parties in the industry. However, not only is this elusive but the decision

lies with the owner since he or she usually prepares the contract agreement (Peckiene, et al., 2013). As a result owners tend to push more risk to the contractor and this often lead to higher pricing on the part of contractors to cover risks
(Dell'Isola, 2003) and disputes among contracting parties (Zaghloul & Hartman, 2003). No wonder contractors will have to cope with risk and owners have to pay for them (Flanagan & Norman, 1993). Hence the current practice of risk allocation is not optimal and have problems. These problems is discussed in the section 2.5

2.4.3 Practice of risk management: the Ghanaian situation

Irrespective of the vast literature on risk management, professionals in Ghana's construction industry, tend to deal with risk in an arbitrary manner. Several methods of contingency estimating to cater for risk are available, these are not limited to: traditional percentage, method of moments, Monte Carlo simulation, factor rating, individual risk-expected value, range estimating, regression, artificial neutral network, fuzzy sets, controlled interval memory, influence diagrams and theory of constraints (Ahmad, 1992; Moselhi, 1997; Diekann & Featherman, 1998).
However, the Traditional percentage method of contingency estimation which involves just the addition of an across-board percentage to the base estimate based on gut feelings, experience and historical data (Baccarini, 2004) is widely used in Ghana (Laryea & Hughes, 2009).

For example, it is a normal practice for professionals to just add a percentage onto the estimated cost of a project as a contingency to cater for risk. Usually this percentage ranges between 5-10% (Laryea & Hughes, 2009; Mills, 2001). These percentages themselves are not based on any formal or analytical approach, rather it is based on years of experience and gut feelings (Laryea & Hughes, 2009). Laryea & Hughes (2009), further noted that the allowances that contractors make for risk in tendering appears to be based on their worries about competition and wining the bid rather than the actual cost of risk. This indicates that the practice of risk management in the Ghanaian construction industry is informal (Yirenkye-Fianko & Chileshe, 2015).

The purpose of contingency funds is to cater for the risk of overrun of project objectives to a level acceptable to the organization (PMI, 2000). This suggests that contingencies are budgets set aside to cope with risks and uncertainties that may incur schedule and cost escalation (Baccarini, 2004). Therefore if the estimation of contingencies for risks are done in an arbitrary way, then this could lead to cost overruns (Hart, 2007; Hartman, 2000).

One of the major reasons why the Traditional percentage contingency estimation method has been relied upon for long is that there is a lack of familiarity with the appropriate techniques and tools for managing risk among professionals in the Ghanaian construction industry (Yirenkye-Fianko & Chileshe, 2015). In addition, the curriculum for construction related courses does not include risk management at the early stages. Thus it usually at the higher level that it is included, therefore professionals who did not get the opportunity to attain higher education may lack the knowledge in risk management. This has led to the ineffective management of risk in the local industry and the resultant collapse of some construction companies in the country (Agyakwa-Baah, et al., 2010).

There is therefore the need for local companies to train their staff with respect to tools and techniques in managing risk in the local industry. And educational institutions offering construction related courses should include risk management in those courses at the early stages to equip students with the requisite skills in risk management so that as they graduate into industry they can analytically deal with risk.

2.4.4 Risks that need critical attention in construction contracts

A study conducted by the Construction Industry Institute (CII) identified top 14 risks that are usually inappropriately allocated. These are listed below:

- No damages for delay
- Consequential damages
- Indemnity
- Ambiguous acceptance criteria
- New or unfamiliar technologies
- Force majeure
- Schedule acceleration
- Cumulative impact of change others
- Owner – mandated subcontractors
- Insurance allocation
- Differing site conditions
- Design responsibility
- Waiver of claims
- Standard of care

Source: (CII, 2007)

Some of these risks are discussed below:

2.4.4.1 No damages for delay

These are clauses included in contract documents by higher-tier parties like owners and contractors. The main object of this clause is to limit or eliminate recovery of damages by lower-tier parties for delays caused by higher-tier parties (Bradford & Awad, 2012). Thus owners include this clause to prevent contractors from claiming for damages for owner- caused delays.

According to Perten (2014), no damages for delay clauses provide that the sole remedy for lower-tier parties for suffering delays caused by owners is extension of time. (Perten, 2014) , further noted that in such situations lower-tier parties are unable to recover cost incurred for owner-caused delays as a result of working out of sequence and overtime to meet completion dates.

The foregoing may motivate lower-tier parties to cut corners to survive under the contract or in a worse case bring a case against higher-tier parties in court. Which in turn will have severe impact on project goals.

2.4.4.2 Indemnity clause

To indemnify is to "hold harmless" but rather accept responsibility or liability for certain judgements resulting from third party claims against the other party (Hess, et al., 2013). These clauses limit the liability of bodily harm, death or injury of contractor employees, owner employees and third parties to the owner (Bradford & Awad, 2012). Thus if any of such incidence occurs the contractor would be held liable.

The essence of an indemnity clause is to waive off risks that are not within the control of a party to a contract (Murai, 2015). For example an indemnity clause from AIA A201 General conditions reads: “Contractor shall indemnify and hold harmless the Owner, Architect, Architects consultants and agents and Employees of any of them from and against claims, damages, losses and expenses including but not limited to attorneys’fees arising out of or resulting from performance of the work provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death…”. The foregoing suggests that the indemnitor (here the contractor) is in the position to control the risk of bodily harm, injury or death to third parties on the project site. Hence the need to allocate that risk to the contractor. Furthermore, indemnities can be used to change the position at law. For instance, it can be used to extend limitation periods, remove the test of causation, remove the requirement to mitigate loss, remove foreseeability and remoteness tests, provide the ability to seek compensation for ongoing losses and project against loss caused by acts and omissions of third parties (Kelly, 2011).

Hess, et al., (2013), suggests that in negotiating for contracts that include indemnity clauses, contractors should ensure that they agree on indemnity obligations that they can insure. And further reasoned that mutual indemnification is a better option that could help contractors to recover loss from the owner provided the owner bears responsibility for that risk.

However, (Bradford & Awad, 2012) argue that some owners see mutual indemnification as unfair to them because the probability that, a contractor’s employee may suffer injury is higher as compared to the owner’s employees. Therefore indemnity clauses should be well negotiated so that risk of third party claims can be properly dealt with.

2.4.4.3 Schedule acceleration

Schedule acceleration are clauses included in contract documents to grant the owner the right to request the contractor to accelerate or speed up work in order to meet a stipulated deadline.

According to Long (2015), there are three main types of acceleration which he explains as:

- *Directed acceleration:* this occurs when the owner or his representative issue an order to the contractor to accelerate work by resequencing the work, running additional shifts, adding more man-hours (overtime) or by any other means that can make the contractor speed up work to the satisfaction of the owner.
- *Constructive acceleration:* this occurs when a contractor is faced with an excusable delay such as severe weather condition, an act of God, differing ground conditions as work progress and therefore is entitled to an extension of time that equals the time of the excusable delay proven by an examination of the effect on the critical path of the program of work. If the contractor is refused the extension of time then the contractor can claim for the cost of constructively accelerating the work to meet the completion date.
- *Voluntary acceleration:* this occurs when the contractor decides to speed up work by himself usually to make up lost time for the contractor's own delay.

Out all these three types of acceleration claims, the constructive acceleration is that which is susceptible to disputes (Long, 2015).

Contractors are of the view that clauses that allow owners to demand that they accelerate work without recovering the cost associated with speeding up is unfair, whereas owners are of the view that there should be a limit to the indirect costs that contractors are allowed to recover as a result of speeding up work (Bradford & Awad, 2012).

Therefore it will do both parties a lot of good if the clause on schedule acceleration is well negotiated between them and clearly stated to deal with such issues since there is a high probability that acceleration efforts will be required in most projects.

2.4.4.4 Ambiguous acceptance criteria

Acceptance criteria defines the standard, state or quality of completion required from contractors to enable them successfully hand over the project to its owner (Loots & Charett, 2009). On the surface acceptance criteria clauses seem not to allocate substantial amount of risk. However when it is viewed as a clause that initiates or incites payment, completion and warranty obligations then the importance and risk accompanying it becomes eminent (Chapman, 2014).

Chapman (2014), further noted that most often the word used in phrasing these clauses focus on relieving the owner of acceptance responsibilities rather than setting a target for the contractor to earn acceptance. Similarly, Bradford & Awad (2012), adds that phrases like “fit for purpose” and “to owner’s satisfaction” are ambiguous and could create disputes. They further suggested that it will be fair and appropriate if the acceptance criteria avoid the use of qualitative statements and rather define a measurable, quantitative criteria that could be used as a yardstick to determine acceptance.

2.4.4.5 Differing site conditions

Differing site conditions in construction contracts refers to subsurface physical conditions that might differ from that which was promised or implied by the contract documents (Levin, 1998). Levin (1998), further noted that those conditions are not limited to natural physical subsurface conditions but artificial subsurface site conditions from past or concomitant construction activities are included.

Traditionally, when a contractor performs works under a fixed price or lump sum contract the contractor takes the risks of any unusual site conditions encountered on the project (Bridston, 2008). In such situations if the contractor did not allow for any contingencies for unforeseen conditions and it encounters any, the contractor risk losses or may even become insolvent (Kamine, 2014). According to Collins & Zack Jr, (2014), owners stand the risk of not receiving bids from experienced contractors or may receive highly priced bids due to the additional cost for contingencies that contractors may add in situations where the contractor bears the risk for differing site conditions. In the case of the later the client might end up paying more if the contingency allowed by the contractor at the biding stage exceeds the cost impact of the differing site condition encountered.

Differing site conditions are best dealt with if a clause for differing site condition is inserted in the contract document usually placing the risk on the owner (Kamine, 2014). A typical differing site condition clause may allow that so long as the contractor informs the owner on a timely bases any conditions encountered that are materially different from those articulated in the contract and bid document, which has caused an increase in cost or time in the performance of the work, then an equitable adjustment shall be made to the contract (Bridston, 2008; Collins & Zack Jr, 2014). The Colorado Court of Appeals affirmed the need to have a differing site condition clause in construction contracts in: URS Group Inc. v. Tetra Tech FW, Inc., Court of Appeals Nos. 06-CA-1243 and 06-CA-2220 (February, 2008), when the court noted that a differing site condition clause "encourages more accurate bidding, a benefit to the party seeking bids, because the contractor does not have to inflate its bid to account for contingencies that may not occur."

Differing site conditions have been identified as one of the most problematic source of uncertainty in construction contracts (Ndekugri & Mcdonnell, 1999; Kumaraswamy, 1997) since it is capable of escalating costs, causing excessive delays and mitigation costs (Bradford & Awad, 2012). Some standard contract forms shift the risk of differing site conditions to the contractor by not obliging the owner to supply information in respect of subsurface conditions but rather requests the contractor to satisfy himself with the site conditions before preparing and submitting bids. And even those that oblige the owner, uses very lose words which does not really enforce it. A typical example is clause 11.1 (Inspection of site) of the

International Federation of Consulting Engineers' Conditions of Contract for Works of Civil Engineering Construction, 4th edition, 1987. Which states that:

"The Employer shall have made available to the Contractor, before the submission by the Contractor of the Tender, such data on hydrological and sub-surface conditions as have been obtained by or on behalf of the Employer from investigations undertaken relevant to the Works but the Contractor shall be responsible for his own interpretation thereof".

Ndekugri & Mcdonnell (1999), noted that the statement above does not:

- Give a firm obligation to the owner to provide information about subsurface conditions to the contractor but rather the obligation takes effect only when the owner have carried out such investigations.
- And even if the owner has obtained such information, the owner is obliged only to produce raw data not interpretative reports.

Where the risk of differing site condition is allocated to either party there are severe implications. Thus the owner should expect higher priced tenders if the contractor have no information on subsurface ground conditions (Asselin & Cahalan, 2000).And if the owner supply the information about subsurface conditions and it turn out to be inaccurate the owner can be held liable for breach of warranty, misrepresentation or negligent misstatement (Ndekugri & Mcdonnell, 1999).

Perhaps a more prudent way of dealing with this type of risk is that recommended by the Technical Committee on Geotechnical Reports of the Underground Technology Research Council (UTRC), USA. Which mentioned that a "Geotechnical Baseline Report" should be included in the Conditions of Contract for construction works that include subsurface works.

The essence of the baseline report is to articulate the anticipated subsurface ground conditions in the Conditions of Contract so that risks associated with subsurface conditions that are less adverse or consistent with the baseline will be borne by the contractor and more adverse or inconsistent with the baseline are borne by the owner (UTRC, 2007).

2.5 Effect of current risk allocation practice on construction contracts

2.5.1 Disputes and Mistrust

Trust is very essential in any business, it is fundamental to establishing a cordial relationship with business partners and also help prevent disputes among contracting parties. Trust aids to affirm people's readiness, confidence, expectation, belief and attitude as well as prevent risk. But because of the varying interest of contracting parties in the construction industry this seldom exist (Wong, et al., 2007).

It is therefore not surprising that the construction industry have been widely criticised for having adversarial working relationship among contracting parties. Baiden, et al., (2005) attribute this to the traditional procurement system which disassosiates the design and construction processes thereby establishing a poor relationship between contracting parties. This assertion have been affirmed by the call of the reports by (Latham, 1994; Egan, 1998; Egan, 2002) for the construction industry to shift from the traditional procurement system to a more cooperative and coordinated approach to the procurement of construction projects.

Fair risk allocation among contracting parties is the first step among the five steps suggested by (Steen, 1994) in his study: *Five Steps to Resolving Construction Disputes – Without Litigation*. He further states that even though a contract can be drafted in a way that could prevent parties from making any successful claim, drafting a contract in such a way harbors adversarial relationships and may lead to litigation.

The standard forms of contract that are currently in use are suppose to allocate fairly, risks among contracting parties but most often in practice these are altered either by deleting or adding certain clauses (Greenwood, 1993). Such a practice may aggravate risks to the contractor (Jannadi, et al., 2000).

According to Cheung & Yiu, (2006) contract provisions is part of the three major ingredient that cooks up construction conflicts. This point out that the terms or clauses in the contract agreement and their inherent fair manner of allocating risk among contracting parties cannot be ignored if it is desired to prevent disputes. Thus unfair allocation of risk among contracting parties leads to disputes. Therefore a proper way of risk allocation enhances efficiency, decrease cost, reduce the occurrence of disputes and elevate project goals (Groton & Smith, 2010).

The International Insitute for Conflict Prevention and Resolution (CPR) suggests the stages of dispute resolution with their inherent or attendant escalating hositlity, cost and time to achieve resolution as shown in Figure 2.5 below

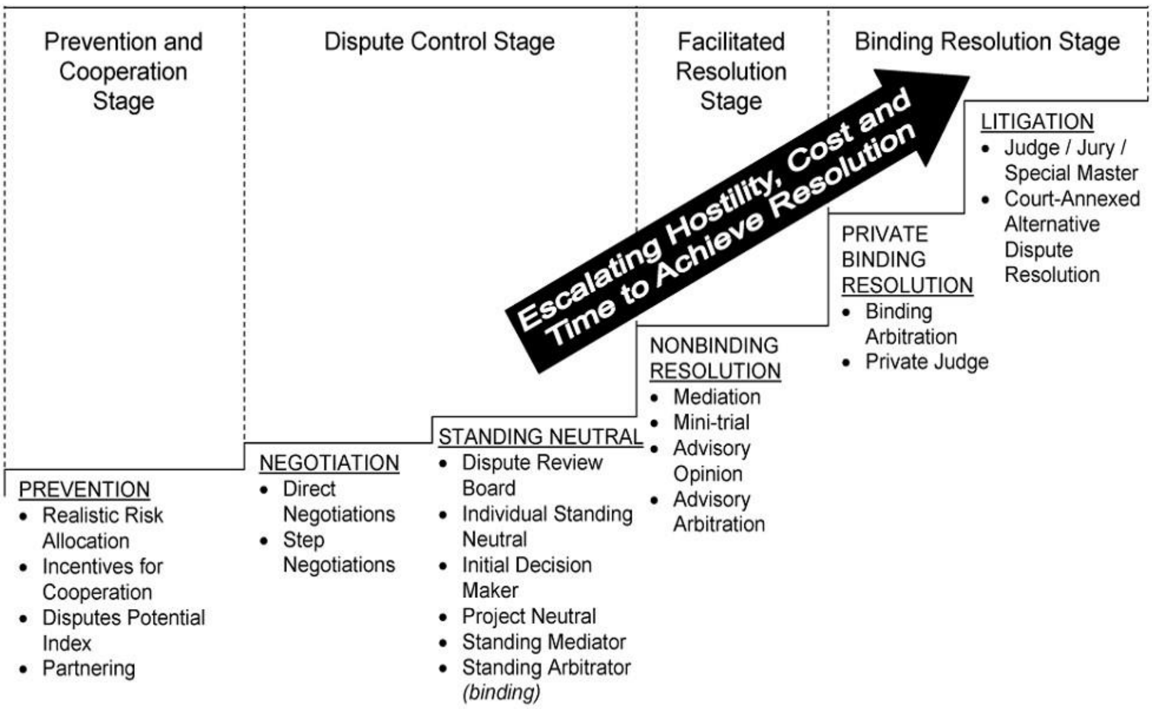

Figure 2.5: Dispute Resolution Stages and Steps

"The original version of this Step Chart appeared in the 1991 CPR Publication "Preventing and Resolving Construction Disputes." It was later reformatted by the Dispute Avoidance and Resolution Task Force ("DART"), and more recently revised and updated by James P. Groton for presentations at international dispute prevention conferences in China, Finland and England."

From Figure 2.5 it can be said that realistic or fair risk allocation is the first preventive measure of disputes and their associated costs, time and hostility issues.

2.5.2 Construction claims

The existence of claims in the construction industry cannot be denied and is inevitable as a result of its unique features distinct from other industries. It is therefore not surprising that most projects exceed their budgeted cost at their completion.

Unbalanced risk allocation has been found to be among the number of factors that lead to construction claims (Ren, et al., 2001). Also the allocation of risks in contract forms and project contracts are key in managing claims (Skyes, 1999; Cox, 1997).The contract forms, project contracts and the procurement routes foretells how risks are apportioned among contracting parties. However, these parties are sometimes risk averse. Thus contractors want to assume less risk and clients want to push more risks to the contactor. This paves the way for more claims as the project progresses (Zack, 1997) and thereafter an increase in the final cost of projects.

In practice, disclaimer clauses have been used extensively to allocate risk among parties but often it becomes a catalyst for cost escalation in the final project account (Zack, 1996; Zaghloul & Hartman, 2003).

Kumaraswamy, (1997) identified unfair risk allocation and unclear risk allocation as the two main root causes of construction claims as shown in Figure 2.6

The above discussion points out that there exist substantial problems in the current practice of risk allocation in the construction industry. Some of these problems are: disputes, mistrust, tensions among contracting parties and project cost overruns.

These are a few of the problems associated with the current practice of risk allocation during the review of literature. However it is believed that this study will unravel more problems associated with the current risk allocation practice.

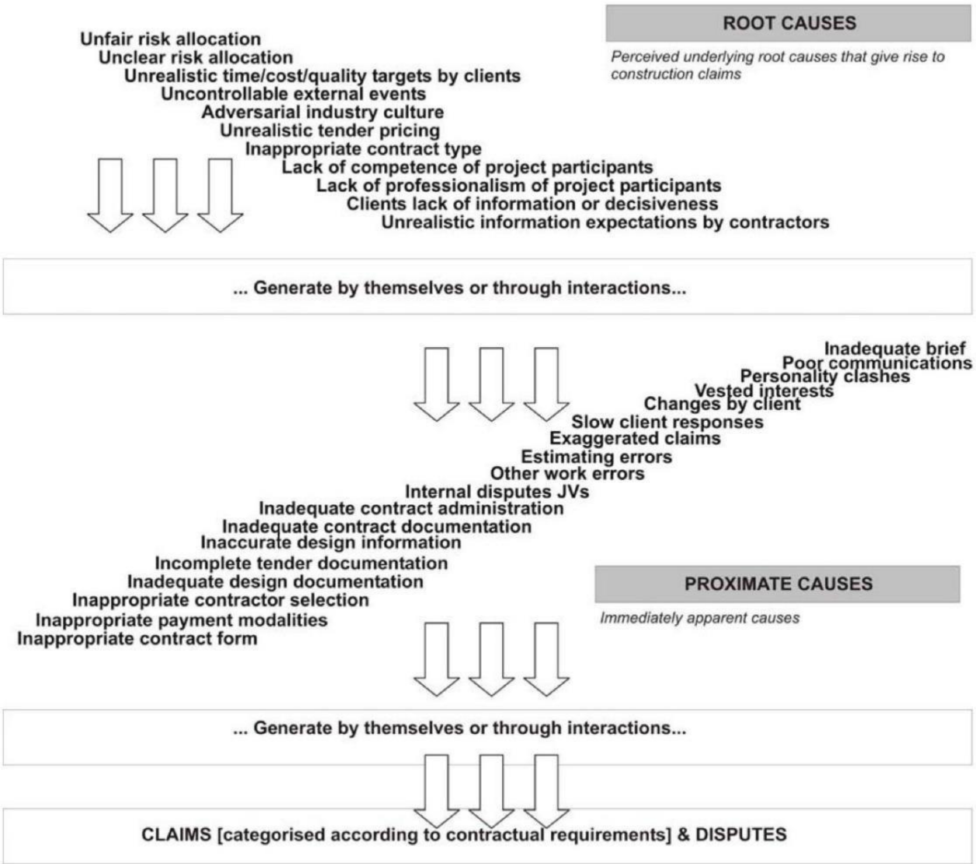

Figure 2.6: Common sources of construction claims and disputes (Kumaraswamy, 1997)

2.5.3 Poor project performance

Construction projects are noted for performing poorly with regards to cost, schedule and quality (Shen, 1997) as a result of inappropriate allocation of risks to participants. Poor project performance refers to worse outcome of the set project objectives or goals; in most cases cost overrun, schedule delay and poor quality

(Alsalman & Sillars, 2013).
Zaghloul & Hartman (2003), contends that realistic and equitable risk allocation between contracting parties is fundamental to eliminating disputes, hostility, unexpected cost and lost time which impairs project performance. Similarly Hashim (2010), posit that improper risk allocation impacts negatively on the success of projects with regards to time, cost and quality. Kumaraswamy (1997), also adds that unsuitable risk allocation in projects breed disagreement, claims, disputes and finally distorts relationships among contracting parties.

From the foregoing it is clear that any project that suffers a misallocation of risk will lead to poor project performance. The prevalent or widespread risk allocation practices has been identified to be ineffective and worsen overall project success (CII, 2007). One of such practice is the allocation of risk by aversion where participants who have strong bargaining power pushes more risk to other parties whose influence is very low (CII, 2007). Allocation of risk by aversion is usually seen between owners, contractors and subcontractors. Thus owners shift risk to contractors and contractors in turn shift it to subcontractors, therefore the risk lands in the hands of the party who lacks the capacity to manage it effectively (Alsalman & Sillars, 2013).

Perhaps the foregoing could be one of the reasons that contribute to poor project performance. Since in such situations the party with low influence or bargaining power who has been exposed to higher risk will resort into focusing on how to survive rather than working towards the objectives set for the project. Interestingly, not only does the failure of the lower-tier participant impairs project performance but it also demands more resources from the higher-tier participant; say the owner to ameliorate the harm caused (Ng & Loosemore, 2007).

2.6 Obstacles to optimal risk allocation

Dictionary.com (2015), defines an obstacle as "something that obstructs or hinders progress." Similarly, Macmillandictionary.com (2015), defines an obstacle as a difficulty or problem that prevents someone from doing something. The foregoing shows clearly that anything that impedes or hold up the progress of something can be referred as an obstacle. In the context of this study an obstacle to optimal risk allocation is anything that hinders or impedes the achievement of optimal risk allocation in construction contracts.

In an attempt to fish out these obstacles of optimal risk allocation it was realised that it will be better to discuss some factors that relates to risk allocation from which these obstacles could evolve. So that these obstacles can properly be identified and understood. Some of these factors are: cooperation, negotiation, communication, collaboration, teamwork and trust.

2.6.1 Collaboration and Cooperation

Relationships have been identified as the most significant and worthy asset of any organisation (Gadde & Snehota, 2000). Relating this to construction projects which are seen as temporary organisations where professionals from diverse disciplines are assembled to create an exceptional product or service (PMBOK, 2008). The foregoing clearly shows that the kind of relationship that exist between contract parties in construction projects can really influence the outcome of project objectives. Fewings (2005), contends that the actual problems faced in the construction industry may be attributed to the relationships that exist within a supply network, the innate characteristics of construction processes and the capacity to move the construction process through the needs of the owner.

Having identified that relationships play a key role in an organization one will wonder that what relationship should exist between contracting parties? The answer is collaboration and cooperation. According to (Latham, 1994), the only way to complete projects to the satisfaction of owners, on schedule and within budget is through the accomplishment of excellence at both business and project level through collaboration.

A number of studies show that the construction industry can benefit immensely from collaboration and cooperation relationships. For instance, Olsson & Espling (2004), contends that collaboration reduces cost and disputes, ensures that work is completed on schedule and creates a good working environment. It is also the medium that help in sharing risk in a competitive environment but requires trust and communication (Hughes, et al., 2012). Osipova (2007), adds that proper collaboration and mindful sharing of project risks among contracting parties is key to manage risk successfully on a project. Similarly, Sakal (2005), reasoned that sharing risk requires an environment where teamwork and collaboration thrives.

However, the parties or professionals that need to come together so that these benefits could be realised are fragmented to the extent that they even receive training separately and seldom come into contact as a result there is an intrinsic distrust of each other

(Deeming, 2012). Furthermore, the contract forms, procedures and processes used in construction projects breed or encourages demeanours that are basically non-collaborative (Eriksson, et al., 2008; Deeming, 2012; Sakal, 2005).

The volatility of these contractual relationships could trigger from the fact that the stage for construction claims and disputes are set through contract documents signed by contracting parties long before men and machine are mobilised to the site (Rubin, et al., 1999). To control this anomaly McInnis (2003), writes that contractual relationships in a given project should be less based on what was agreed but rather how contracting parties will deal with future events.

In sum, it can be concluded that collaborative and cooperative relationship between contracting parties is key to preventing disputes, sharing and properly managing risk. As a result a lack of collaborative and cooperative relationship can be an obstacle to optimal risk allocation.

2.6.2 Negotiation and Communication

Negotiation can be defined as the process of discussing or deliberating with others to reach an agreement (Benita, 2014). Moore & Woodrow (2010), also defines negotiation as a problem-solving approach where parties out of will deliberate or confer with each other in an attempt to arrive at a joint decision on common interests. Similarly (Thompson, 2001), defines negotiation as an interactive decision making procedure through which two or more parties agree to apportion limited resources. The foregoing means that negotiation demand that people or parties with opposing views or position about a phenomenon or situation come together to take a decision

(Elahee & Brooks, 2004). In an industry like the construction industry where the participants come from diverse disciplines the need for negotiations to deal with issues like disputes, claims and risks cannot be overemphasized (Moore & Woodrow, 2010; Levin, 1998). Moore & Woodrow (2010), further noted that negotiation has become fundamental to almost all Alternative Dispute Resolution methods. Loosemore & McCarthy (2008), contend that risk allocation occurs through negotiation.

Inferring from the above it can be reasoned that negotiation is less a technical procedure than a human based process (Ren, et al., 2001) and therefore can be influenced by people's behaviour and attitudes. People view negotiation with either of two attitudes: a process in which both parties gain (win-win) or one gain and the other lose (win-lose) (Brott, 2014; Robinson, et al., 2000). Attitudes like recognition, trust, affection and friendship gives negotiation a good outcome whereas threat, disrespect, harshness, and irritation can give a bad outcome (Jin & Geshin, 2007).
Communication is *sine qua non* to negotiation. Communication can be defined as the act of transmitting meaning from one individual to another or many people either verbally or non-verbally (Barrett, 2006). Basically it is the conveyance of information between people (Dainty, et al., 2006).

Construction contracts involves people from different background and a myriad of processes, it will be very hard for anyone to function without communication (Dainty, et al., 2006). It is not surprising that DeVito (1999), viewed communication as inevitable, irreversible and unrepeatable. These (Pearson, et al., 2003), explains as:

Inevitable: Communication occurs almost every minute. Thus it is either we communicate with ourselves (thinking, planning or reacting to situation around us) or observe others and infer from their actions.

- *Irreversible:* no one can go back in time to erase messages he or she sent to others. And the messages we send creates the perception people form about us.
- *Unrepeatable:* Granted the same setting the experience we will encounter with one person will differ from another.

Therefore when using communication as a tool to negotiate care must be taken since communication is influenced by the values of social behaviour and it is people who interpret and use information (Gayeski, 1993).

The foregoing suggests that communication is vital to achieving expected project objectives. Tang, et al. (2006), contend that when organizations embark on open communication on risk management it helps them to measure either organization's risk management against each other thereby providing a comparative feedback. Loosemore & McCarthy (2008), adds that when contracting parties communicate effectively about possible risks it facilitates negotiation. And (Maslej, 2006), asserts that ineffective communication during projects affect time, budget, safety and quality. Therefore one can conclude that negotiation is vital to settle differing views and discover alternatives to reach agreements. The absence of negotiation and effective communication among contracting parties can be an obstacle to optimal risk allocation.

2.6.3 Trust and Teamwork

Trust is the mood and behaviour regarding the readiness to depend on the actions of or be helpless towards another party with the potential for collaboration (Pryke & Smyth, 2006; Smyth, et al., 2010). Similarly, Rousseau, et al., (1998), defines trust as emotional state which includes the intent to accept vulnerability based upon concrete anticipations of the intentions or attitude of another. Therefore when someone trust another person he or she believes that the person will not cause any harm to him or her even though the person has that chance (Gambetta, 2000).

A number of studies attest that trust is key to all relationships. For instance trust has an influence on working relationships (Lewicki & Bunker, 1996) reduces the cost of transaction between contracting parties (Zaheer, et al., 1998) and can facilitate communication, information exchange, enhance people's working satisfaction thereby increasing the performance or achievements of organizations (Dirk & Ferrin , 2001). According to Osipova (2007), trust and commitment affects a project's risk management. And construction risks when ill-managed have severe impact on project budget (Zaghloul & Hartman, 2003). The forgoing suggests that trust and commitment are indispensable to the development of human relationships (Anantatmula, 2008; Karlsen, et al., 2008; Lee & Cavusgil, 2006).Which connotes that the absence of trust is an obstacle to the collaborative connection between contracting parties (Akintoye & Main, 2007).

However, the contractual relationship between contracting parties in the construction industry is currently fraught with mistrust which is attributed to the confrontational contract documents (Zaghloul & Hartman, 2003). As a result trust levels are gloomy which leads to conflicts (Pinto, et al., 2009). Against this background (Zaghloul & Hartman, 2003), writes that proper risk allocation can only be achieved when a high trust relationship is present among contracting parties. This they posit can be done through:

- Articulating the risks to be carried by either party and who the risk owner is
- Ample time and work executed at the project inception stage coupled with adequate knowledge to deal or control risks and administer the contract.
- A negotiation stage which should be present before the contract starts with the aim of growing a trust relationship between parties. This stage can be included to the contract itself.
- Plausible risk sharing and risk- incentive structure must be present to allot benefits if risk do not show up.

A team is an assembly of people whose skills complement each other and are geared toward a shared goal as well as hold themselves equally responsible for their success or accomplishment (Foley & Macmillan, 2005; Quinn, 2015). It will be unconvincing to say that one person can conceive a project and execute it all by him or herself. For this reason seeing contracting parties as a project team is in the right direction. However, it is not just having the team that is important but having a team that works to achieve the project objectives. So the question is how do we get the project team to work effectively in an industry where disputes, risks, fragmentation and adversarial relationships exist? (Baiden, et al., 2005).

Perhaps the solution is to create an atmosphere of cooperation, trust, openness, effective communication and ethical behaviour (Gido & Clements, 2011).

Hence it can be concluded that a high trust relationship among contracting parties is indispensable to achieving a better allocation of risk and consequently impacting positively on project goals. And teamwork cannot be relegated to the background as far as success of construction projects are concerned.

Therefore a lack of trust and teamwork between contracting parties can be an obstacle to optimal risk allocation.

2.6.4 Risk allocation by aversion

It has been well established by many studies that the construction industry is unique and fraught with a myriad of risk. Most often the contract agreement for construction projects are prepared by one party, the owner (Lam, et al., 2007), as a result owners apportion a greater part of the risks to the contractor and apportion little to themselves (Peckiene, et al., 2013).

Construction risk attitudes have been grouped into three namely: risk averse, risk neutral and risk taker (Erikson, et al., 1978). Amongst the participants in construction projects, owners are seen to be risk averse or risk neutral depending on the size and intricacy of the project at hand (Zaghloul & Hartman, 2003). Allocation of risk by aversion usually leads to a situation where the risks land in the hands of the entity or party who lack the capacity to manage it (Alsalman & Sillars, 2013). It can therefore be concluded that risk allocation by aversion can be an obstacle to achieving optimal risk allocation in construction contracts.

2.6.5 A dynamic industry with a static risk allocation mechanism

Risks in construction projects have the tendency of changing as the project progress: new risks may be identified, anticipated risks may change in form which may increase or reduce its severity and expected risks may even not occur (PMBOK, 2008). Irrespective of this likely occurrence construction project risks are apportion using contracts at the outset of the project and the allocation seldom changes. However, these risks are susceptible to change and could significantly change over the project life cycle. For instance risks like underground conditions, force majeure (Acts of God), financial risk and political risks are probable of changing at the course of the project. Hence having a static risk allocation mechanism for a dynamic construction project can be an obstacle to optimal risk allocation.

2.6.6 Differing risk perceptions of contracting parties

Construction projects require a number of participants from diverse disciplines who have varying interest as far as the outcome of a project is concerned. These participants' definition of the project objectives and success are different and are involved at different stages of the project (Darda'u Rafindadi, et al., 2014). As a result contracting parties perceive risks differently (Liu & Cheung, 1994). For instance it has been reported by a number of studies (Akintoye & Macleod, 1997; Hliang, et al., 2008; Al-labtahai & Diekmann, 1992) that risk identification which is the first step to risk management is done through subjective means of individual intuition, judgement and experience. The foregoing is an evident that there will be varying perceptions because these subjective elements are influenced by the ethics, beliefs and anticipations of these various parties which may consequently define how risk will be managed on a project. Therefore the risk attitudes of owners, contractors, designers, surveyors, engineers and suppliers may differ since each entity or participant may have their own intuitive way of calculating the probability of occurrence and impact of a given risk on the project. It can therefore be reasoned that differing risk attitudes and perceptions of contracting parties may be an obstacle to optimal risk allocation.

2.6.7 Key obstacles to optimal risk allocation in construction contracts

Below is a list of the key obstacles to optimal risk allocation identified in literature:

- Different set of information about project risk
- Lack of efficient risk allocation mechanism to include all parties involved at the inception stage
- Lack of understanding the benefits of optimal risk allocation
- Ineffective risk management communication between contracting parties
- Mistrust among contracting parties
- Differing risk attitudes and perceptions among contracting parties
- Aversion to risk by contracting parties
- Static risk allocation in a dynamic industry
- Imbalance and abuse of power (leverage)
- Staging/phase inclusion (different parties involved at different stage of the project)
- Competition among participants on the project
- Intricate/complex contracts between project parties

CHAPTER THREE – RESEARCH DESIGN AND METHODOLOGY

3.1 Introduction

This chapter elaborates the procedures that were adopted in carrying out the research work. It gives the reader an understanding of how the researcher undertook the survey and the statistical methods that were employed to analyse data collected. It also gives detail on how samples were drawn from the targeted population to partake in the survey.

3.2 Research design

Research design is a blue print that directs the way the researcher will achieve the research objectives (Fellows & Liu, 2008). Simply put it is the framework that seeks to provide answer to the research questions. The aim of this research is to optimize the allocation of risk factors associated with construction contracts. With regards to this objective a descriptive research design was employed using quantitative approach. The reason was that the study was concerned with conditions and relationships that exist. In light of this a survey was conducted. Survey is a very famous technique of collecting information since it embraces contributions from diverse sources (McKillip, 1986).

The survey method is useful for research works in which:

- A sample survey is selected to represent a known population
- Data collection is directly from respondents making use of a systematic technique (questionnaires, Interviews)
- Data is collected in a natural setting, and
- The researcher does not manipulate any of the independent variables.

3.2.1 The study setting

Although the study seeks to find an optimum way of allocating risk factors associated with construction contracts in Ghana, it was conducted in the Greater Accra and Ashanti regions. Specifically in Accra and Kumasi, which are the regional capitals of both regions respectively. The reason for this study setting is that the two regions have the highest population density in Ghana. Their population densities are 1,236 and 196 persons per square kilometres for Greater Accra and Ashanti regions respectively (Ghana Statistical Service, 2012).

It is therefore not surprising that a lot of complex and wider scoped projects are ongoing in these regions. Therefore the researcher believes carrying out such a study in these two regions can give findings that are representative of the whole construction industry in Ghana.

3.2.2 Target population

The target population of any research study is the whole set of units from which survey data would be collected. It therefore defines those units for which the outcome of the survey is supposed to generalize. The population of this study consist of D1K1 contractors, consultants and clients (both cooperate and public) who were currently undertaking projects or have been undertaking projects over the past five

(5) years in the Accra and Kumasi metropolis.

3.2.3 Sampling size and Sampling technique

Sampling is the process of selecting research units from a targeted population (Kothari, 2004). A critical examination of the criteria set for the target population, revealed that both purposive sampling and snowball sampling techniques were appropriate for the study. Purposive sampling is usually employed in circumstances where there is the need to reach a targeted population quickly and where proportionality of sampling is not a priority. Snowball sampling on the other hand is used where there is the need to reach a targeted population that is hard to find.

Purposive sampling was used in the selection of contractors who were currently undertaking construction projects or have undertaken some projects over the last 5 years in the Accra and Kumasi metropolis and therefore have been exposed to severe construction risks in recent past. During a visit of some construction sites, 40 contractors that are eligible to be part of the study were identified. The snowball sampling technique was used to select consultants and clients due to the different types of consultants and clients available such as Architects, Quantity surveyors, Engineers, public and cooperate clients. The contractors were asked to direct the researcher to the consultants and clients they deal with. Through that the researcher was able to reach 30 clients and 30 consultants respectively who were eligible to partake in the study.

The sample size of any study can be determined by using formulas, published tables, sample size of similar studies and lastly a census for small populations (Glenn, 1992). In view of this the census of the targeted population was used. Therefore the sample size included 40 contractors, 30 clients and 30 consultants giving a total sample size of 100.

3.3 Data collection

To achieve the objectives and find answers to the research questions, the study focused on the principal contracting parties; contractors, clients and consultants because they are those who are directly affected with issues of risk in the construction industry. A structured questionnaire was developed to collect data extensively from clients, contractors and consultants. The structured questionnaire which consisted of closed ended questions were sent via email or administered personally by the researcher to respondents.

The questions were categorised into five (5) parts based on the objectives of the study. The first series of questions related to the respondents profile. This was to inquire about the background and experience of the respondents. The second series of questions related to current risk allocation practices in construction contracts, the third series of questions related to the effects of current risk allocation practice on contracting parties and project objectives, the fourth set of questions related to the obstacles to optimal risk allocation in construction contracts and the fifth set of questions related to the solutions to remedy the effects of current risk allocation practices in construction contracts.

A five (5) point Likert scale of strongly agree, agree, neutral, disagree and strongly disagree were used, where the respondents were asked to indicate from the list provided in each of the categorized questions their magnitude of agreement.

3.4Response Rate

In all hundred (100) questionnaires were sent to respondents and a total of seventy eight were received, which represents 78% response rate. The breakdown is shown in table 3.1 below.

Forty (40) questionnaires were issued to contractors and thirty seven (37) were received which represents 92.5% response rate. Thirty (30) questionnaires each were issued to both consultants and clients, and twenty one (21) and twenty (20) were received respectively; representing 70% and 66.67% response rate respectively.

Table 3.1- Response rate

Respondent groups	No. Of questionnaires issued	Responses	Response rate (%)
Contractors	40	37	92.50
Consultants	30	21	70.00
Clients	30	20	66.67
Total	**100**	**78**	**78.00**

3.5 Method of analyses

The statistical methods which were used to analyse data collected from respondents are discussed below.

3.5.1 Relative importance index (RII)

Relative Importance Index refers to the input a variable makes to the forecast of a criterion variable by itself and in conjunction with other forecaster variables (Johnson & LeBreton, 2004).

A five (5) point scale, ranging from 1 (strongly disagree) to 5 (strongly agree) was used and subsequently transformed the Relative Importance Indices (RII) for each factor as follows:

$$RII = \frac{\sum W}{A \times N}$$

Where:

- W is the weighting given to each factor by the respondents (which ranges from 1 to 5)
- A is the highest weight (5 in this case)
- N is the total number of respondents

3.5.2 Spearman rank correlation coefficient

This is a non-parametric test used to measure the difference in ranking between two groups of respondents scoring a number of factors (Naoum, 2002). This statistical method was used to test whether the rankings of contractors, clients and consultants on the obstacles to optimal risk allocation were significant or not. The formula below was used:

$$Rho = 1- \left[\frac{6\sum di^2}{N(N^2-1)}\right]$$

Where: di is the deference in ranking and N is the number of factors.

CHAPTER FOUR – SURVEY RESULTS, ANALYSIS AND DISCUSSION

4.1 Introduction

Based on the objectives of this study a questionnaire was developed and sent to the principal contracting parties of construction contracts; clients, consultants and contractors.

The results of this survey, its analysis and discussion are presented below.

4.2 Survey results

A total of hundred (100) questionnaires were sent to respondents consisting of clients, consultants and contractors of which 78 were received representing a response rate of 78%. These questionnaires were further analysed to ascertain the profile of respondents, current practices of risk allocation, effects of the current practices on project objectives, obstacles to optimal risk allocation and remedies to the effects of current practices of risk allocation.

4.2.1 Demography of respondents

Table 4.1 below, depicts that 28.21% of the questionnaires were filled by Engineers, 34.62% by Quantity Surveyors, 20.51% by Architects, 2.56% by Managing Directors, 5.13% by Contractors, 1.28% by principal consultants and 7.69% by Project managers. The foregoing makes it evident that those respondents that play active role in project risk management as far as risk allocation is concerned answered the questionnaires. It is also important to note that the respondents have great experience in the construction industry, since 43.39% and 38.46% of the respondents have 3-5 years and more than 5 years working experience. For this reason it can be said that the answers that were obtained are practical and reliable.

Table 4.1 Respondents profile

	Contractors		**Clients**		**Consultants**		**Overall response (%)**
	Frequency	***Percentage***	***Frequency***	***Percentage***	***Frequency***	***Percentage***	
Number of years in firm/construction industry							

Less than 1 year							
1-2 years	3	8.11%	-	-	2	9.52%	6.41%
2-3 years	3	8.11%	3	15%	3	14.29%	11.54%
3-5 years	18	48.65%	9	45%	7	33.33%	43.59%
More than 5 years	13	35.14%	8	40%	9	42.86%	38.46%
TOTAL	37	100%	20	100%	21	100%	100%
Position in firm							
Engineer	10	27.03%	4	20%	8	38.10%	28.21%
Quantity surveyor	13	35.14%	9	45%	5	23.81%	34.62%
Architect	4	10.81%	5	25%	7	33.33%	20.51%
Managing Director	1	2.70%	1	5%	-	0%	2.56%
Contractor	4	10.81%	-	0%	-	0%	5.13%
Principal Consultant		0%		0%	1	4.76%	1.28%
Project manager	5	13.51%	1	5%	-	0%	7.69%
Others		0%		0%	-	0%	0%
TOTAL	37	100%	20	100%	21	100%	100%
Highest Qualification							
PhD	-	-	1	5.00	1	4.76	2.56
MSc	14	37.84%	13	65.00	3	14.29	38.46
BSc	19	51.35%	6	30.00	17	80.95	53.85
HND	4	10.81%		0%	-	0%	5.13
Professional Qualification	-	0%	-	0%	-	0%	0%
Others	-	0%	-	0%	-	0%	0%
TOTAL	37	100.00	20	100.00	21	100.00	100.00

4.2.2 Current risk allocation practices in construction contracts

A list of 17 risk allocation practices were identified in literature and was presented to the respondents to rank on a 5 point Likert scale ranging from 1(strongly disagree) to 5 (strongly agree).From this list presented in table 4.2 below, respondents ranked "owners allocate risk by aversion" and "Higher tier parties (owners) use disclaimer clauses to prevent contractors to make genuine claims" as the major current practice of risk allocation in construction contracts, each scoring a relative importance index of

0.9744. These were followed by “sufficient time is not allowed at the tendering stage for risk assessment before risks are allocated” and “contractors accept higher risks in order to secure jobs due to competitive markets”. Both risk allocation practices scored a relative importance index of 0.9692 and 0.9667 respectively.

Table 4.2: Ranking of current risk allocation practices in construction contracts

	Current risk allocation practices in construction contracts ranking										
Current practice of risk allocation	**1**	**2**	**3**	**4**	**5**	**∑W**	**A**	**N**	**AxN**	**RII**	**Ranking**
B1			1	8	69	380	5	78	390	0.9744	1st
B2			1	15	62	373	5	78	390	0.9564	5th
B3			3	28	47	356	5	78	390	0.9128	12th
B4		2	1	41	34	341	5	78	390	0.8744	15th
B5		1	10	26	41	341	5	78	390	0.8744	15th
B6		1		14	63	373	5	78	390	0.9564	5th
B7			1	19	58	369	5	78	390	0.9462	7th

B8		2	2	19	55	361	5	78	390	0.9256	11th
B9		2	6	28	42	344	5	78	390	0.8821	13th
B10			2	20	56	366	5	78	390	0.9385	8th
B11				10	68	380	5	78	390	0.9744	1st
B12			17	30	31	326	5	78	390	0.8359	17th
B13			1	21	56	367	5	78	390	0.9410	10th
B14			1	10	67	378	5	78	390	0.9692	3rd
B15			1	11	66	377	5	78	390	0.9667	4th
B16		1	2	19	56	364	5	78	390	0.9333	9th
B17		1	3	38	36	343	5	78	390	0.8795	14th

Legend

B1: Owners allocate risk by aversion

B2: Higher- tier parties shift more risk to lower-tier parties

B3: Risks are allocated to parties that lack the expertise and resources to manage them

B4: The procurement routes that are employed do not create room for proper risk allocation

B5: Risks are rarely negotiated before they are allocated

B6: The contract which is supposed to allocate risk among contracting parties is usually written by the owner

B7: Some of the phrases used in drafting contractual agreements are ambiguous and as such do not properly allocate risk

B8: The contract is usually drafted to favour the higher-tier party (the owner)

B9: Lower-tier parties (contractors) are hardly allowed to make any input to the terms of agreement for construction contracts

B10: Standard forms of contracts are edited to suit owner's interest

B11: Higher-tier parties (owners) use disclaimer clauses to prevent contractors to make genuine claims

B12: Risks are not realistically and equitably allocated

B13: Formal risk assessment is not religiously undertaken before risks are allocated

B14: Sufficient time is not allowed at the tendering stage for risk assessment before they are allocated.

B15: Contractors accept higher risks in order to secure jobs due to high competitive markets

B16: Contracting parties do not identify risks that can be shared among them.

B17: Risk tolerance level of contracting parties is seldom measured or identified before risk is allocated.

Respondents also ranked: No damages for delay; Consequential damages; Differing site conditions and Waiver of claims as the main contract clauses that unfairly allocate risk between contracting parties out of 13 clauses that were presented to them. These rankings are shown in table 4.3 below.

Table 4.3: Ranking of clauses that unfairly allocate risk

Contract clauses that have been found to unfairly allocate risk between contracting parties											
Clause	**ranking**					**∑W**	**A**	**N**	**AxN**	**RII**	**Ranking**
	1	**2**	**3**	**4**	**5**						
No Damages for delay				5	73	385	5	78	390	0.9872	1st
Consequential Damages				7	71	383	5	78	390	0.9821	2nd
Indemnity			3	41	34	343	5	78	390	0.8795	9th
Acceptance criteria			6	18	54	360	5	78	390	0.9231	6th
Force majeure	1	3	36	22	16	283	5	78	390	0.7256	13th
Schedule acceleration				17	61	373	5	78	390	0.9564	5th

Ownermandated subcontractor		3	10	22	43	339	5	78	390	0.8692	10th
Differing site conditions		1	2	7	68	376	5	78	390	0.9641	3rd
Waiver of claims			1	13	64	375	5	78	390	0.9615	4th
Design responsibility		1	7	35	35	338	5	78	390	0.8667	11th
Liquidated and ascertained damages		4	1	21	52	355	5	78	390	0.9103	8th
Cumulative impact of change orders				31	47	359	5	78	390	0.9205	7th
Insurance		1	2	48	27	335	5	78	390	0.8590	12th

4.2.3 Effects of current risk allocation on contracting parties and project objectives

To find the effects of current risk allocation on contracting parties and project objectives, the list of 10 effects of current risk allocation that were found in literature were presented to respondents to rank on a 5 point Likert scale ranging from 1(strongly disagree) to 5(strongly agree). Out of the 10 effects, respondents ranked: disputes between contracting parties; adversarial project environment and aggressive relationships between contracting parties; additional resources (time and funds) to manage the misallocated risk and more construction claims leading to escalated final project account as the four main effects of current risk allocation practice on contracting parties and project objectives. It must be noted that both “Adversarial project environment and aggressive relationships between contracting parties” and “Additional resources (time and funds) to manage the misallocated risk” were scored the same relative importance index of 0.9692. The rankings are presented in table 4.4 below.

Table 4.4: Ranking of the effects of current risk allocation practice on contracting parties

Effects of current risk allocation practice											
Clause	**ranking**										
	1	**2**	**3**	**4**	**5**	**∑W**	**A**	**N**	**AxN**	**RII**	**Ranking**
D1		1		2	75	385	5	78	390	0.9872	1st
D2				12	66	378	5	78	390	0.9692	2nd
D3		1	1	20	56	365	5	78	390	0.9359	5th
D4			3	28	47	356	5	78	390	0.9128	7th
D5		1	2	41	34	342	5	78	390	0.8769	8th
D6			5	38	35	342	5	78	390	0.8769	8th
D7		3	5	36	34	335	5	78	390	0.8590	10th
D8			1	10	67	378	5	78	390	0.9692	2nd
D9				15	63	375	5	78	390	0.9615	4th

D10				32	46	358	5	78	390	0.9179	6th

Legend

D1: Disputes between contracting parties.

D2: Adversarial project environment and aggressive relationships between contracting parties.

D3: Subjective pricing of risk leading to a higher contingency.

D4: Allocation of risk to a lower tier party who may lack the capacity to manage it.

D5: poor overall performance of the project.

D6: Unfair allocation of risk among project participants.

D7: Insolvency of lower-tier parties (contractor, subcontractors).

D8: Additional resources (time and funds) to manage the misallocated risk.

D9: More construction claims leading to escalated final project account.

D10: Lower tier parties may find it difficult to survive under the contract due to unbearable risk allocated to them.

Respondents also agreed the following effects of risk allocation can consequently cause project delays:

- Adversarial project environments and aggressive relationship between project participants
- Allocation of risk to a lower-tier party who lacks the capacity to manage it
- Insolvency of lower tier (contractors, subcontractors) contracting parties
- Additional resources (time and funds) to manage the misallocated risk
- Disputes between contracting parties

However, subjective pricing of risks leading to higher contingency was identified by respondents as a cause of increase in project costs. The rankings are shown in table 4.5 below.

Table 4.5:Ranking of the effects of current risk allocation practice on project objectives

Effects of current risk allocation practice on project objectives											
Effect	**ranking**					**∑W**	**A**	**N**	**AxN**	**RII**	**Ranking**
	1	**2**	**3**	**4**	**5**						
Adversarial project environments and aggressive relationship between project participants can:											
Increase cost		5	2	27	23	302	5	78	390	0.7744	3rd
Cause project delays		1	1	14	62	371	5	78	390	0.9513	1st
Negatively affect overall quality performance of project		1	1	36	40	349	5	78	390	0.8949	2nd
Subjective pricing of risk leading to a higher contingency can:											
Increase cost		2	1	5	70	377	5	78	390	0.9667	1st
Cause project delays		2	2	60	14	320	5	78	390	0.8205	3rd
Negatively affect overall quality performance of project		2	6	45	25	327	5	78	390	0.8385	2nd
Allocation of risk to a lower tier party who lacks the capacity to manage it can:											
Increase cost			4	35	39	347	5	78	390	0.8897	2nd
Cause project delays				38	40	352	5	78	390	0.9026	1st

Negatively affect overall quality performance of project			1	36	41	352	5	78	390	0.9026	1st
Insolvency of lower tier (contractors, subcontractors) contracting parties can											
Increase cost			1	40	19	312	5	78	390	0.8000	3rd
Cause project delays			4	27	47	355	5	78	390	0.9103	1st
Negatively affect overall quality performance of project			8	33	37	341	5	78	390	0.8744	2nd
Additional resources (time and funds) to manage the misallocated risk leads to:											
Increase project cost			6	4	68	374	5	78	390	0.9590	2nd
Schedule delays				10	68	380	5	78	390	0.9744	1st
Disputes between contracting parties can:											
Cause delay and affect overall schedule performance of the project			1	17	60	371	5	78	390	0.9513	1st
Increase project cost			3	31	44	353	5	78	390	0.9051	2nd

4.2.4 Obstacles to optimal risk allocation

Out of the 11 obstacles to optimal risk allocation presented, respondents ranked: Differing risk attitudes and perceptions among project participants; aversion to risk by project participants; lack of a joint risk management mechanism which include all project participants at the early stage of the project and static risk allocation for a dynamic construction industry as the four main obstacles to optimal risk allocation in construction contracts. The rankings are presented in table 4.6 below.

Table 4.6: Ranking of the obstacles to optimal risk allocation

Obstacle	ranking					∑W	A	N	AxN	RII	Ranking
Obstacles to optimal risk allocation in construction contracts											
	1	2	3	4	5						
Differing risk attitudes and perceptions among project participants				2	76	388	5	78	390	0.9949	1st
Aversion to risk by project participants				10	68	380	5	78	390	0.9744	2nd
Complexity of contracts between project participants			1	24	53	364	5	78	390	0.9333	8th
Different participants with different sets of information about project risks				22	56	368	5	78	390	0.9436	6th
Imbalance and abuse of power (leverage)		1	1	37	39	348	5	78	390	0.8923	10th
Lack of understanding of the benefits of optimal risk allocation		3	10	17	48	344	5	78	390	0.8821	11th
Static risk allocation for a dynamic construction industry				18	60	372	5	78	390	0.9538	4th
Ineffective risk management communication among project participants			2	17	59	369	5	78	390	0.9462	5th
Competitive attitude among project participants			2	21	55	365	5	78	390	0.9359	7th
Lack of a joint risk management mechanism which include all project participants at the early stage of the project			1	14	63	374	5	78	390	0.9590	3rd

Stage/phase inclusion - different participants are included at different stages of the project life cycle			2	37	39	349	5	78	390	0.8949	9th

These obstacles to optimal risk allocation that were ranked by the three groups of respondents: clients, contractors and consultants were also tested using the spearman rank correlation coefficient. This was computed from the data summary sheet using Microsoft excel spread sheet. The results is presented in tables 4.6 and 4.7

Table 4.7: Ranking of actual scores by contractors, clients and consultants

Obstacles	**Contractor actual scores (%)**	**Rank (A)**	**Client actual scores (%)**	**Rank (B)**	**Consultant actual score (%)**	**Rank ('C)**
Differing risk attitudes and perceptions among project participants	99.46	1	100	1	99.05	1
Aversion to risk by project participants	96.22	4	99	2	98.09	2
Complexity of contracts between project participants	91.89	7	94	6	93.33	7
Different participants with different sets of information about project risks	95.14	5	96	3	91.42	10
Imbalance and abuse of power (leverage)	88.65	10	89	9	90.48	11
Lack of understanding of the benefits of optimal risk allocation	84.32	11	86	10	94.29	5
Static risk allocation for a dynamic construction industry	95.14	5	96	3	95.24	4
Ineffective risk management communication among project participants	97.3	3	92	8	93.33	7
Competitive attitude among project participants	91.89	7	94	6	97.14	3
Lack of a joint risk management mechanism which include all project participants at the early stage of the project	97.84	2	95	5	94.29	5

Stage/phase inclusion - different participants are included at different stages of the project life cycle	90.27	9	88	11	92.38	9

Table 4.8: Difference in rankings of contractors, clients and consultants scores

Obstacles	contractor client (A-B)	$(A-B)^2$	Contractor consultant (A-C)	$(A-C)^2$	Consultant client (C-B)	$(C-B)^2$
Differing risk attitudes and perceptions among project participants	0	0	0	0	0	0
Aversion to risk by project participants	2	4	2	4	0	0
Complexity of contracts between project participants	1	1	0	0	1	1
Different participants with different sets of information about project risks	2	4	5	25	7	49
Imbalance and abuse of power (leverage)	1	1	1	1	2	4
Lack of understanding of the benefits of optimal risk allocation	1	1	6	36	1	1
Static risk allocation for a dynamic construction industry	2	4	1	1	1	1
Ineffective risk management communication among project participants	5	25	4	16	1	1
Competitive attitude among project participants	1	1	4	16	3	9

Lack of a joint risk management mechanism which include all project participants at the early stage of the project	3	9	3	9	0	0
Stage/phase inclusion - different participants are included at different stages of the project life cycle	2	4	0	0	2	4
Total		**54**		**108**		**70**

In order to test for the significant level between the three groups of respondents using the one tailed test, three research hypotheses and null hypothesis were formulated.

The research hypotheses were:

1. There is an agreement between contractors and clients about the list of obstacles to optimal risk allocation in construction contracts.
2. There is an agreement between contractors and consultants about the list of obstacles to optimal risk allocation in construction contracts.
3. There is an agreement between consultants and clients about the list of obstacles to optimal risk allocation in construction contracts.

The null hypotheses were:

1. There is no agreement between contractors and clients about the list of obstacles to optimal risk allocation in construction contracts.
2. There is no agreement between contractors and consultants about the list of obstacles to optimal risk allocation in construction contracts.

3. There is no agreement between consultants and clients about the list of obstacles to optimal risk allocation in construction contracts.

The computed Spearman correlation coefficients are shown in table 4.9 below

Table 4.9: Computed Spearman correlation coefficients

	Contractors	Clients	Consultants
Contractors	1	0.7545455	0.50909091
Clients		1	0.6818
Consultants			1

These coefficients in table 4.9 were compared to the critical values of Rho at a probability level P< 0.01 for a one tailed test from the Spearman's correlation coefficient table in Appendix B.

From the Spearman's correlation coefficient table in Appendix B, the critical value of Rho at P<0.01 for a one tailed test of N=11 reads 0.709, which is less that the rho value computed for Contractor Client. Hence hypothesis 1 of the research hypotheses was accepted and hypotheses 2 and 3 of same were rejected. The foregoing means that there is a positive correlation between the contractors and clients on how they ranked the obstacles to optimal risk allocation. And the probability of this result being due to chance is less than 1%.

However, the null hypotheses 2 and 3 were accepted and hypothesis 1 of same was rejected because the rho values of hypotheses 2 and 3 (0.509 and 0.6818 respectively) were less than the critical value 0.709. Hence there is no positive correlation between contractor consultant ranking and client consultant rankings of the obstacles to optimal risk allocation.

4.2.5 Remedies to the effects of current risk allocation

Table 4.10 below, shows that out of the 9 remedies suggested, respondents ranked: Effective negotiation and communication between contracting parties at all stages of the project life cycle; Building trust and teamwork among contracting parties; Allocation of risk to the party that have the resource and expertise to manage them and A clear unambiguous language should be used in writing contract terms as the four main remedies to the effect of current risk allocation in construction contracts.

Table 4.10 Ranking of the remedies to the effects of current risk allocation

Remedies to the effects of current risk allocation in construction contracts											
Remedy	**ranking**					**∑W**	**A**	**N**	**AxN**	**RII**	**Ranking**
	1	**2**	**3**	**4**	**5**						
R1			1		77	388	5	78	390	0.9949	1st
R2				9	69	381	5	78	390	0.9769	2nd
R3				13	65	377	5	78	390	0.9667	3rd
R4			1	23	54	365	5	78	390	0.9359	5th
R5				25	53	365	5	78	390	0.9359	5th
R6				26	52	364	5	78	390	0.9333	7th
R7				23	55	367	5	78	390	0.9410	4th
R8		1	2	25	50	358	5	78	390	0.9179	8th

R9			2	34	42	352	5	78	390	0.9026	9th

R1: Effective negotiation and communication between contracting parties at all stages of the project life cycle.

R2: Building trust and teamwork among contracting parties.

R3: Allocation of risk to the party that have the resource and expertise to manage them.

R4: Lower-tier parties (contractors and subcontractors) should be allowed to make inputs to the terms of agreements in construction contracts.

R5: Any choice of a procurement route should be made in cognisance of the terms of agreements that will be used in the contract.

R6: Standard forms of contracts should only be edited where necessary to suit the interests of all parties in the contract.

R7: A clear unambiguous language should be used in writing contract terms.

R8: Owners should make a shift from allocating risk by aversion to risk sharing.

R9: Ample time should be allowed at the inception stage of projects for contracting parties to assess risk and plan adequately for them.

4.3 Comments/Discussion of findings

Below are comments on the findings based on the respective objectives for this study

4.3.1Current risk allocation practice in construction contracts

a) Owners allocate risk by aversion

There are a number of risk attitudes: risk averse, risk neutral and risk taker. However owners have chosen to be risk averse or risk neutral depending on the intricacy of the project at hand. Perhaps the reason for this risk attitude of owners evolve from the fact that most often than not, they prepare the terms of agreement for construction contracts and for that matter have the opportunity to push risks to other parties.

However owners should be mindful that such risk attitudes only increase cost of projects, as contractors will cater for them by providing higher contingencies. Therefore owners must shun from such practices and take risk, after all; all the risk on projects comes to play due to their commissioning of a project and for that matter they should learn to take the bull by its horns.

b) Higher-tier parties use disclaimer clauses to prevent contractors from making genuine claims

Disclaimer clauses has become a strategy that owners usually use to prevent contractors from making genuine claims. In practice, the use of disclaimer clauses only becomes a catalyst for cost escalation and disputes. Therefore owners should desist from such practices since in the long run it will not serve them any good.

c) Sufficient time is not allowed at the tendering stage for risk assessment before risks are allocated

Indeed time is of essence in every aspect of life and for construction projects it is one of the major objectives to complete work within schedule. However when it comes to dealing with the myriad of risks in construction contracts, it is only better to find ample time to search about probable risks and adequately plan for them. The nature of the industry usually grants owners the chance to set schedule deadlines which in some situations are unrealistic. Since risk management is fundamental to success of construction projects, it is better that ample time is allowed at the tendering stage for parties to assess risk before they are allotted.

Respondents were of the view that enough time is allowed at the tendering stage to enable contractors adequately assess risk.

d) Contractors accept higher risk in order to secure jobs due to competitive markets

Construction firms always have to compete for jobs and it is not likely to change as far as the demand for various services from the industry keep growing.

In practice, contractors most often take high risks because of competition. However contractors are advised to take calculated risks even in times of adverse competitions. Since the overarching goal of winning a contract is to stay in business and not to win a job and have their enterprises become insolvent.

4.3.2 Effects of current risk allocation on contracting parties and project objectives

a) Disputes between contracting parties

There are a number of factors that cause disputes in construction contracts. All stems from improper risk allocation. In a situation where risks are not appropriately allocated, it creates room for claims from contracting parties which consequently raise disputes and adversely cause delays and increase project cost.

b) Additional resources (time and funds) to manage the misallocated risk

Inappropriate allocation of construction risks could lead to dire consequences. For instance, if risks are allocated to a lower-tier party (contractor or subcontractor) and they are unable to manage them adequately, it could lead to insolvency. When this happens, the owner will have to bring on board another contractor to take up the ruins of the project. This will certainly demand additional resources from the owner in order to keep the project running. The foregoing could have been prevented if risks were appropriately allocated *ab initio*.

c) Adversarial project environment and aggressive relationships between contracting parties

Adversarial relationships already exist in construction contracts due to the varying project participants that comes together to play active roles in achieving project objectives. And if risk is not properly allocated as a result of not stating clearly each parties risk responsibilities, allocating risk to the party that can best manage it and creating a trust relationship among parties. Then it could aggravate matters and have adverse repercussions on project goals.

d) More construction claims leading to escalated final project account Claims are inevitable in construction contracts so far as all risks cannot be identified at the outset of the project. Additionally, risks may even present themselves in new forms as work progress.

However, the onus is on the contracting parties to have a risk management plan that can absorb such shocks. If this is effectively done claims can considerably be managed.

4.3.3 Obstacles to optimal risk allocation in construction contracts

a) Differing risk attitudes and perceptions among project participants

Construction project participants have differing risk attitudes not only because they come from different disciplines but also the subjective concept of risk explained in the literature of this study plays a role here. As such their attitudes are influenced by their ethics, beliefs and anticipations which consequently define how they calculate the probability of occurrence and impact of a given risk on a project.

To control these differing risk attitudes, project participants should be brought together at the inception stage of the project to discuss risks that are probable to occur in the project. So as to have all views and perceptions brought together in the preparation of the risk management plan.

b) Aversion to risk by project participants

Risk aversion certainly paves the way to unfair allocation among contracting parties. When project participants are risk averse it is the parties who have low bargaining power that suffers the most because more risks are allocated to them.

However these lower-tier parties that have low bargaining power perform a substantial amount of the works of any given project. Therefore a risk aversion attitude will definitely have adverse consequences on project objectives.

Contracting parties could resort into risk sharing as an alternative that can lead to a win-win situation.

c) Lack of a joint risk management mechanism which include all project

participants at the early stage of the project

Indeed project participants are included in projects at different stages as and when the need arises. This lack of inclusion of all participants at the outset of a project makes the allocation of risk and for that matter its management difficult. Adding new participants at different stages means that there will be a knowledge gap in respect to what had transpired in previous stages as far as risk allocation and its management is concerned. And this can impact negatively on project goals.

Hence it would be preferable to include all participants as early as possible so that they all will have the same information of risk with respect to the project.

d) Static risk allocation for a dynamic construction industry

Construction projects are susceptible to changes, so are their risks. However, the contract which is supposed to allocate these risks is prepared at the outset of the project and remains the same throughout the project.

The foregoing does not allow efficient allocation of risk among contracting parties. It would be better to find a better approach that can make construction contracts flexible to the erratic changes that takes place during the project.

4.3.4 Remedies to the effect of current risk allocation

a) Effective negotiation and communication between contracting parties at all stages of the project life cycle

In all contracts negotiation and communication is key to ensuring that all parties are able to perform their respective task adequately so as to achieve the object of the contract, and construction contracts are of no exception. It is through negotiation and communication that conflicts and disputes are settled. Therefore effective negotiation and communication between contracting parties at all stages of the project life cycle is key to dealing with issues that may arise as the project unfolds.

b) Building trust and teamwork among contracting parties

In the construction industry, participants come from diverse disciplines and each participant's role is interdependent even though participant themselves are independent. The foregoing makes it certain that the industry is likely to be fraught with adversarial relationships.

Therefore building trust and teamwork between contracting parties in construction contracts is indispensable to ensuring a cordial relationship leading to a focus on the actual project objectives rather than each party seeking their own interest. In effect successful projects will be achieved if trust and teamwork prevails between contracting parties.

c) Allocation of risk to the party that have the resource and expertise to manage them

Identifying probable risks in any construction project is essential to success. However, its allocation foretells whether the risk can be adequately dealt with or not. It is therefore a best practice to allocate risk to the party that have the requisite resources and expertise to manage them.

Failure to allocate risk properly can lead to a situation where parties focus on how to survive under the contract rather than working towards the set objectives of the project.

d) A clear unambiguous language should be used in writing contract terms The terms and conditions of any contract must clearly state the roles and responsibilities of all parties in the contract. In light of the myriad of participants involved in construction projects, it is prudent that from the outset of the project all participants are made to know their roles and responsibilities as far as risk allocation and its management are concerned.

4.4 Summary of findings

The survey conducted achieved a response rate of 78%, mainly of which are Quantity surveyors, Engineers and Architects working in client organizations, construction and consultancy firms. In the rankings of the 17 risk allocation practices found in literature the first four practices that topped the rankings were: owners allocate risk by aversion; higher-tier parties use disclaimer clauses to prevent contractors from making genuine claims; sufficient time is not allowed at the tendering stage for risk assessment before risks are allocated and contractors assume high risks in order to secure jobs due to competitive markets.

These findings confirms Dell'Isola's (2003), statement that owners tend to push more risk to the contactor and this often leads to higher pricing of risk. It also confirms Alsalman & Sillars's (2013), assertion that clients are risk averse and shifts a lot of risk to the contractor as a result risk may land in the hand of the party who lacks the capacity to manage it. No damages for delay; consequential damages; differing site conditions and waiver of claims were also identified as the four main contract clauses that unfairly allocate risk among contracting parties. These also confirms the list of top 14 risks that were identified by the Construction Industry Institute (CII) in 2007 and further confirms Perten's (2014), statement that no damages for delay clauses only allow extension of time to the contractor but not recovery of cost incurred as a result of owner caused delays that have warranted that contractors work out of sequence or overtime to meet completion dates. It is therefore not surprising that no damages for delay clauses was number one on the list of clauses that unfairly allocate risk among contracting parties.

The ranking of the effects of current risk allocation practices in construction contracts, saw: disputes between contracting parties; adversarial project environment and aggressive relationships between contracting parties; additional resources (time and funds) to manage the misallocated risks and more construction claims leading to escalated final project account emerging as the four major effects of current risk allocation practice in construction contracts.

Respondents also agreed that adverarial project environment and aggressive relationship between project participants, allocation of risk to a lower party that lacks the capacity to manage it, insolvency of lower tier parties, additional resources to manage misallocated risks and disputes can lead to project delays. But they identified, subjective pricing of risks as an effect that can increase project cost. Furthermore, the survey also identified: differing risk attitudes and perceptions among project participants; aversion to risk by project participants; lack of a joint risk management mechanism which include all project participants at the early stage of the project and static risk allocation for a dynamic construction industry as the four main obstacles to optimal risk allocation. The foregoing affirms the statement by (Liu & Cheung, 1994) that construction parties perceive risk differently. And risk identification is done through subjective means of individual intuition, judgement and experience (Akintoye & Macleod, 1997; Hliang, et al., 2008; Al-labtahai &

Diekmann, 1992).

It further confirms Zaghloul & Hartman’s (2003), statement that amongst project participants in construction projects, owners are risk averse or risk neutral depending on the intricacy of the project at hand. It must also be noted that there is a positive correlation in the contractor client ranking of the obstacles to optimal risk allocation. Finally, the study found: effective negotiation and communication between contracting parties at all stages of the project; building trust and teamwork among contracting parties; allocation of risk to the party that have the resource and expertise to manage them and a clear unabiguous language should be used in writing construction contracts as the four major remedies to the effects of current risk allocation practice in construction contracts.

CHAPTER FIVE – CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the conclusions of the research and recommendations proposed to address the major findings obtained from the analysis in respect of the objectives of the study. The objectives of this research were to: explore the current practice of risk allocation in construction contracts, identify the effects of the current practice of risk allocation on contracting parties and project objectives and to identify the obstacles to optimal risk allocation in construction contracts. The remedies to help solve these effects of current risk allocation practice in construction contracts and some specific recommendations made are also presented in this chapter. The chapter concludes with recommendations for further research.

5.2 Conclusions

In respect of the adverse impact of risks on project objectives and contracting parties involved in construction projects, the objectives of the research were geared towards finding out the current risk allocation practices in construction contracts, their effects on contracting parties and project objectives, the obstacles to optimal risk allocation and the solutions to remedy the effects of the current risk allocation practices in contraction contracts. At the end of the research, the survey results attests that the current risk allocation practices in construction contracts are sub-optimal.

The study revealed the following as the six main current practice of risk allocation in construction contracts arranged in descending other of significance:

- Owners allocate risk by aversion.

- Higher-tier parties (owners) use disclaimer clauses to prevent contractors from making genuine claims.
- Sufficient time is not allowed at the tendering stage for risk assessment before risks are allocated.
- Contractors accept higher risks in order to secure jobs due to competitive markets.
- Higher-tier parties shift more risks to lower-tier parties.
- The contract which is supposed to allocate risk among contracting parties is usually written by the owner.

It is not surprising that "Owners allocate risk by aversion" is the number one current practice of risk allocation in construction contracts, because it is very clear that owners are likely to prepare contract agreements. As a result, the decision to accept some risks or avoid them all lies in their bosom. Interestingly, the next current practice of risk allocation found: "Higher –tier parties (owners) use disclaimer clauses to prevent contractors from making genuine claims" attest to the fact that owners are risk averse. Thus, it is through the use of disclaimer clauses that owners are able to waive off some risks from the outset of the project.

In addition to these current risk allocation practices identified, the following five clauses usually used in construction contracts were found to unfairly allocate risks:

- No damages for delay.
- Consequential damages.
- Differing site conditions.
- Waiver of claims.
- Schedule acceleration.

These clauses are congruent with the fourteen (14) that were identified as inappropriately allocating risk among contracting parties by CII in 2007. Amongst these five (5) clauses, “No damages for delay” is the number one clause that unfairly allocate risk. It is very unfortunate that contractors will have to bear the risk associated with no damages for delays caused by the owner. A clear evidence that contractors lack the bargaining power to obtain agreeable risk allocation (CII, 2007). The foregoing further confirms Peckiene, et al., (2013) assertion that equitable risk allocation seldom exist.

The study further revealed the following as the main effects of the current risk allocation practices on contracting parties and project objectives:

- Disputes between contracting parties.
- Additional resources (time and funds) to manage the misallocated risk.
- Adversarial project environment and aggressive relationships between contracting parties.
- More construction claims leading to escalated final project account.
- Subjective pricing of risks leading to higher contingency.

The construction industry has been noted to be fraught with fragmentation of project participants based on its nature of operation, which usually results into disputes and adversarial relationships between contracting parties. However, in most instances, it is the unfair manner in which construction contracts allocate risk among contracting parties that lead to disputes. The above finding is consistent with (Cheung & Yiu, 2006) assertion that contract provisions is part of the three major ingredient that cooks up construction conflicts.

The ranking of “Additional resources (time and funds) to manage the misallocated risk” as the second effect of the current practices of risk allocation, makes it clear that no matter the situation risk cannot be ignored. Bringing on board additional resources to mitigate risks that have been misallocated suggests that, there will be an escalation in both cost and time; two of the core objectives of any construction project.

Also, effects such as adversarial project environments and aggressive relationship between project participants, allocation of risk to a lower tier party who may lack the capacity to manage it, insolvency of lower-tier contracting parties, additional resources (time and funds) to manage the misallocated risk and disputes between contracting parties can cause delays. And subjective pricing of risk can increase project costs.

Furthermore, the following obstacles to optimal risk allocation in construction contracts were found in the survey:

- Differing risk attitudes and perceptions among project participants.
- Aversion to risk by project participants.
- Lack of a joint risk management mechanism that include all project participants at the early stage of the project.
- Static risk allocation for a dynamic construction industry.
- Ineffective risk management communication among project participants.

It must quickly be added that contractors and clients ranking of these obstacles to optimal risk allocation were found to positively correlate.

“Differing risk attitudes and perceptions among project participants” was ranked as the number one obstacle to optimal risk allocation, which suggests that participants are fragmented and as a result each have their own way of understanding and dealing with a particular risk. Thus affirming (Darda'u Rafindadi, et al., 2014) assertion that the definition of project objectives and success are different amongst project participants.

Studies suggest that equitable risk allocation is the best and fair means of allocating risk. However, in an industry where participants are risk averse (especially owners) and hold varying perceptions as far as risk is concerned, achieving equitable risk allocation would be difficult. Perhaps a way of dealing with this situation could be through Alliance contracting and risk sharing where all participants are equally held accountable for the success or failure of the project at hand.

Finally, the study also revealed that, the major stakeholders to any construction project have begun to realise the effects of the current risk allocation practices in construction contracts. As a result of this,

- Effective negotiation and communication between contracting parties at all stages of the project life cycle;
- Building trust and teamwork among contracting parties;
- Allocation of risks to the party that has the resource and expertise to manage them;
- Use of unambiguous language in writing contract terms; and
- The choice of a procurement route that is in cognisance with the terms of agreements to be used in the contract can be concluded to be the best remedies to the effects of the current risk allocation practices in construction contracts in Ghana.

5.3 Recommendations

The nature of risk is dynamic, can manifest in various forms and difficult to predict its probability of occurrence and impact at the outset of a project. However, the foregoing can be curtailed through in depth research about the anticipated risks in any given project and the formulation of a risk management plan that is detailed and flexible to absorb any shocks as the project unfolds. There will also be the need to create a collaborative, cooperative and teamwork project environment in order to bring risks under control in construction projects. In light of the above conclusions, the study recommends the following approach to curtail the intricate nature of risk as far as its allocation among contracting parties is concerned. Other specific recommendations are also included.

5.3.1 Recommended strategies/efficient ways of risk allocation

The following are suggestions that can efficiently allocate risk among construction contracting parties in Ghana. They are: contracting parties should shun from aversion to risk and consider risk sharing as an alternative, risks should be allocated to the party that have the capacity and expertise to manage them, ample time should be allowed at the tendering stage of the project for effective assessment of risk before they are allocated, effective negotiation and communication should run through all the stages of the project life cycle, unambiguous language should be used in writing contract terms, procurement routes that are in cognisance with anticipated contract terms should be used and contract terms that builds trust and teamwork must be used in allocating risk.

a) Contracting parties should shun from risk aversion and consider risk sharing as an alternative

Aversion to risk by project participants only shifts the risk to a party whose bargaining power is low and most often these are lower-tier parties who may lack the capacity to manage the said risks at hand.

The foregoing implies that, additional resources may be required to control the risks as a result of the lower-tier parties failing to manage risks that were allocated to them. And that consequently will impact on project goals. According to CII (1993), efficient risk management is where the cost of a particular risk has been reduced, not necessarily the cost to any party separately. With regards to this statement, project participants should team up to deal with project risks with the goal of ensuring that its cost on the project is considerably reduced.

b) Risks should be allocated to parties that have the capacity and expertise to manage them.

The early stages of a project should see the risk tolerance level of each contracting party measured so that it could be a guide to the project team when risks on the project are being apportioned. This will prevent the misallocation of risks and its dire implications that comes with it.

c) Ample time should be allowed at the tendering stage of the project for risk assessment before they are allocated.

Risks can be managed properly when much information about them is known. It makes their probability of occurrence and impact to be accurately predicted with much confidence so that a proper plan can be formulated to deal with it. Therefore sufficient time must be allowed at the initial stages of the project for an in depth research about anticipated risks to be carried out by project participants so that risks can efficiently be planned for.

d) ***Effective negotiation and communication should run through all the stages of the project life cycle.***

As a result of the diverse participants involved in construction projects and their varying risk attitudes and perceptions, risk can better be dealt with through effective negotiation and communication of the status or changes of the risk. Thus, by alerting participants about how the risk might have changed or could manifest in other forms.

McInnis (2003), writes that contractual relationships in a given project should be less based on what was agreed but rather how contracting parties will deal with future events. This statement attests to the need for project participants to effectively communicate as far as construction risks and its management are concerned.

e) ***Unambiguous language should be used to write contract terms***

The contract is the medium or vehicle for risk allocation, therefore its object can only be achieved when unambiguous language is used in writing the terms enshrined in it.

Thus risks to be borne by each contracting party should be articulated clearly without any doubts for parties to known their responsibilities as far as project risks ae concerned.

The foregoing can help eliminate or minimise disputes to allow the smooth running of projects.

f) ***Procurement routes that are in cognisance with anticipated contract terms should be used.***

Procurement routes foretell the type of contract and its terms that will be used in allocating risk on a project. According to (Latham, 1994), the choice of any procurement route for a construction project should be guided by the nature of the project and the client's attitude to risk. This statement affirms that the procurement route signifies how risks are allocated on a construction project by the contract. Therefore any choice of a procurement route for construction projects should be done in cognisance with the anticipated terms and conditions of the contact that is supposed to allocate risk.

g) Contract terms that can build trust and teamwork

In fact, situations where mutual trust and teamwork thrives do not need contracts at all. However, that is not the case in construction contracts where risks are innate and broad. And participants come from diverse disciplines with varying interests. Therefore there will definitely be the need to have contracts regulate or administer each participant's responsibilities. But, the terms in the contract should be formulated such that it can build mutual trust and teamwork to enable projects run successfully.

5.3.2 Specific recommendations

Contracts are agreements between two or more parties enforceable by law. Therefore it is reasonable to say that each party under a contract have a role to play. In the case of construction contracts, it is the medium in which risks are allocated and as such all parties involved; owner, contractors and consultants have significant roles to play.

In view of this some specific recommendations were made to each contracting party.

i. Owners

It is recommended that owners:

- Shun from risk aversion to risk sharing as an alternative.
- Should allow enough time for risk assessment at the inception stage of the project before risks are allocated.
- Use negotiation and communication to resolve all issues of risk.
- Should have a risk management plan that is flexible to absorb any surprise if risks should manifest in a different form.
- Look for solutions to risk issues on the project first before looking for which party to hold liable for the risk.
- Allocate risk to contractors that have the expertise and resource to manage them.

ii. Consultants

It is also recommended that consultants:

- Guide owners on the choice of procurement routes as well as contract types and their respective conditions
- Should advise owners on the terms or clauses to be included in contract documents. This they can do by helping owners to:
    - Identify risk tolerance levels of project participants so that risk can be allocated to participants that can control them.
    - Articulate specifications that reflect the skills, materials and plants readily available so that risks related to quality can be curtailed.
    - Monitor risk triggers so that any changes in risks can be quickly identified and dealt with.

iii. Contractors

It is also recommended that contractors:

- Bid for projects whose risk they can manage.
- Employ qualified professionals to advise them on contractual terms and their implications before they formalise any contract.
- Allocate risk to sub-contractors only when they are convinced that they can bear or manage them.
- Have a risk management plan to manage project risks.
- Have an in house research and development unit responsible for collecting data on project risks so as to accurately predict risk occurrence and impact.
- Communicate early warning signs of risk beyond their capacity quickly to the owner.

iv. Public Procurement Authority

Finally, it is recommended that the PPA should come out with new procurement routes for construction works that shifts from the traditional procurement system that has been noted for fragmentation and adversarial relationships of project participants to other forms of procurement systems that can help allocate risk efficiently in construction contracts.

5.3.3 Future research

The following are some areas suggested for future research.

- A research on how to investigate the risk tolerance levels of construction project participants.

- The study covered contractors in class D1K1 in the Greater Accra and Ashanti regions of Ghana. There is the need to repeat the research for other classes (D1K1-D4K4) and expanded by taking samples from the other eight regions in Ghana.
- The study can also be repeated to cover subcontractors and suppliers as well.

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APPENDIX APPENDIX A: Questionnaire

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY SURVEY QUESTIONNAIRE RESEARCH TOPIC – **Optimizing the allocation of risk factors associated with construction contracts in Ghana**

Dear Sir,

TO ALL WHOM IT MAY CONCERN

Contractual risks are innate and broad in the construction industry. A proper management of risk is fundamental to overall project success. However the norm in the construction industry is to allocate risk by aversion. Thus owners push a lot of risk to main contractors who in turn pass them on to subcontractors. As a result the risk may land in the hands of the party who lacks the expertise to manage it. For this reason there is the need to find a proper way to efficiently allocate risk among contracting parties in the Ghanaian construction industry.

This research work is therefore being carried out to find answers to the problems with the current risk allocation practices. The research has the following objectives:

- To explore the current risk allocation practices in construction contracts.
- To identify the effects of current risk allocation practices on contracting parties and project objectives.
- To identify the obstacles to optimal risk allocation in construction contracts.
- To provide solutions to remedy the effects of current risk allocation practices in construction contracts.

This survey is for academic purposes, therefore all the information you provide will be kept in strict confidentiality and only used for the research.

I value your participation and appreciate your commitment of time and effort. If you have any further questions or suggestions you may contact me on the address provided below. Sincerely,

Siaw Ansong Daniel

Email: dsiawansong@gmail.com

Tel: 0246474591

SECTION A: RESPONDENT'S PROFILE

Please, kindly respond to the questions by ticking (√) in the appropriate box(s) for each item.

1. Name……………………………………………..(please ignore if you wish to remain anonymous)
2. Please state the number of years you have been in the firm/construction industry
    - Less than 1 year
    - 1 – 2 years
    - 2 – 3 years
    - 3 – 5 years
    - More than 5 years
3. Please indicate your position in your firm.
    - Engineer
    - Quantity Surveyor
    - Architect
    - Managing Director
    - Contractor
    - Principal Consultant
    - Project Manager
    - Other ………………………………(please explain further)
4. Please indicate highest qualifications (please do not tick **(**√ **)**more than two boxes)
    - PhD
    - MSc
    - BSc
    - HND
    - Professional qualification……………………………(please indicate type)
    - Other……………………………………………………(please indicate)
5. What type of organisation do you belong?
    - Clients' organisation
    - Supplier
    - Plant/

- ☐ Equipment firm
- ☐ Contracting firm
- ☐ Consulting firm
- ☐ Others (specify type of organisation)...

SECTION B

Part 1: Questions related to current risk allocation practices in construction contracts.

2.1 Below is a list of current practices of risk allocation in construction contracts in Ghana. From your experience, please express your opinion in order of magnitude whether or not you agree.

(5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree)

Current practice of risk allocation	**Magnitude of agreement**				
	5	**4**	**3**	**2**	**1**
Owners allocate risk by aversion					
Higher-tier parties shift more risk to lower-tier parties					
Risks are allocated to parties that lack the expertise and resources to manage them					
The procurement routes that are employed do not create room for proper risk allocation					
Risks are rarely negotiated before they are allocated					
The contract which is supposed to allocate risk among contracting parties is usually written by the owner					
Some of the phrases used in drafting contractual agreements are ambiguous and as such do not properly allocate risk					
The contract is usually drafted to favour the higher-tier party (the owner)					
Lower-tier parties (contractors) are hardly allowed to make any input to the terms of agreement for construction contracts					
Standard forms of contracts are edited to suit owner's interest					
Higher-tier parties (owners) use disclaimer clauses to prevent contractors to make genuine claims					
Risks are not realistically and equitably allocated					
Formal risk assessment is not religiously undertaken before risks are allocated					
Sufficient time is not allowed at the tendering stage for risk assessment before they are allocated.					
Contractors accept higher risks in order to secure jobs due to high competitive markets					
Contracting parties do not identify risks that can be shared among them.					
Risk tolerance level of contracting parties is seldom measured or identified before risk is allocated.					

Please indicate in the spaces provided below any other current practice of risk allocation that has not been captured above.

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2.2 Below are lists of contract clauses that have been found to unfairly allocate risk between contracting parties. From your experience, please express your opinion in order of magnitude whether or not you agree that such clauses unfairly allocate risk among contracting parties.

(5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree)

Clause	**Magnitude of agreement**				
	5	**4**	**3**	**2**	**1**
No Damages for delay					
Consequential Damages					
Indemnity					
Acceptance criteria					
Force majeure					
Schedule acceleration					
Owner-mandated subcontractor					
Differing site conditions					
Waiver of claims					
Design responsibility					
Liquidated and ascertained damages					
Cumulative impact of change orders					
Insurance					

Please indicate in the spaces provided below any other clause that you believe unfairly allocate risk among contracting parties that has not been captured above.

Part 2: Please the following has been identified as effects of current risk practice on contracting parties. Kindly indicate in your experience the effects on the parties based on the ranking/rating as……strongly agree, agree, neutral, disagree and strongly disagree.

3.1 The current practice of risk allocation leads to:

(5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree)

Effects of current risk allocation	**Magnitude of agreement**				
	5	**4**	**3**	**2**	**1**
Disputes between contracting parties					
Adversarial project environment and aggressive relationships between contracting parties					
Subjective pricing of risk leading to a higher contingency					
Allocation of risk to a lower tier party who may lack the capacity to manage it					
poor overall performance of the project					
Unfair allocation of risk among project participants					
Insolvency of lower-tier parties (contractor, subcontractors)					
Additional resources (time and funds) to manage the misallocated risk					
More construction claims leading to escalated final project account					
Lower tier parties may find it difficult to survive under the contract due to unbearable risk allocated to them					

Please indicate in the spaces provided below any other effect of risk allocation on contracting parties and project objectives that has not been captured above.

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3.2 Kindly rank the impact of the following effects of current risk allocation practices on the corresponding project objectives

(5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree)

Effect of current practice of risk allocation	**5**	**4**	**3**	**2**	**1**
Adversarial project environments and aggressive relationship between project participants can:					

Increase cost					
Cause project delays					
Negatively affect overall quality performance of project					
Subjective pricing of risk leading to a higher contingency can:					
Increase cost					
Cause project delays					
Negatively affect overall quality performance of project					
Allocation of risk to a lower tier party who lacks the capacity to manage it can:					
Increase cost					
Cause project delays					
Negatively affect overall quality performance of project					
Insolvency of lower tier (contractors, subcontractors) contracting parties can					
Increase cost					
Cause project delays					
Negatively affect overall quality performance of project					
Additional resources (time and funds) to manage the misallocated risk leads to:					
Increase project cost					
Schedule delays					
Disputes between contracting parties can:					
Cause delay and affect overall schedule performance of the project					
Increase project cost					

Part 3: Questions related to obstacles to optimal risk allocation in construction contracts

The following is a list perceived to be obstacles to optimal risk allocation, skindly rank them.

(5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree)

Obstacles to optimal risk allocation	**5**	**4**	**3**	**2**	**1**
Differing risk attitudes and perceptions among project participants					
Aversion to risk by project participants					

Complexity of contracts between project participants					
Different participants with different sets of information about project					
Imbalance and abuse of power (leverage)					
Lack of understanding of the benefits of optimal risk allocation					
Static risk allocation for a dynamic construction industry					
Ineffective risk management communication among project participants					
Competitive attitude among project participants					
Lack of a joint risk management mechanism which include all project participants at the early stage of the project					
Stage/phase inclusion – different participants are included at different stages of the project life cycle					

Please indicate in the spaces provided below any other obstacles to optimal risk allocation that has not been captured above.

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Part 4: Solutions to remedy the effect of current risk allocation practices in construction contracts

Below is a list of possible solutions to remedy the effects of current risk allocation.

Please rank them

(5= strongly agree, 4= agree, 3= neutral, 2= disagree, 1= strongly disagree)

Remedies to the effects of current risk allocation	**5**	**4**	**3**	**2**	**1**
Effective negotiation and communication between contracting parties at all stages of the project life cycle					
Building trust and teamwork among contracting parties					
Allocation of risk to the party that have the resource and expertise to manage them					
Lower-tier parties (contractors and subcontractors) should be allowed to make inputs to the terms of agreements in construction contracts					
Any choice of a procurement route should be made in cognisance of the terms of agreements that will be used in the contract					
Standard forms of contracts should only be edited where necessary to suit the interests of all parties in the contract					

A clear unambiguous language should be used in writing contract terms					
Owners should make a shift from allocating risk by aversion to risk sharing					
Ample time should be allowed at the inception stage of projects for contracting parties to assess risk and plan adequately for them					

Please indicate in the spaces provided below any other remedy to the effect of current risk allocation that has not been captured above.

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APPENDIX B: Critical values of rho at various levels of probability (Spearman's rank correlation coefficient)

	Level of significance for two-tailed test			
	0.10	0.05	0.02	0.01
	Level of significance for one-tailed test			
	0.05	0.025	0.01	0.005
$N = 4$	1.000			
5	0.900	1.000	1.000	
6	0.829	0.886	0.943	1.000
7	0.714	0.786	0.893	0.929
8	0.643	0.738	0.833	0.881
9	0.600	0.700	0.783	0.833
10	0.564	0.648	0.745	0.794
11	0.536	0.618	0.709	0.755
12	0.503	0.587	0.671	0.727
13	0.484	0.560	0.648	0.703
14	0.464	0.538	0.566	0.675
15	0.443	0.521	0.604	0.654
16	0.429	0.503	0.582	0.635
17	0.414	0.485	0.566	0.615
18	0.401	0.472	0.550	0.600
19	0.391	0.460	0.535	0.584
20	0.380	0.447	0.520	0.570
21	0.370	0.435	0.508	0.556
22	0.361	0.425	0.496	0.544
23	0.353	0.415	0.486	0.532
24	0.344	0.406	0.476	0.521
25	0.337	0.398	0.466	0.511
26	0.331	0.390	0.457	0.501
27	0.324	0.382	0.448	0.491
28	0.317	0.375	0.440	0.483
29	0.312	0.368	0.433	0.475
30	0.306	0.362	0.425	0.467

For $n > 30$, the significance of r_s can be tested by using the formula:

$$t = r_s\sqrt{\frac{n-2}{1-r_s^2}} \quad df = n - 2$$

and checking the value of t.

Calculated r_s must *equal* or *exceed* the table (critical) value for significance at the level shown.

Source: J.H. Zhar (1972), Significance testing of the Spearman rank correlation coefficient, *The Journal of the American Statistical Association*, *67*, 578–80. Reprinted with permission. Copyright 1972 by the American Statistical Association. All rights reserved.