# RISK MANAGEMENT STRATEGIESAND PERFORMANCE OF CONSTRUCTION FIRMSIN SELECTED COUNTIES IN KENYA

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## DECLARATION

This thesis is my original work and has not been presented for a degree in any other university. No part of this thesis should be reproduced without authority of the author or/and Kenyatta University.

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## DEDICATION

I dedicate this work to the Almighty God, my late father Elijah, my mum Eunice, my wife Dinnah, children; Petra, Sonia, Abe and Doddy and to all people of good will.

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| **ACWP** | Actual Cost of Work Performed |
| **ADR** | Alternative Dispute Resolution |
| **ANOVA** | Analysis of Variance |
| **BAC** | Budget at Completion |
| **BCWP** | Budgeted Cost of Work Performed |
| **BCWS** | Budgeted Cost of Work Scheduled |
| **CAR** | Contractors' All Risks |
| **CBK** | Central Bank of Kenya |
| **CPI** | Cost Performance Index |
| **DAR** | Dispute Avoidance and Resolution |
| **EVA** | Economic Value Added |
| **RoK** | Republic of Kenya |
| **GDP** | Gross Domestic Product |
| **ISO** | International Organization for Standardization |
| **KNBS** | Kenya National Bureau of Statistics |
| **M-M** | Modigliani-Miller |
| **NaCoSTI** | National Commission for Science, Technology and Innovation |
| **NCA** | National Construction Authority |
| **NCR** | Non-Conformance Reports |
| **POOGI** | Process of Ongoing Improvement |
| **QMS** | Quality Management System |
| **SMEs** | Small and Medium Enterprises |
| **SPSS** | Statistical Package for the Social Sciences |
| **TOC** | Theory of Constraints |
| **TPI** | Time Performance Index |
| **TV** | Time Variance |
| **UK** | United Kingdom |
| **VIF** | Variance Inflation Factors |

## OPERATIONAL DEFINITION OF TERMS

| | |
|---|---|
| **Construction firm** | Are those firms involved in infrastructure development, such as road and building construction, and is registered by the Republic of Kenya as at July 2011 to June 2012; |
| **Construction risk** | Isthe likelihood that a construction project will exceed budgeted cost, scheduled time, not meet technical specifications in terms of quality, and result in disputes leading top costly litigation |
| **Litigation risk** | is the likelihood of disagreements between stakeholders involved in a construction project that may lead to breach of contract and subsequent court cases |
| **Performance** | Is defined along efficiency and effectiveness measures. Effectiveness refers to good quality management and ability to deliver the construction projects within set standards. Effectiveness measures, on the other hand, refer to user satisfaction with the end-product of the project |
| **Performance Indicators** | Referto adherence to budget, keeping within schedule, conformity to quality expectations, user satisfaction and compliance with occupational safety and health concerns. |
| **Risk** | Is an uncertain event or condition that, if it occurs, has an adverse effect on at least one construction project performance |
| **Risk management** | a management tool that helps in identifying root causes of uncertainty, evaluates their impact and formulates appropriate risk management strategies |
| **Risk management strategies** | Are risk management responses that include risk retention, risk reduction, risk transfer and risk avoidance, or a combination of all these mechanisms. These involve accepting a known risk and/or taking steps to mitigate the impact and likelihood of the occurrence of risks, to minimise the threats and maximise the opportunities |
| ***Uberrimae fidei*** | Theexistence of good faith between the parties to an insurance contract. |

## ABSTRACT

The construction industry entails high levels of risk, but often this risk is not dealt with adequately, resulting in poor performance, which is reflected in frequent cost and time overruns, as well aspoor quality of work. This may cause disputes which may lead to costly litigation and further time and cost overruns. Additionally, insurers traditionally avoid firms with high risk portfolios and subsequently will not offer insurance covers or may charge very high premiums to compensate for the increased risk. Previous studies have found an inconclusive relationship between adoption of risk management strategies and enhanced construction firm performance.As such, the general objective of this study was to determine how risk management strategies influenced performance of construction firmsin selected counties in Kenya. The specific objectives were to determine the influence of resource risk management strategies, personnel risk management strategies, project control risk management strategies, litigation risk management strategies and insurance risk management strategies on the performance of construction firms in selected counties in Kenya. The study also sought to assess the moderating role of government policy and regulation of the construction sector on the relationship between these risk management strategies and performance of the construction firms. Performance was measured as a function of cost variance, time variance and quality control. The theoretical framework revolved aroundfive theories that offereda foundation for interrogating the relationship between the variables under study. These werethe theory of constraints in project planning and management, fuzzy set theory of risk management, institutional theory of the regulatory environment, financial economics theory of corporate risk management and shareholder value maximization theory. This study usedan explanatory research design and the research philosophy was based on positivism. The population of the study was all construction firms carrying out construction and public works in selected counties in Kenya, registered by the Republic of Kenya as of July 2011 to June 2012, a total of 2,414 construction firms. The sample size was97 respondents, and simple random samplingwas used for identifying respondent firms in Nairobi County, Nakuru County and Machakos County.Data collection was done using a self-administered semi-structured questionnaire. Data analysiswas done using both descriptivestatistics and inferential statistics.The findings led to the conclusion that resource risk, personnel risk and project control risk management strategies had a significant influence on firm performance, implying that any effect on firm performance was not solely due to chance. Litigation risk management and insurance risk management strategies did not have a statistically significant effect, implying that any effect on firm performance was solely due to chance. Government policy and regulation of the construction sector had a statistically significant moderating effect on the relationship between risk management strategies and firm performance. The study recommended that, from a policy perspective, in order to further entrench risk management practices in the construction sector, construction firms in selected counties in Kenya need to increasingly engage in capacity building activities in risk management and construction project management in general. The government should also encourage activities that encourage proper risk management and risk sharing cross the entire construction value chain. The beneficiaries of the findings of the research will include Government policy makers, construction firm management and business and academic research.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background of the Study

The construction industry in the United Kingdom (UK), owing to the nature of its business that involves open air operations, has always been seen as vulnerable to weather extremes that impact adversely on financial performance. Wedawatta, Ingirige, Jones and Proverbs (2011) confirmed this in their findings that identified this sector as being one of the most exposed to the vagaries and extremes of climate change. Such adversefinancial impacts are significant in light of the fact that construction sector firms constituted over 99 percent of Small and Medium Enterprises (SMEs) in the UK (Wedawatta et al., 2011), and dominated SME businesses.

The high risk exposure to adverse weather in the construction sector was attributed to poor risk management strategies. These included negative individual attitudes and informal organizational culture, low levels of technical expertise, poor disaster risk management procedures, poor planning activities, low levels of capital formation to manage recovery efforts and poor linkages with national agencies and technical support institutions such as the universities. These were attributed as the reason for the poor cost, time and quality performance in the sector, within the UK (Wedawatta et al., 2011).

Depending on the country context, additional challenges were faced by construction firms. For instance, Hlaing, Singh, Tiong and Ehrlich (2008) argued that the turbulent economy in Singapore, coupled with continuous change in the corporate environment, exposed players in

the construction industry to increased risk. This motivated a need among construction project managers to develop an integrated approach to construction project management, necessitating a strategic planning approach that covered the entire scope of construction projects, from inception to occupancy. This was as a consequence of significant changes within the sector, especially in the procurement function. This resulted in clients increasingly apportioning responsibility for risk management to contractors, making formal risk management a necessity among construction firms. Therefore, formulating effective risk management systems and strategies, in order to mitigate the impact of various risks, has become a critical issue that must be addressed by construction firm management (Hlaing et al.,2008).

In the developing country context, especially in Africa, risk management in the construction sector is an amorphous affair faced with higher levels of risk as compared to the developed countries. The level of adoption of formal risk management strategies is not widely studied either. In Ghana for instance, Boadua, Fianko and Chileshe (2015) observed a limited level of adoption of formal risk management strategies among construction oriented firms, with low levels of procedural documentation. One reason that was forwarded for this state of affairswas the low levels of awareness regarding appropriate tools and techniques to effectively manage construction risk. Consequently, the construction sector in Ghana faces many problems related to frequent cost and time overruns(Fugar & Agyakwah-Baah, 2010). Within the mass construction market in Ghana, Ahadzie, Proverbs and Olomolaiye (2008), observe that the most crucial project performance success criteria were overall project cost and quality.

Risk management among construction firms in Kenya has gained increased prominence owing to what Ngundo (2014) observes as an increase in infrastructure development in the country. The rise of many construction projects, most notable in real estate at the mass market level, has been faced with a lot of uncertainty, resulting in outcomes that fail to meet minimum standards benchmarked against best practice in the sector. Ngundo (2014) attributed the low levels of project success to failure to develop proper procedures, lack of sufficient training and capacity building programs, incompetence among project staff, low levels of formal quality management support and low levels of management commitment. As a result, project risk management planning was characterised by poor risk identification, assessment, prioritization, mitigation and control. The overall outcomes were weak and inappropriate risk management measures that increased the vulnerability of the construction firms to risk.

In order to enhance the management of construction risks, the Republic of Kenya (RoK) enacted legislation such as the Engineers Act (2011) and the National Construction Authority Act (2011) for purpose of ensuring that legal compliance in the industry went a long way towards reducing the various risks associated with construction projects (RoK, 2011). Karimi (2004) further observed that key reforms proposed in the Kenya Vision 2030 that would have resulted in effective risk management of construction projects included the creation of the necessary institutional framework to improve policy implementation and enforcement of industry codes and standards among others. There was also recognition of the need to institute functional and comprehensive risk management strategies in the industry, in order to achieve performance objectives.

### 1.1.1 Risk Management Strategies

Uher (2003) noted that risk management has been described as a management tool that helps in identifying root causes of uncertainty, evaluating their impact and formulatingappropriate risk management strategies. Perera, Rathnayake and Rameezdeen (2008) observed that risk management is composed of several processes including risk identification, classification, analysis, attitude and risk response. The focus of this study was risk management strategies, which concerns itself with how to manage risk either through risk retention,risk reduction, risk transfer or risk avoidance, or a combination of all these mechanisms. Construction firms adopt various methods for allocating risk, with risk transfer being one of the most preferable options.

Ahmed, Kayis and Amornsawadwatana(2007) further added that successful project risk management strategies entailed the use of metric tools and techniques to quantify the risk involved. Risk management strategieswere processes aimed at managing the attendant risks and focused on the quantified construction project risks. Risk management strategiesincluded eliminating the risk by avoiding it (usually by treating the root causes), accepting the risk but having a contingency plan in place, shifting risk to a third party by transferring it, for example, through insurance, and reducing the likelihood of its occurrence by mitigation.

Uher (2003) notedthe difficulty in instituting cost-effective risk management systems, owing to the fluid nature of the risk dynamics that underlied effective risk management in the constructionsector. In order to circumvent uncertainty, Uher (2003) proposed the use of matured risk management systems, coupled with delegation to the agent best equipped to deal with the risk. The matured systems approach that espoused matured processeswas seen

as more holistic as it paid attention to process maturity along the entire construction value chain.

Risk management strategies were also specific in the sense that components that may adversely affect construction firm performance wereisolated, witha view to managing them. These components constituted the unsystematic risk function, could be minimized or eliminated through risk retention,risk reduction, risk transfer, risk avoidanceor a combination of these. Such unsystematic risk components included resource risk, project control risk, litigation risk, and insurance risk. By managing these unsystematic riskcomponents, it was then possible for construction firm management to optimize on firm performance (Ahmed et al., 2007).

Panigrahi, Zainuddin and Azizan (2014) observed that resource risks related to uncertainties that revolved around financial risks, material risks, capital equipment risks and land resources, among others. Resource risk management strategies aspired to maintain a continual and timely availability of resources and ensure their proper working order. Meredith and Mantel (2006) defined project control risk management strategies as feedback loops that informed management on variations between actual and desired performance. Project control risk management strategies were key to ensuring timely revision of project activities, to avoid deviations that may impact adversely on firm performance. Bayliss (2002) observed that litigation risk management strategies were alternative dispute resolution mechanisms that were used at any stage in a construction project, ranging from routine dispute resolution to binding arbitration.

Finally, policy and regulatory frameworkshad the ultimate consequence of creating a balance between a firm'sgeneral operations and compliance with policies formulated and implemented by the regulator. Government wasviewed both as a facilitator and an inhibitor, in its role whereby it created bureaucratic barriers aimed at maintaining or enhancing standards. Building codes, inspections, approvals and other requirements, imposed restrictions on construction project progress. Also, minimum capital requirements imposed barriers on construction firms' ability to access financial markets. On the other hand, tax holidays and relaxation of custom duties facilitated cheaper imports and prevented crippling shortages, and were viewed as facilitating the industry (Isik, Arditi, Dilmen& Birgonul, 2010).

### 1.1.2 Performance of Construction Firms

Baker and Reid (2005) identified two major categories of construction firm performance, these being efficiency and effectiveness measures. The former referred to good quality management and ability to deliver construction projects within set standards. These includedadherence to schedule, budget, technical specification, safety, profitability and absence of any legal claims and proceedings. These measures were applied to evaluate success at the construction project implementation phase, thus encouraging result oriented thinking. Effectiveness measures on the other hand, referred to user satisfaction with the end-product of the project.Construction firm performance was measured using the key metrics of cost variance (CV), time variance (TV) and quality control (Leong, Zakuan, Saman, Ariff & Tan, 2014).

Leong et al. (2014) defined cost variance as the degree to which a construction project achieved budgetary compliance or completion within the estimated budget. Time variance was the difference between the budgeted timeframe for project completion less the actual time taken. Quality control was described as conformity to consumer expectations and fitness for purpose intended. Quality was also seen holistically as the totality of features required for a construction end product to satisfy needs and deliver benefits(Kim, Kumar & Kumar, 2011). Quality ramified the entire construction value chain, and wasdeployed using a participatory stakeholder approach in order to holistically address quality issues at all stages. Kim et al. (2011)noted that quality performancewas based on Non-Conformance Reports (NCR), which were benchmarked against best practice in the industry relating to quality certification.

In line with the key metrics enumerated by Leong et al. (2014), measurement of construction firm performance was based on four key data points that were the basic points of reference in performance analysis. These included theBudgeted Cost of Work Scheduled (BCWS), Budgeted Cost of Work Performed (BCWP), Actual Cost of Work Performed (ACWP) and Budget at Completion (BAC).The BAC represented the total BCWS for the entire project. Leong et al.(2014) observed that these four data points enabled planners to estimate possible differences between actual versus projected performance levels, thereby enabling forecasting overall cost and time frames for successful completion.

Cost and time variances were used as measures of the difference between planned and actual cost and time performance respectively. Cost variance measured how well ACWP conformed to budget (that is CV=BCWP-ACWP). On the other hand, Time Variance (TV) was the

difference between BCWP and BCWS. Positive variances were indicative of a project that was within budget and ahead of schedule, while negative variances represented having exceeded budget and behind schedule respectively(de Marco, 2011). As mentioned earlier, quality was measured based on a comparison of the conformance report with an established quality standard.

Construction firm performance wasmeasured on the basis of indices or ratios that were computed using the measures for CV and TV. In terms of ratios, CV was measured using the Cost Performance Index (CPI), that indicated how efficiently a project team utilized its resources (that is CPI= (BCWP)/(ACWP). On the other hand, TV was measured using the Time Performance Index (TPI), a measure of how efficiently the project teamwas utilizing its time (that is TPI= (BCWP)/(BCWS). The decision rule in the above formulae was that a value of 1.00 indicated performance that was on target, greater than 1.00 indicated excellent performance, while less than 1.00 indicated inefficient performance (Kim et al., 2011). It must be recognized that both variance and the ratio indices were indicative of performance on work done, and should be continually monitored to enable decision making in real time and avoid expensive time and cost overruns in the long term (Kim et al., 2011).

### 1.1.3 Risk Management Practices and Performance of Construction Firms

Odeyinka, Lowe and Kaka(2012) argued that the major problem affecting construction firm performance was the uncertainty and ambiguity regarding expected construction project progress and completion. For complex construction projects, Odeyinka et al. (2012) observed that uncertainty and ambiguity, and subsequent impact on firm performance,were even more pronounced, due to the impact of unexpected changes on construction project progress.

Uncertainty and ambiguity were occasioned by project specific factors as well as the wider macro-economic parameters, largely social, technological, economic, political, environmental and legal issues.

Kim, Han and Kim (2009) pointed out the development of numerous ways of identifying factors that affected the performance of construction projects. It was instructive to note that factors that gave rise to risks in construction projects did not act in isolation from each other. Instead, they were themselves, interdependent, and the reality then was that it was important to examine the interactions among the different risk factors. This was more so, if there was to be any realistic chance of developing any meaningful inferences on risk management strategies from such investigations.

The adoption of risk management practices was demonstrated to yield positive outcomes in a variety of contexts. In the building construction sector in Nigeria, Aje, Odusami and Ogunsemi (2009) evidenceda significant positive impact of contractor's management capability on construction project cost and time performance. Similarly, Ahmed et al. (2007)in a benchmarking exercise ontechniques for risk management in construction projects, observed that risk management practices conferred a competitive advantage to construction firms. They observed that institutional memory, through learning and retention of knowledge, helped to smoothen out the continuous changes and interference at the construction stage that undermined firm performance.

### 1.1.4 Construction Industry in Kenya

Despite the recent slowdown in the world economy, the construction sector in Kenya remained buoyant as reflected in increased investment in both commercial and residential buildings over the past few years. According to data from the Economic Survey of 2015, the construction sector grew by 13.1 percent in 2014 (Kenya National Bureau of Statistics [KNBS], 2015), boosted by massive road construction projects and increased activity in the real estate sector. Growth in the construction industry was also mirrored in cement consumption, which rose by 21.8 percent to 5,197 tonnes in 2014,boosted by increased construction activities (KNBS, 2015). The sector contributed 4.8 percent of Kenya's Gross Domestic Product (GDP), which increased to KShs. 5.36 trillion from KShs. 4.73 trillion in 2013, representing a nominal growth of 13.3 percent (KNBS, 2015).

By nature, construction projects are capital intensive and incur huge financial costs. Financial costs include interest and management fees charged on loans and overdrafts extended by financial institutions to the contractors. Interest rates in Kenya are currently pegged at 4.5 basis points above the Central Bank of Kenya base lending rate, averaging at 14.5 percent. Additionally, financial costs include the costs of bid securities issued by banks and collateral and performance security required by banks, to guard against contractor default. Bid securities average at 2 percent of thecontract value for which the banks charge 1-2 percent of the security amount. There is also the cost of all-risks and third party insurance for work done under the terms of reference of the contract (Mwende, 2015).

Mwende (2015) observes that for successful project conduct, contractors are required to maintain liquid assets that average to approximately thrice the monthly cash flow of the

contract. This is due to the need to pre-finance project operations, followed by claims for refund from the project financierand/or client. This process takes time, during which the project operations are expected to continue. This makes it necessary for the contractor to be able to access alternative funding, in case of delays that may adversely affect the project in question. Contractors, who lack adequate cash reserves or reliable funding alternatives, are faced with the risk of bankruptcy, and subsequent inability to perform their work.In addition, contractors who are unprofitable may not be able to access much needed funding to finance the cost of growth and expansion. This includes the procurement of capital goods and equipment, hiring and retention of technical staff and other activities crucial for eligibility to bid for high-value contracts. Construction firm profit margins are also fairly moderate owing to high levels of competition in the sector, especially among the constructionSMEs. Consequently, profit margins are in the range of 2.5 to 10 percent, and in order to maximize profits, there is also the need to institute strict cost, time and quality controls (Ngundo, 2014).

### 1.2 Statement of the Problem

Projections by the KNBS estimate the population growth in Kenya at 4.2 percent per annum, with the actual population estimated to rise to 50 million by the year 2020 (KNBS, 2013). Based on these projections, the annual demand for housing units was pegged at 206,000 units, which, matched against a current annual supply of 50,000 units, created a deficit of 156,000 units per year (KNBS, 2013). The social pillar of the Vision 2030 had a target of matching the demand and supply of housing in the country by 2030by producing 200,000 housing units annually by 2012 under Public Private Partnerships (PPPs) and other initiativessuch as the Kenya Vision 2030. However, according to the Ministry of Housing,

Land and Urban Development (2011), 48 percent of construction projects in Nairobi County were incomplete, with about 10 percent completely stalled. For construction firms, these figures paint dim prospects with regard to firm performance.

More specifically, the construction sector had a poor reputation for coping with construction risks, such as poor resource management, lack of competent personnel, poor project management controls, high exposure to litigationand a general aversion by insurers to underwrite construction projects (Charagu, 2013).Charagu (2013) further arguesthat the use of sub-standard or faulty construction techniques and a lack of adherence to the building code and best practice standards contributed further to increased construction risk. This was characterized by the tendency towards maximizing profitability through use of sub-standard construction techniques and materials, non-conformity with design and lack of quality supervision (Charagu, 2013).

The construction industry still continues to experience significant cost overruns, schedule delays and poor quality output, resulting in poor time, cost and quality performance. This then made it necessary to understand therisk management strategies that had been instituted by construction firm management in order to enhance firm performance.Previous studies that have been conducted have attempted to bring various outstanding issues in the construction industry to light.

Yamo (2006) examined the relationship between strategic planning and firm performance, in the civil engineering construction sector among firms based in Nairobi, Kenya. The findings indicated elements of strategic planning in use in these firms, although the findings varied greatly from one firm to another. Mandere (2006) examined the use of quality management

practices in large building construction firms in Kenya. The findings revealed the use of various quality management practices, with the traditional low-innovation practices being the most common. However, there were no significant differences in terms of preferences for the various quality management practices.

None of thesestudies dealt with the issue of risk management strategiesin construction projects in relation toresource, personnel, project control, litigation and insurance risk management strategies, and how they affect the performance of construction firms. Also, given the changing political, economic, social, technological, economic and legal landscape in the country, various micro- and macro-economic variables that affect selected risk management strategiesin the construction industrykeep changing.The purpose of this study wastherefore to determine how risk management strategies influence the performance of construction firms in selected counties in Kenya.

### 1.3 Objectives of the Study

The general objective of the study was to determine howrisk management strategiesinfluence performance of construction firms in selected counties in Kenya, whereas the specific objectives sought to:

i. Determine the influence of resource risk management strategieson performance of construction firms in selected counties in Kenya;

ii. Establish the influenceofpersonnelrisk management strategiesonperformance of construction firms in selected counties in Kenya;

iii. Assess the influenceofproject controlrisk management strategiesonperformance of construction firms in selected counties in Kenya;

iv. Determine the influenceof litigation risk management strategiesonperformance of construction firms in selected counties in Kenya;

v. Establish the effect ofinsurance risk management strategies onperformance ofconstruction firms in selected counties in Kenya.

vi. Assess the moderating role ofGovernment policy and regulation of the construction sector, on the relationship between risk management strategies and performance of construction firms in selected counties in Kenya.

### 1.4 Hypotheses of the Study

The study was guided by following null hypotheses:

$H_{01}$: Resource risk management strategies have no significant effect on the performance of construction firms in selected counties in Kenya;

$H_{02:}$Personnelrisk management strategies have no significant effect on performance of construction firms in selected counties in Kenya;

$H_{03}$:Projectcontrol risk managementstrategies have no significant effect on performance of construction firms in selected counties in Kenya;

$H_{04}$:Litigation risk management strategies have no significant effect on performance of construction firms in selected counties in Kenya;

$H_{05}$:Insurance risk management strategies have no significant effect on performance of construction firms in selected counties in Kenya;

$H_{06}$:Government policy and regulation of the construction sectorhas no significant moderating effect on the relationship between risk management strategies andfinancial performance of construction firms in selected counties in Kenya.

### 1.5 Significance of the Study

The study was significant in an African and developing context economy in that it contributed to findings in the largely under-researched area of risk management in the construction industry. In this regard, the sample included respondents from the private and public sectors, foreign companies and joint ventures, among others. A key contribution of the study was that it helped to identify, group and measure selected indicators of risk management practices, in the Kenyan context. A second key contribution was that the study also measured the influence of these risk management practices on performance measures dimensioned into cost, time and quality. Few empirical studies were found to have been done in this area, and none was found to have examined the relationship between the identified independent variables and dependent variable, as attempted in this study.

The findings will contribute to knowledge in the area by empirically demonstrating that resource risk, personnel risk, project control risk, litigation risk and insurance risk management strategies all had a statistically significant influence on firm performance. A robust model was also designed and validated, and which could be used to predict the likely firm performance outcomes based on given indicators of risk management practices adopted

in the study. The study also made recommendations on areas for further research that were designed to arouse the interest of business and academic researchers to conduct more research in the context of developing countries especially in Africa.

For construction firm management, the findings have a practical implication related to the measurement of the features and benefits of risk management practices. Further, the findings captured the influence of these practices on firm performance, using a monadic scale scoring method. This provided a useful framework that facilitated internal and external benchmarking against best practice within the construction sector. Additionally, the findings helped in identifying implementation gaps, which constituted a basis for increased formal and informal education, training and capacity building.

This then assisted in realizing a better application of risk management practices and enhancing their influence on firm performance.The findings of the study assistedgovernment planners in the Ministry of Transport, Infrastructure, Housing and Urban Development, in understanding how to develop policies that assist the construction industry in proper management of project risk. This would have a positive impact on the country's economic growth through reducing losses incurred as a result of project mismanagement.

### 1.6 Scope of the Study

This study examined how risk management strategies in construction projects affected performance of construction firms. In particular, the study examined the influence of resource risk management strategies, personnel risk management strategies, project control risk management strategies, litigation risk management strategies and insurance risk

management strategies in Machakos, Nairobi and Nakuru counties in Kenya. The study also examined the moderating role of government policy and regulation of the construction sector on the relationship between risk management strategies and performance of these construction firms.

The target population was a total of 2,414 construction firms in Kenya, listed in the contractors register from the Ministry of Transport, Infrastructure, Housing and Urban Development dated July 2011 to June 2012 and 97 respondents across Nairobi, Nakuru and Machakos Counties respectively,were surveyed. The construction industry was selected as the focus of the study as it is currently experiencing a construction boom brought about by investments in infrastructure such as roads, houses and other forms of public works. The findings of the study were intended to provide a practical basis for construction firms to measure the benefits and capture the awareness of risk management strategies through the provision of risk management strategies framework.

### 1.7 Limitations of the Study

With regard to the window available for conducting the research, some of the firms that had been targeted as part of the sampling frame, were either inactive. This compelled the researcher to improvise by collecting data using a simple random sampling strategy, as opposed to the initially planned stratified approach. The cross-sectional data made it difficult to generalise the findings. Geographically, given the logistical and financial constraints, majority of the respondents were from construction organisations in Nairobi County. However, it is recommended that future research be extended to cover all the regions of the country.

It was highly likely that exogenous factors of market conditions and extraneous issues regarding strategic alliances impacted on construction firm performance. However, this study was only concerned with the companies own ability to mitigate construction risk through the risk management strategies of risk reduction, risk retention, risk avoidance or risk transfer. These were found to contribute up to 65 percent of the variance in observed performance, implying a need for further enquiry to identify additional risk management practices that may influence the selected measures of firm performance.

The study also faced certain methodological limitations that arose from the kind of limitations characterized by restrictions imposed by the survey method. Chief among these was those respondents who did not respond, but who had information crucial to informing the study. The researcher took care to communicate the need for privacy and confidentiality in conducting the entire study so as to maximize the response rate. Also, the research instrument was designed so as to contain questions that were simple, straight-forward and easy to answer.

### 1.8 Assumptions of the Study

The researcher, in formulating the study objectives, was of the opinion that construction firmswere already engaged in risk management strategies related to resource, personnel, project control, litigation and insurance related risks. Finally, it was also assumed that contractors, especially those running small- and medium- sized-firms, understood the necessity of taking out insurance covers, such as contractors all risk covers, in order to mitigate the risk of loss. These assumptions were necessary owing to the lack of formalized risk management procedures in Kenya’s construction industry.

## 1.9 Organization of the Study

This thesis is structured as follows: Chapter one provided the research background, risk management strategies, risk management and performance of construction firms in Kenya, statement of the problem, research objectives, research hypotheses, significance of the study, scope, limitations and assumptions of the study. Chapter twopresented literature on the theoretical and empirical reviews, summary and gaps to be filled by the study and finally, the conceptual framework. Chapterthree dealt with the research methodology employed in the study, while Chapter 4 and 5 were dedicated to presenting the findings and conclusions of the study, respectively.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

The literature review looked at the theoretical framework for the study, an empirical review of past studies done in the studyarea, the research gaps that needed to be addressed as per the study objectives and, finally, presented the conceptual framework for the study.

## 2.2 Theoretical Literature Review

The following theories were selected for their contribution in explaining the study objectives.

### 2.2.1 Theory of Constraints

The primary theoretical anchorage of this study is the Theory of Constraints (TOC), a management paradigm that postulates that any manageable system faces a number of constraints that limit the achievement of its organizational goals (Goldratt, 1990).The TOC was the main theory for this study, as it interrogated the entire construction value chain, from start to finish. The TOC largely takes a process based view of firm performance and identifies the rate determining steps, that is, those that are most critical in affecting project performance, and by extension, firm performance. When these are resolved, they have a net effect of enhancing the flow of work and effective allocation and distribution of firm resources.

At the minimum, TOC holds that there is at least one constraint and proposes the use of a focusing process to identify the constraint and organize the rest of the processes around it. In

identifying the constraint or constraints, TOC proposes measurement and control using threekey parameters, namely, the throughput, operational expense and inventory. Inventory represents the financial costs of all items necessary in production; operational expense, on the other hand, is the cost of production (converting inventory into throughput); while throughput refers to the rate at which the system generates sales revenues.

According to TOC, if there were no constraints inhibiting an organization from achieving its throughput, its sales revenues would be infinite. This is however, impossible in a real life system, and only by optimizing flow through the constraints, can overall throughput be maximized.Constraints can be internal, where the system fails to generate sufficient supply to match demand, conversely, external, where supply exceeds demand. In order to focus processes through the constraints, TOC proposes fivekey steps, namely, identification of the systems constraints, formulating strategies on exploiting the identified constraints, prioritizing these strategies, increasing the constraintsthroughout capacity and monitoring and elevating with the necessary feedback loops. The fivefocusing steps areknown as the Process of Ongoing Improvement (POOGI) and the centroid of their implementation is the identified system constraints (Goldratt, 1990).

In applying TOC to risk management of construction projects, there is recognition of the fact that existing and future constraints are liable to become project risks. In practice, in the initial definition of construction project risks, project management focuses on the identification of the most critical risks involved (Steyn, 2002). Risk events are thus prioritized according to their potential impact at any given stage in a project. This implies that, along the project life cycle, different risks tend to assume different levels of criticality as

the project progresses. Using the feedback loop implied in the last focusing step of TOC approach ensures that risk events are effectively managed by continually reducing the most critical current risk, thereby ensuring that the overall risk is reduced gradually, continually and systematically. Thisensures that scarce resources are directed at managing the risks that may impact adversely on the project at any given point, and that emergent risks obtain the required attention, in terms of resource allocation, at the right stage. Ultimately, this speed up project performance and has a multiplier effect on firm performance.

### 2.2.2 Fuzzy Set Theory

In his seminal work, Zadeh (1965) proposed the fuzzy set theory as a tool to model the uncertainty that envelops the human cognitive processes. This theory points out the fact that fuzziness or uncertainty, affects all situations where it is necessary to consciously and deliberately apply human thinking, judgement and formulate decisions. This theory has been extended to cover the uncertainty and fuzziness that surrounds the risk management process in construction projects and eventually, affects the performance of these firms. The fuzzy logic provides a useful managerial tool for critically analysing potential areas of risk in construction projects. Chen and Huang (2007)notes that in its application by project management, fuzzy logic presents a decision rule, in that activity durations with a lower degree of criticality should be minimized before activities with higher degree of criticality.

In other words, activities that are important and urgent should be prioritized over those activities that are of lesser importance and urgency. Where activities are equally ranked for purposes of achieving the projects outcomes, then the priority should be based on an assessment of the resources available in terms of skills, materials and capital. That activity

that best fit the resources available should be implemented. In this study, the fuzzy set theory was used in explaining how risk management strategies are prioritized, in order to favour activities with higher critical mass in managing construction risk, over those with less. Since risk management strategies can be many and diversified, fuzzy logic provides a framework for discriminating the most important strategies that explain the highest variance in firm performance. Given the fact that firms worked in environments characterized by scarcity of resources, construction firm managers may then focus on optimizing those strategies that deliver maximum value.

Carr and Tah (2001) have the efficacy of fuzzy set theory, through fuzzy approximation and composition, in defining risk descriptions and their consequences. Fuzzy logic was used to illustrate the relationships between risk factors, risks and their consequences, and quantify their potential impact on project performance measures. In so doing, fuzzy logic enabled the development of a construction project risk management system that produced consistent results in relation to quantifying construction risk indicators and their performance implications. Fuzzy logic was similarly deployed in this study, to analyze the five independent variables and quantify impact on firm performance.

### 2.2.3 Institutional Theory

The moderating influence of government was explained through the institutional theory. Scott (2008) notes that the institutional theory refers to the role of regulatory policy in exercising control over industries, execute through the formal and legal aspects of government infrastructure. The theory examines the processes through which government infrastructure and authority forms an authoritative guideline for institutional and social

behaviour. In order to survive, and earn legitimacy, construction firms must conform to the rules and belief systems prevailing in the environment.

The role of government, both as a facilitator and regulator, exerts a lot of influence on the performance of firms in the construction industry. This normative influence of government, extended through support and sanction of players in the industry, ensures fair-play, and promotes constructive competition. Social, technological, economic, political, environmental and legal factors, as manipulated through the legislative mechanism, create industry-centric factors conducive for business (Porter, 1990). This in turn creates competitive advantage for firms that choose to exploit opportunities in these market segments.

In this study, this theory helped to examine how the level of compliance of the construction firms, with the policy and regulatory standards regarded as best practice in the sector, moderates the relationship between risk management strategies and firm performance. Through enforcement of the building code, government initiates risk management strategies that seek to attain compliance with acceptable standards which affects the relationship between the dependent variable and independent variables. The institutional theory assisted in explaining how construction firms seek legitimacy through ensuring compliance.

Ju and Rowlinson (2014) conducted a case study on the institutional determinants of construction safety management strategies of contractors in Hong Kong. The study aimed to find out how contractors respond to institutional demands in terms of compliance with construction health and safety requirements, involvement of involuntary safety initiatives and safety campaigns, and commitment to zero accidents. The findings indicate that contractors preferred to use compromise and avoidance strategies in the face of stringent safety

requirements. The other response identified in the study was conformity to compliance requirements, as a means of ensuring compliance.

### 2.2.4 Financial Economics Theory

The financial economics theory builds upon the classic Modigliani-Miller (M-M) paradigm (Miller & Modigliani, 1963), as adapted to the field of risk management. This approach holds that hedging leads to lower cash flow volatilities and thus, lower volatility of firm value as measured by its stock price volatility. The ultimate value of hedging is expected to be a higher value for the firm, or a hedging premium reflected in a higher market value of equity. Implications for construction firm risk management deduced from the irrelevance conditions include higher debt capacity (Miller & Modigliani, 1963), progressive tax rates, lower expected costs of bankruptcy (Smith & Stulz, 1985), and securing internal financing (Froot, Scharfstein& Stein, 1993).

Higher debt capacity is motivated by the need for firms to raise their gearing ratios, using the tax shield to minimize tax liability as far as possible. Hedging facilitates this by lowering risk of default and allowing higher debt capacity. Hedging is also postulated to lead to a positive relation with growth options, represented by high market-to-book value ratio. This is postulated to increase the firm's ability to secure internal financing for important strategic projects and lower the costs of financialdistress important especially for large construction firms with high development expenditure.

Jin and Jorion (2006) have demonstrated that risk management does lead to a hedging premium, Faff and Nguyen (2002) have verified positively, the link between hedging and

higher debt capacity, and Geczy,Minton and Schrand(1997)demonstrated a positive relationship with the internal financing hypothesis, while Nance, Smith and Smithson (1993) verified positively the tax hypothesis. Since this study also investigated the role of insurance in enhancing construction firm performance, where insurance was treated as a form of hedging, the study used the financial economics theory to offer explanations as to how insurance resulted in increased firm value, essentially through increased profitability.

### 2.2.5 Shareholder Value Maximization Theory

As a tool for explaining construction firm performance, this study made use of the shareholder value maximization theory. Lazonick and O'Sullivan (2010) observe that maximizing shareholder value entails maximizing the stock market valuation of a firm's shares. The principle behind shareholder value maximization or value based management, states that managers should first and foremost consider the interest of shareholders in any business decisions. In the context of the construction industry, this implies serving the interest of all the stakeholders and meeting all their expectations, both financial and otherwise.

Shareholder value is normally broken into components, also known as value drivers. In the construction firm context, these include minimizing cost variance, minimizing time variance and optimizing on quality control. Thus, maximizing firm value will be a function of how well management optimizes on each of these variables, to ensure optimal overall performance. Shareholder value theory also recognizes the need to minimize information asymmetries between the stakeholders such as the principal (project financier) and the agent

(contractor), in order to curb opportunistic behaviour that may result in losses or result in an increase construction risk (McSweeney, 2008).

Shareholder value theory was useful in the context of this study as all aspects of construction firm's performance are aimed at optimizing on project performance to maximize value delivered. Through optimizing cost, time and quality performance, construction firms are able to complete construction projects within budget and scope. This then would result in maximum shareholder value for all stakeholders. Panigrahi et al. (2014) conducted a study comparing traditional and economic performance measures for creating shareholder's value in Malaysia. Specifically, they investigated the importance of Economic Value Added (EVA) in shareholder value maximization.

The (EVA)referred to the residual wealth created after deducting cost of capital from operating profits. The sample was composed of 28 construction public listed companies and entailed the use of panel data with fixed effects during the period of 2003 to 2012. The findings demonstrated a significantly positive relationship between EVA and shareholder wealth maximization. The quest for shareholder value maximization reduces information asymmetries among the different stakeholders, thus lowering the financial cost of capital and improving overall risk management efforts, thereby contributing to improved firm performance (Panigrahi, et al.,2014).

## 2.3 Empirical Literature Review

This section presented a review of the literature related to the problem under study. The section was categorized according to the specific objectives in order to ensure relevance to the overall research study.

### 2.3.1 Risk Management Strategies and Performance of Construction Firms

Flyvbjerg, Holm and Buhl (2003) argue that the importance of instituting risk management in construction projects is to increase value-added along the construction value chain, ensuring compliance with best practice construction approaches, thus minimizing waste and inefficiencies. Risk management of construction projects thus optimizes shareholder value on all activities along the value chain and maximizes overall profitability. This is mainly through minimizing or eliminating the potential adverse impact of uncertain events that may affect achievement of the project objectives. Flyvbjerg et al. (2003), further observe that effective risk management increases value through adherence to budget, adherence to schedule, and conformance to quality expectations, among other measures.

According to Kagiri and Wainaina (2008), the Republic of Kenya alongside its development partners, has over time allocated vast resources, both in terms of financial capital and investments in skilled manpower, in the construction industry. However, in quite a number of cases, the desired outcomes are never achieved, owing to unsuccessful project implementation. There are a number of studies that have been conducted in Kenya, with a view to identifying the potential causes of poor construction firm performance.

In Kenya, Mandere (2006) examined the use of quality management practices in large building construction firms in Kenya. Mandere (2006) also sought to determine challenges faced by these firms in their quality management efforts. The survey collected primary data through the use of self-administered questionnaires and used descriptive statistics for data analysis and reporting. The findings revealed the use of various quality management practices, with the traditional low-innovation practices being the most common. However, there were no significant differences in terms of preferences for the various quality management practices.

Challenges identified by Mandere (2006)included resistance to change due to long held industry traditions, low levels of awareness and knowledge of best practice in quality assurance, design limitations, legal inadequacies in contract documentation and scarcity of resources. Quality management practices were seen to deliver benefits such as cost reductions, higher levels of client satisfaction and increased profitability. The main conclusion drawn from this study was that quality management practices deployed by most construction firms in Kenya were largely outdated. The firms were found to be mainly practicing quality management practices that were found to be uncompetitive in the context of a globalized and liberalized world market.

Another study that has touched on risk management strategies and firm performance in Kenya, is that conducted by Isensi (2006). This study investigated the factors responsible for failure of building construction projects, their causes and mitigating measures put in place. The sampling frame was drawn from active construction firms registered in categories A and B by the Ministry of Transport, Infrastructure, Housing and Urban Development. This

classification was mainly based on the firms' annual turnover. Isensi (2006) identified 36 variables, categorized into cost, time and quality related themes, and which had a statistically significant attribution to project failure.

Among the quality related indicators, lack of contractor experience topped the rankings, while the time-related theme category had the underestimation of project duration, as the main cause of project failure. Finally, in the cost-related project failure theme, inadequate project budget was seen as the main cause of project failure. In the developing country context, Isensi (2006) also observed the very high failure rate of building construction projects. As risk mitigants, Isensi (2006) proposed realistic project budgets, realistic project life estimates and use of appropriate technology as useful practices that would contribute to a reduction of building construction project failure rates.

Kimilu (2005) conducted a cross-sectional survey, regarding materials management practices, among building construction firms in Kenya. The specific objectives entailed determining any benefits, risks and issues in the adoption of material management programs. This also entailed establishing the respondent's level of awareness of the effect of these programs on the various manufacturing strategies adopted by these firms. To this effect, primary data was collected from 12 large building construction firms, using a questionnaire. The findings indicated a degree of usage of materials management practices with various short-comings.

Various risks and challenges were seen to influence the successful implementation of materials management practices. These included a low level of awareness of the effectiveness of materials management practices as an effective risk management strategy,

absence of effective metrics to measure materials management practices and low levels of top management commitment. Kimilu (2005) recommended enhancing competitiveness among construction firms in Kenya through strategic application of materials management practices. Kimilu (2005) also recommended on the need for these firms to train more staff on the benefits of applying these materials risk management practices.

In another study, Gitonga (2005) examined the use of benchmarking for purposes of continuous improvement in the construction industry in Kenya. Benchmarking develops standard best practices in any one business, through comparison with the leading firms in the industry. The methodology employed a survey questionnaire targeting project managers and directors of the general building contractors, using personal interviews and self-administered data collection approaches. The findings revealed that benchmarking was not widely used as a formal practice, despite the fact that most firms were aware of the versatility of the technique. Benchmarking was being done on an *adhoc* basis from one construction project to another and also informally among competitors. Substantial performance improvement was one of the key benefits that emerged as a consequence of benchmarking.

A key conclusion from Gitonga's(2005) study was that the use of benchmarking, as a performance improvement technique, was not fully optimized. This was attributed in part, to poor management culture and also, to industry rivalry that reduced margins, leaving little capital for research and development. The recommendations from this study was that construction firms needed to conduct benchmarking as an activity that enabled them to learn from best practice in the sector and that these firms needed to exploit learning opportunities created from standards in the manufacturing industry. They also needed to adopt structures

that favoured learning organizational cultures. In line with the balanced scorecard approach, this would then enable them to formulate appropriate strategies and adopt values that would engender a performance based work environment.

A related study is that by Githiri (2004) who studied the application of lean production techniques among large construction firms in Kenya. The methodology entailed use of a questionnaire survey, which dimensioned over 50 independent variables known to be correlated with lean production practices. The findings revealed that there was no systematic use of lean production techniques, and the use of such practices was largely discretionary with low involvement on the part of the planning of the projects. The findings also highlighted malpractices that were key contributors to inefficiencies and waste. The study recommended the need for contractors to focus on these areas for added-value to engender sustainable quality improvement practices. This was a departure from earlier practices that managed quality performance as an emergent issue during the construction process, rather than integrating quality management into the entire construction value chain.

As a quality management initiative, Githiri (2004) proposed a management information system, known as "The Last Planner System", for construction project monitoring and evaluation. This system was a real time tool, with in-built algorithms, that focused the project managers' efforts holistically on the entire value chain. Such a tool was seen to improve performance through embedding results based management in the construction firms. The studies also recommended further inquiry into ways of integrating this holistic thinking, and escalate the implementation of lean production principles in the construction sector. Fundamental to this was the need to systematically develop and adopt customized, cost-

effective and practical quality management information systems for use by practitioners in the sector. This would enable an increased customer focus and the embedding of quality improvements, as part of the daily operations cycle.

Finally, Yamo (2006) examined the relationship between strategic planning and firm performance, in the civil engineering construction sector among firms based in Nairobi, Kenya. The findings indicated elements of strategic planning in use in these firms, although these findings varied greatly from firm to firm. The findings further revealed a significant relationship between strategic planning and firm performance. Firms that adopted formal project planning and management practices, such as work plans and method statements, and which monitored performance indicators, demonstrated much better project completion prospects. This was against a comparison group of firms whose level of strategic planning and control was haphazard, minimal or altogether absent.

### 2.3.2 Resource RiskManagement Strategies and Firm Performance

Panigrahi et al. (2014) categorize financial risks as including cash flows, working capital, credit ratings and interest rates. In order to mitigate resource risks, it is necessary to maintain a continual and timely availability of resources. Material risks relate to poor quality of materials or an inconsistent availability of material that meets standard specifications. Land resource risk relates to the ground and site conditions, while capital equipment risk reflects the appropriateness of available construction technology and associated costs, which is normally a problem for many contractors, especially those in the SME sector.

Empirical studies have been done in relation to resource risk management strategies and firm performance. For example, Odeyinka, Lowe and Kaka (2008) carried out a descriptive cross-sectional survey whose objective was to identify and assess the impact of risk factors attributed for causing critical variations between forecasted and actual cash flows among construction firms in the UK. The research tool was a structured questionnaire while respondents were drawn from firms categorized into small, medium and large, based on annual turnover. Statistical analysis entailed mean value Analysis and Univariate Analysis of Variance (ANOVA) techniques. This permitted determination of significant risk factors as well as an investigation of differences in opinions among the three categories. The findings identified eight significant risk factors isolated from a total of twenty six risk parameters.

These risk factors included undervaluation of the scope of work, payment delays, underestimating the complexity of the project, shortage of skilled labour, variations to planned work activities, production target slippage, adverse and unpredictable weather conditions, and unforeseen changes to initial designs. Risk management strategies entailed proper scheduling and cost forecasting, timely payments, effective forward planning to cater for unforeseen contingencies, using competent professions in the planning and design stage to breakdown complex project activities, ensuring ready availability of competent labour, keeping design and work variations to a minimum and constant revision of the work schedule to avoid deviations from set project targets (Odeyinka, et al.,2008). This study was carried out in a developing country context and offers opportunities for further research in a developing country such as Kenya.

In this regard, Chen, Hao, Poon and Ng (2004) investigated the issue of cost risk management in the West Rail Project of Hong Kong. This was a case study where the researchers proposed fifteen risks that were thought to affect project costs and which were divided into three clusters, resource factors, management factors and parent factors. The findings indicated that the most significant factors that led to cost escalation in this project included resource factors such as price escalation of materials, management factors such as inaccurate cost budget and supplier or subcontractors' default. Parent factors included excessive interface on project management.

Chen et al. (2004) proposed different risk management strategies for the different risk clusters as a means of enhancing firm performance. Risk management strategies aimed at mitigating the risk of cost overruns included agreeing on contract prices for materials at various stages of the project to hedge against the risk of price volatilities. Chen et al. (2004) also agreed that management factors could be controlled through use of qualified and experienced personnel at all stages of the project life cycle. This study was based in Hong Kong, a country with different contextual challenges compared to Kenya, and thus could be replicated elsewhere.

In a separate study, Alinaitwe, Mwakali and Hansson(2007) found that design errors and increase in the scope of the work were key sources of cost overruns. Risk management strategies recommended for managing material price volatilities, reduce design problems, and delayed payments included forwardcontract pricing for material purchases, use of qualified professionals, and using several sources of funding for financing developments, to avoid the risk that comes with overreliance on one financier. Alinaitweet al.(2007) also observed that

adverse weather changes adversely affected project completion, and where they occur, were major causes of cost and time overruns.

Ali (2007) studied the issue of risk and stakeholder management in mega projects in the Kingdom of Bahrain. The methodology relied on a questionnaire survey, an evaluation of completed projects and literature review of secondary data. The questionnaire was used to determine the perceptions of the stakeholders towards the importance of risk and stakeholder management and the impact on project performance. Previous projects were examined to identify the relationships and levels of stakeholder consideration. The findings indicated that a large number of time and cost overruns were caused by poor stakeholder-needs-identification and the absence of clear risk and stakeholder management strategies.

Risk strategies measures suggested by Ali (2007) included use of a supply chain management approach to construction project management as key to ensuring successful project delivery. This would require high levels of collaboration among the key project stakeholders and a collaborative philosophy among them. More importantly, this would also ensure an efficient flow of goods and services, with attendant payments, along the construction value chain, minimizing the risks of time and cost overruns. Research gaps existed since the study only focused on time and cost overruns only, implying an opportunity to add more variables such as litigation and insurance as part of the study.

### 2.3.3 Personnel RiskManagement Strategies andFirm Performance

Goh and Abdul-Rahman (2013) conducted an investigation into the identification and management of major risks in the Malaysian construction industry. The primary goals of this

study was to find out the key risks in the industry and evaluate what measures the stakeholders had implemented to respond to these risks. The research methodology was based on questionnaire surveys and in-depth interviews with key players. The findings of the study revealed that financial and time risks were the key risks faced both in terms of frequency of occurrence and impact on the projects.

This was largely occasioned by a lack of risk management expertise and also, the prohibitive costs of implementing sustainable risk management strategies. Risk management strategies identified included a need for training of project personnel on sustainable risk management strategies with a bigger emphasis on the time and other benefits of effective risk management. Such training was geared towards demonstrating the implementation of risk management strategies as an investment that would result in positive outcomes, thus changing the negative perception of overall risk management as an unnecessary and costly undertaking (Goh & Abdul-Rahman, 2013).

The inter-dependencies among the different risk factors is demonstrated by Han and Diekmann (2004), in their cross-impact model relating to cause and effect relationships among factors underlying project cost performance. Poor design quality leads to redesigns, scope increases and schedule deviations which eventually lead to cost overruns. Country risk parameters, such as the political and legal environment, influence the regulatory and compliance environment, which then affect contract conditions and lead to amendments in scope of the project. From a risk management strategies perspective, this then implies the urgent need to deploy qualified personnel right at the inception of the construction project. The personnel dimension takes a great importance as they are the resource responsible for

overall planning and management of the project, and it is thus important to deploy the right people, in the right numbers, into the various project functions to ensure project success.

Mahamid (2011)carried out a study which was intended to identify causes of time overruns in road construction projects in the West Bank in Palestine, from the owner's perspective. The research design entailed literature review to establish possible causal factors and subsequently, a questionnaire survey to collect primary data. From their findings, the factors that were the biggest causes of time overruns were poor communication between construction parties; poor resource management; delay in commencement; insufficientinspectors; rework from poor material quality; rework from poor workmanship; and payments delays. These factorswere largely caused by human related inadequacies and risk management strategies suggested by Mahamid (2011) included control or reductionthroughpersonnel training and capacity development. Given that such factors may be country specific, it was useful to examine them from the Kenyan context.

Kikwasi (2012)conducted an assessment of the causes and effects of delays and disruptions in construction projects in Tanzania. The study employed a descriptive research design, where the key objective was to obtain feedback from clients, consulting firms, regulatory boards and construction firms regarding the cause and effects of these delays and disruptions. Literature surveys, questionnaire and interviews were the main techniques used to collect primary and secondary data. The main causes of delays and disruptions were design changes, delays in payment to contractors, information delays, funding problems, poor project management, compensation issues and disagreement on the valuation of work done.

The effects of delays and disruptions were identified as time and cost overruns, negative social impact, idling resources and disputes. These effects had the possibility of resulting in litigation and insurer aversion. Risk management strategies suggested included the use of adequate construction budget, timely information, finalization of design and project management skills as the main focus in the project procurement process. Other than the country context, these cause and effect relationship are bound to be affected by extraneous variables such as regulation, which this study did not address. Additionally, the present study extends on to how time risks affect the firm performance, something that Kikwasi (2012) did not investigate.

Chapman and Ward (2004) conducted a study whose main aim was to find out how risks were managed in the construction industry in India and whether stakeholder relationships influenced project success. The methodology employed a case study approach and relied largely on in-depth interviews with key project stakeholders, such as the project managers, supervisors and the main supplier. The findings indicate that risks arising from the construction project itself can be managed through application of risk management models.

Crucial risk management strategies included effective cooperation among the various stakeholders involved in the construction work. Poor stakeholder management was a key reason for poor quality delivery owing to lack of coordination within the chain of activities required for total project delivery. Chapman and Ward (2004) also indicatedthe need for lower levels of sub-contracting as viable risk management strategies that improves co-ordination by reducing the diversity of reporting levels for the various project personnel. Additionally, in order to improve quality delivery, Chapman and Ward (2004) proposed,

among other measures, the need for flexible inter-relationships among the different players in the project network.

Ali, Mohd-Don, Alias, Kamaruzzaman and Pitt (2010) examined the quality performance of construction partnering projects in Malaysia. This was done in relation to the satisfaction level of construction industry players and the dominant benefits associated with construction partnering. This was done by first identifying the problem and objectives of the research in a thorough exploratory literature review based on reliable sources. Next was a comprehensive quantitative data collection through questionnaire surveys.

The research results revealed that the risk management strategies of communication among parties and functionality are the two key dominant variables in determining the quality performance of a partnering project. Functionality covers those aspects relating to conformity with the technical specifications of a construction project. This lends support to the notion that failure of the end-product of a construction project to meet predetermined requirements reflects poor implementation and coordination as well as incompetence in the workforce (Ali et al., 2010), an idea that this study sought to examine from a Kenyan context.

### 2.3.4 Project Control Risk Management Strategies andFirm Performance

Meredith and Mantel (2006) define control systems as feedback loops whole role is to inform management on variations between actual and desired performance. The feedback loop, according to Moselhi, Li and Alkass (2004), provides information that enables comparisons between planned and actual performance in terms of cost, time and quality. Project control systems are key to ensuring timely revision of project activities, to avoid deviations that may

impact adversely on performance. An efficient control system is characterized by an accurate measurement system, given that the accuracy of information provided by the feedback loop determines the cost, time and quality performance of the project.

A review of the empirical literature has identified studies conducted in relation to control risk management and firm performance. Ling and Ang (2013) conducted a study that involved identifying project control risk management strategies that were crucial in determining effective project performance among Singapore based construction firms. Their research was a survey that deployed an online questionnaire and used electronic mail for data collection. They identified a total of sixteen project management control risk management strategies that correlated significantly with project performance. The key control risk indicators identified included quality of techniques that enabled proper risk identification, adequacy of time float in the schedule, and relevance of information necessary for developing the time schedule.

Ling and Ang (2013) also piloted performance predictive models that were modelled along the identified control systems. These were used to attempt to predict schedule and quality outcomes of the construction projects. Time (or schedule) performance, was best predicted using the variables adequacy of time float and the relevance of the criteria that was used to select suppliers. Project quality outcomes were largely predicted by how competent project quality management was, rather by the actual processes used in the project. These findings help to point out the importance of control risk management strategies. However well planned a project may be, if the feedback mechanisms do not function properly, good project performance is not assured. Effective control systems help to concretize the monitoring and

evaluation component in a project that in turn guides management towards revising the overall strategy to ensure the desired outcomes are attained.

In another study, Leonget al.(2014) conducted a survey to measure the effectiveness of Quality Management System (QMS) maintenance and practices in the Malaysian construction industry. The methodology relied on a questionnaire survey based on QMS variables derived from past research and construction project performance indicators obtained from theories of project management. Data analysis relied on correlation and regression analysis. Seven indicators, including cost variance, cost performance index, time variance, non-conformance reports, client satisfaction, number of accidents and fatalities, were used as measures of quality performance.

Leong et al's. (2014) findings indicated that construction firms implement quality control as a risk management strategies to improve the cost, time and quality performance of their projects. Additionally, in regression analysis, Leong et al. (2014) observed that two key project performance indicators, namely client satisfaction and time variance, demonstrated a statistically significant positive association with indicators of quality control risk management's strategies. Soetanto and Proverbs (2004) argue that this provides an explanation as to the reason why time is a critical determinant of client satisfaction in many studies done on construction project performance.

Ali and Rahmat (2010) agree with these findings with the observation that they concur with the findings of an ISO 9000 study in the Malaysian construction industry, where client satisfaction as a QMS project management control risk management strategies emerged as one of the most important criteria used to measure construction project performance.

However, Leong et al.(2014) indicated that overall project performance cannot be indicated by cost, time and quality alone, but other indicators needed to be factored for a more holistic assessment. One limitation of Leong et al.studywas that the findings varied in different countries due to differences in the business environment. There is thus a need to replicate the findings of this study in different countries to improve generalizability.

In a different study, Ali and Kamaruzzaman (2010) conducted a questionnaire survey to identify factors that contribute to cost overruns and potential mitigating measures in Malaysia. The methodology relied on questionnaires which were administered to 30 respondents in the Klang Valley. The findings demonstrated that inaccurate or poor estimation of original costs, a planning parameter, was the most serious causes of cost overruns. Effective risk strategies measures suggested to control construction costs included proper project costing and financing and analyzing and forecasting cost and schedule performance. This presented an opportunity for further research into the effectiveness of proper project costing in reducing cost overruns. Gido and Clements (2003) also observed the need for proper cost estimation at project inception and continuous cost assessment and control throughout the project life cycle to ensure conformity to budget, as an effective cost risk management strategies in construction projects. Effective project cost management also factors in the needs of all project stakeholder's as these will also be affected.

Zou, Zhang and Wang (2007) carried out a study where they used a holistic and systematic approach to identify construction project risks, their likelihood of occurrence, impact of the risks and mitigating factors. Their study, rather than focusing on the traditional elements of cost, time and quality took a stakeholder and project life cycle approach and focused on a

broader set of quantitative and qualitative variables, among these, those that affected project cost performance. The research methodology used for this risk management project comprised of a comprehensive literature review, a postal questionnaire to the construction industry practitioners and a statistical analysis of the survey data. Twenty major risk factors were identified based on their probability of occurrence and impact on the project goals.

Among those that adversely affected project costs included tight project schedules, design variations, excessive approval procedures in administrative government departments, unsuitable construction program planning and variations of construction program. Zouet al.(2007) proposed holistic risk management strategies where clients, designers and government bodies work cooperatively from the feasibility phase onwards to address potential cost and time risks. Zouet al.(2007) also proposed that contractors and subcontractors with robust construction and management knowledge be employed early to make sound preparation for carrying out safe, efficient and quality construction activities.

### 2.3.5 Litigation Risk Management Strategies andFirm Performance

Bayliss (2002)observed that stakeholders in the construction industry normally solve day to day disputes easily, but complex issues tend to end up in courts where the lengthy litigation process results in unwanted cost and time overruns. These lengthy and expensive legal procedures eventually negatively affect firm performance. Construction projects, just like in any business, are subject to disputes and this need to be addressed speedily to avoid adverse impacts on construction firm performance. The risk of litigation, which then results in massive cost and time overruns, has increasingly resulted in a shift towards out of court settlements. This has led to the emergence of alternative dispute resolution mechanisms

thatare used at any stage in a construction project, ranging from routine dispute resolution to binding arbitration.

For example, Jannadia, Assaf, Bubshait and Naji (2000) conducted a survey designed to examine the suitability of contractual methods towards Dispute Avoidance and Resolution (DAR) for industrial projects in Saudi Arabia. The methodology relied on survey questionnaires with the targeted respondents being firm owners, contractors and industry consultants. The intention was to gauge their attitude towards recommended contractual approaches for DAR during actual construction implementation. These recommended contractual approaches towards DAR were allocating fair contract risk, drafting dispute clauses, team building, provision of a neutral arbitrator, and binding arbitration.

A brief discussion of these contractual approaches is important to facilitate an understanding of the findings. Allocating fair contract risk refers to a situation where construction industry professionals have resorted to a fair distribution of risk among all the parties involved, the architect/engineer, the owner, the contractor and the sub-contractor(s). Drafting dispute clauses entail use of clauses with explicit provisions and instructions for dispute resolution as these arise during project implementation. Team building is another dispute-resolution technique that can be instituted at the beginning of a construction project to help allow for better cooperation and coordination among the parties. Partnering is one such aspect of team building, which entails developing a contractual understanding among all stakeholders towards the achievement of common objectives. Team building creates a win-win cooperative relationship that focuses the project on results rather than litigation (Jannadia et al., 2000).

Provision of a neutral arbitrator allows for the presence of a neutral entity that provides alternative dispute resolution channels in the event that disputes do indeed arise, before resorting to a binding settlement. Finally, there is the use of binding arbitration, which is the element of last resort before outright litigation. This would entail the use of legally recognized bodies of industry professionals who are well grounded in the construction value chain and who can provide conflict resolution leadership in the area. As in litigation, the parties give up control over the decision and have to proceed in an adversarial forum, and reach an out of court settlement (Jannadia et al., 2000).

The findings from Jannadiaet al.(2000) indicated that the appropriateness of fair risk allocation in contract documents was lowly ranked by all the stakeholders, with close agreement in rankings among them. This was attributed to uncertainty among them as to the allocation of responsibilities and the traditional use of unfair risk transfer. The use of dispute resolution clauses revealed close agreement among the respondents, suggesting a strong willingness to resolve issues through established procedures and responsibilities. Team building contracts, such as partnering, received a middle ranking, suggesting the prevalent existence of mistrust. Provision of a neutral arbiter, experienced high variations in rankings, owing to the possibility of partiality towards the project financier/owner, who may also be paying the architects and engineers.

Appropriateness of using binding arbitration was highly variable. Most contracts tend to have the formal law as their reference point, leaving arbitrators with few avenues for manoeuvring. Owner's ranked arbitration low, as to them, this represented a ceding of control, while contractors ranked it highly as they prefer low cost and speedy avenues for

dispute resolution, compared to litigation (Jannadia et al., 2000).Overall, the key statistic (average mean values), revealed the strong desire among the contractors towards practicing Alternative Dispute Resolution (ADR), compared to all the other parties. This was attributed to the fact that, in situations where disputes and delays arose, the contractors were the biggest losers and such dispute placed a heavy burden on their ability to finance their operations.

### 2.3.6 Insurance Risk Management Strategies andFirm Performance

In practice, construction firms mainly adopt three strategies for risk transfer, these being through insurance, sub-contracting or through modifying contract conditions. Of these three, taking out an insurance cover is the one of the most commonly used method of risk transfer. Martz Jr, Neil and Biscaccianti (2006) define insurance as the equitable transfer of risk of a potential loss, from one entity to another (generally an insurance company), in exchange for a premium. The insurer is the entity that sells the insurance cover while the insured is the entity that purchases the insurance cover. Insurance covers are based on good faith between all the parties involved and this requires the insured to make full disclosure of all relevant facts that are known to them.

The use of insurance has demonstrated positive correlation with the value of a firm. For instance, Zhan (2007) conducted an empirical investigation on the cross-sectional relationship between firm value and the deployment of property insurance targeting 663 unlisted firms in Norway. Theresearch used return on assets measures that had been adjusted for industry type as the proxy for firm value and was able to demonstratea positive relation between firm value and property insurance. However, this relationship only applied to firms

with above average financial performance and relatively high leverage (measured as long term debt scaled by total assets) in their sample.

From the findings of this study, it can be inferred that, in addition to risk transfer, insurance assists the contractor in managing risks by identifying the risks and reducing or mitigating their probability of occurrence by taking out policies, thus raising firm value. Additionally, by accepting to insure construction project risks, the insurer effectively commits to compensating any claims that may arise, thus absorbing the financial burden of such firms and improving firm profitability. One example of construction insurance coverage products is the Contractors' All Risks (CAR) insurance, an all inclusive insurance cover used in construction contracts. The CAR policy is widely accepted, in the insurance sector worldwide, as a comprehensive cover in which all the material damages and third party damages are included (Zhan, 2007).

Pereraet al.(2008) evaluated the efficiency of use of CAR insurance policy for civil engineering projects in Sri Lanka.Among the primal objective was to investigate those factors that affected the effectiveness of the use of this policy.Secondary data was collected relating to types of claim, amount claimed, amount settled, reasons for under-settlement or rejection and details of transferred amount including whether the remaining cost of damage had been transferred to any party other than the insurer.All the contractor respondents considered insurance as key to transferring construction risk.

Preliminary findings indicated that reasonsby contractors for selecting insurance coverswere client's requirement, conditions of contract,contractors own interest, knowledge and experience in descending order. On the other hand, key factors affecting the selection of an

insurance company by contractors, included wordings of the policy, size of the premium, quality of service, reinsurance, economic potential and reputation, in descending order. Insurer willingness to assume contractor risks depended on the magnitude of risks, good cooperation between insurer and contractor, long term relationship with contractor, contractor's performance, contractor's reputation and reputation of the insurance broker (Perera et al, 2008).

Successful claims were accompanied by certain attributes including correct estimate of settlement amounts by contractor, involving the insurer in all aspects of claim settlement, interactive and responsive cooperation with the insurer, full disclose of all project information to the insurer, and also engaging in a negotiated settlement in case of any discrepancies. Insurers also inspected the construction site to assess risk as a basisfor setting premiums.

Contractors who used this approach were much more likely to have their claims paid and reported overall better project performance compared to those who did not.For those claims that were rejected, this was largely attributed to lack of experience and knowledge on proper risk management and also due to foreseeable damage. Insurers also insisted on long term business relationships worth their clients, rather than concentrating on stringent management of risks (Perera et al., 2008).

Liu, Li, Lin, and Nguyen (2007) conducted an empirical study on the key challenges in risk management and insurance inthe Chinese construction industry and proposed recommendations to improve risk management. The research methodology relied on surveys conducted through e-mail, postal questionnaires and fax. The target population were those

individuals with relevant knowledge of risk management and construction insurance in China. These included selected clients, construction firms (project director, project managers, and contract managers/administrators), insurers, brokers, consultants, claim advisors, and academics; and researchers in the Chinese construction industry.

The findings by Liuet al.(2007) revealed that the lack of expertise and experience prevented Chinese contractors from recognizing the importance and benefits of risk management. As a consequence, they negate the need for insuring construction risks and instead opt to manage such risks internally. The researchers identified a need for a collaborative approach between government, the construction sector, insurance industry and the academics to develop learning solutions targeted at contractors aimed at creating a favourable learning environment that boosts the adoption of risk management.

Additionally, in the developing countries, there are many contextual challenges faced by construction firms in securing insurance products and services. Such could include the lack of knowledge of available insurance products, actual lack of such appropriate products in the insurance industry, high premiums, or cultural apathy ingrained among local contractors towards use of insurance covers. These discourage construction firms from pursuing such services and eventually result in disinterest and cultural apathy. Martz Jret al.(2006) also observed that the developing countries have a limited spectrum of insurance products and services and that although construction insurance is a huge financial opportunity for insurers; they lack the depth of experience to exploit such gaps.

### 2.3.7 Policy and Regulatory Framework, Risk Managementand Firm Performance

Isik et al.(2010) conducted a research study in Turkey, whose purpose was to investigate the role of exogenous factors in the strategic performance of construction companies. The research methodology relied on e-mail questionnaires and face-to-face interviews administered on 185 construction firms. The exogenous factors under examination were categorized into market conditions and strategic alliances. Market conditions included those aspects of the business environment that the firm could not easily influence. These included the role of government, legal conditions, and the political scenario.

The findings indicated that these parameters influenced the strategic performance of the construction firms through impacting on the differentiation strategies, and market/project/partner selection strategies. Punitive government regulation also impacted negativelyon the ability to differentiate through the use of innovative construction methods, materials and equipment by sanctioning the use of new technologies. Political conditions turned out to be the most influential and tend to suggest that it is difficult to make strategic decisions in developing countries like Turkey where political stability is often questionable (Isik et al., 2010).

The role of government in this study was examined as part of a composite affair and has been congregated along with that of the political landscape and labour unions, making it hard to isolate the real impact of government on its own (Isik et al., 2010). This study goes one step further by isolating government as a sole moderating variable.Blayse and Manley (2004) conducted a desk review of existing literature whose primary goal was to identify the main factors driving or hindering construction innovation. Their analysis revealed six primary

parameters among which were the issue of regulations and standards as promulgated by government. Government policies were found to be key in influencing the use of technology and given the punitive nature of such regulations, they have had a negative influence, thus hampering innovation.

Whereas these regulations contribute towards effective risk management by insisting on the use of time-tested construction methods, firm performance suffers in the medium to long term, given the inability to exploit alternative technology to enhance the construction value chain. Blayse and Manley (2004)also observed a shift in the literature from prescriptive regulations to performance-based regulations that avoid placing resource and operational constraints and that insist only on the need for compliance with the final regulatory milestones and goals. High standards may therefore, induce demand for improved technologies which would otherwise be commercially unsuccessful.

Mbusi (2016) conducted a study to evaluate the influence of interest rates on construction industry output in Kenya. The objective of the study was to determine whether wholesale interest rates, such as the Central Bank of Kenya base lending rate, may be used as an effective policy instrumentto influence the level of output in the construction industry. Thefindings of the study indicated no statisticallysignificantrelationships between interest rate changes and annual changes in the level of construction output. These findings violate the widely held assumption that manipulating monetary policy is a means to stimulating construction demand and subsequently enhancing economic growth. The implications for government policy and construction firm management is that policymakers should focus on

improving the construction industry performance through real growth in the sector, by stimulating real demand, rather than manipulating interest rates.

It is important to observe that government policy and regulation of the construction sector may influence the performance of construction firms. If government adopts performance oriented approaches, these may go a long way towards encouraging innovation in the industry. To achieve this effectively, the regulator should be well versed in market conditions, advanced practices and technologies, organizational competencies, industry structure, competition, and technical infrastructure. This enables the regulators to set requirements based on both current and emergent technologies and thus prevent the fossilization of practices. By imposing requirements that make current technologies uneconomical to use, the regulator forces construction firms innovate and improves the up-take of good practices and subsequently, improves firm performance (Farooqui & Ahmed, 2008).

## 2.4 Summary of Empirical Review

Table 2.1 presents a summary of the empirical studies reviewed and present evidence of research gaps that form a basis for further investigation in this study.

Table 2.1 Summary of Empirical Review and Research Gaps

| Author/ Year | Research Theme | Variables | Methodology | Findings | Research Gaps | Focus Of The Study |
|---|---|---|---|---|---|---|
| Chen, Hao, Poon and Ng (2004) | Cost risk management in the West Rail Project of Hong Kong | Resources factors, management factors and parent factors affecting costs | Case study | Significant factors were resource factors such as price escalation, inaccurate cost budget, supplier/sub-contractors' default & excessive interface on project mgt | Role of forward contracts in hedging against price volatilities can be replicated in Kenya | Resource risk management response |
| Ali (2007) | Risk and stakeholder management in mega projects in the Kingdom of Bahrain | Risk, stakeholder management and the impact on project performance | Survey | Time/cost overruns caused by poor stakeholder-needs-identification, absence of clear risk and stakeholder management strategies | Risk management strategies suggested included supply chain mgt /further research to elucidate its effectiveness in managing time and cost overruns | Resource risk management strategies |

**Summary of Empirical Review and Research Gaps (continued)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Ali and Kamaruzzaman (2010) | Cost overruns for building construction projects in Klang Valley | Project costs | Survey | Inaccurate or poor estimation of original cost most serious factor contributing to cost overruns | Only focused on cost overruns/time, litigation, and insurance risks were not queried | Project management control |
| Zou, Zhang and Wang (2007) | Identifying key risks in construction projects: life cycle & stakeholder perspectives | Broad set of quantitative and qualitative variables. | Survey | Key risks were tight project schedules, design variations, excessive approval procedures, unsuitable construction planning & program variations | Did not query the impact of the risks on firm performance | Project management control |
| Goh and Abdul-Rahman (2013) | Identification and mgt of major risks in the Malaysian construction industry | Key risks and risk mitigants | Survey | Financial and time risks were the key risks faced both in terms of frequency of occurrence and impact on the projects | Lack of risk mgt expertise key reason for cost & time overruns/study on training interventions to improve risk mgt and impact study | Personnel risk management response |

**Summary of Empirical Review and Research Gaps (continued)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Mahamid (2011) | Factors affecting time overruns in road construction projects in the West Bank in Palestine | Time overruns | Survey | Most severe factors were poor communication; poor resource management; delays; insufficient inspectors; rework from poor material quality; rework from poor workmanship; and payments delay | Causes of time overruns were human specific/need to examine the role of training & development in mitigating these risks | Personnel risk management response |
| Kikwasi (2012) | Assessment of the causes and effects of disruptions in construction projects in Tanzania | Time overruns | Survey | main causes-design changes, payment/ information delays, funding problems, poor project mgt, compensation issues, disagreement on the valuation of work done | Did not examine the impact of delays and disruptions on firm performance | Personnel risk management response |
| Leong, Zakuan, Saman, Ariff and Tan, (2014) | Project performance to measure effectiveness of Quality Management System maintenance and practices in the Malaysian construction industry | Quality management systems | Survey | Quality management improves the cost, time and quality performance of their projects | The findings will vary in different countries due to differences in the business environment, hence open for replications in different contexts | Project management control |

**Summary of Empirical Review and Research Gaps (continued)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Chapman and Ward (2004) | How risks were managed in the construction industry in India and whether staBN keholder relationships influence project success | Risk mgt | Case study | Risks mgt through flexible inter-relationships among the different players in the project network | Examined only how stakeholder relationships affected risk mgt-did not look at time/cost overruns, litigation and Government | Personnel risk management response |
| Ali, Mohd-Don, Alias, Kamaruzzaman and Pitt (2010) | The quality performance of construction partnering projects in Malaysia | Quality performance | Survey | Communication and functionality are the two most dominant variables in determining the quality performance of a partnering project | Focus on quality only-excludes other variables like cost & time | Personnel risk management response |
| Jannadia, Assaf, Bubshait, and Naji (2000) | Examine the suitability of contractual methods towards DAR for industrial projects in Saudi Arabia | DAR | Survey | The use of dispute resolution clauses highly ranked among all respondents | Focused only on mitigating litigation risks-did not examine how these may affect performance | Litigation risk management strategies |
| Zhan (2007) | Cross-sectional relationship between firm value and the deployment of property insurance targeting 663 unlisted firms in Norway | Firm value and insurance | Survey | Insurance assists the contractor in managing risks through identifying the risks and reducing their probability of occurrence, thus raising firm value | Does not demonstrate a causal relationship between cost, time, litigation and insurance | Insurance risk management strategies |

**Summary of Empirical Review and Research Gaps (continued)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Perera, Rathnayake and Rameezdeen (2008) | Efficiency of use of CAR insurance policy for civil engineering projects in Sri Lanka | Contractors All Risks insurance cover | Empirical survey | Reasons by contractors for selecting insurance covers were client's requirement, conditions of contract, contractor's own interest, knowledge and experience in descending order | Mainly descriptive-no causal relationships explored among different variables determining use of CAR policy | Insurance risk management strategies |
| Liu, Li, Lin and Nguyen (2007) | The key challenges in risk management and insurance in the Chinese construction industry and proposed recommendations to improve risk management | Risk management and insurance challenges | Survey | Lack of expertise and experience prevent Chinese contractors from recognizing the importance and benefits of risk management | mainly descriptive-did not investigate impact on firm performance | Insurance risk management strategies |
| Isik, Arditi, Dilmen, and Birgonul, (2010) | To investigate the role of exogenous factors in the strategic performance of construction companies in Turkey | Market conditions and strategic alliances | Survey | These parameters influenced the strategic performance of the construction firms through impacting on the differentiation strategies, and market/project/partner selection strategies | Studied variables the firm could not control-these study focuses on these that the firm can control | Government policy/risks management strategies |

**Summary of Empirical Review and Research Gaps (continued)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Blayse and Manley (2004) | Desk review of existing literature whose primary goal was to identify the main factors driving or hindering construction innovation | Various | Survey | Six primary parameters among which were the issue of regulations and standards as promulgated by Government | Focus was mainly on the regulator and how they can promote or hinder innovation through regulation-did not look at the cost, time and insurer implications of innovation | Government policy/risks management strategies |
| Mbusi (2016) | Evaluate the influence of interest rates on construction industry output in Kenya | Interest rates | Survey | No statistically significant relationships between interest rate changes and annual changes in the level of construction output | Focused only on monetary policy-many other aspects of the macro-environment not queried | Government policy/risk management strategies |
| Farooqui and Ahmed (2008) | Longitudinal study assessment of the performance of the Pakistani construction industry | | Survey/expert interviews | Need for cultural and behavioural shifts in thinking among management and all stakeholders to improve performance | Did not investigate cost, time, litigation and Government roles | Government policy/risks management strategies |

## 2.5 Conceptual Framework

Figure 2.1 belowillustrates the conceptual relationship among the study variables. The independent variables, that is, resource risk management strategies, personnel risk management strategies, project control risk management strategies, litigation risk management strategies and insurance risk management strategies are operationalized using the various indicators listed under each variable. These were then seen to influence firm performance, through the moderating influence of the government policy and regulatory framework. The indicators that operationalized the government policy and regulatory framework were economic, legal, political and technological aspects of the macro-environment. Firm performance was operationalized through cost variance, time variance and quality control.

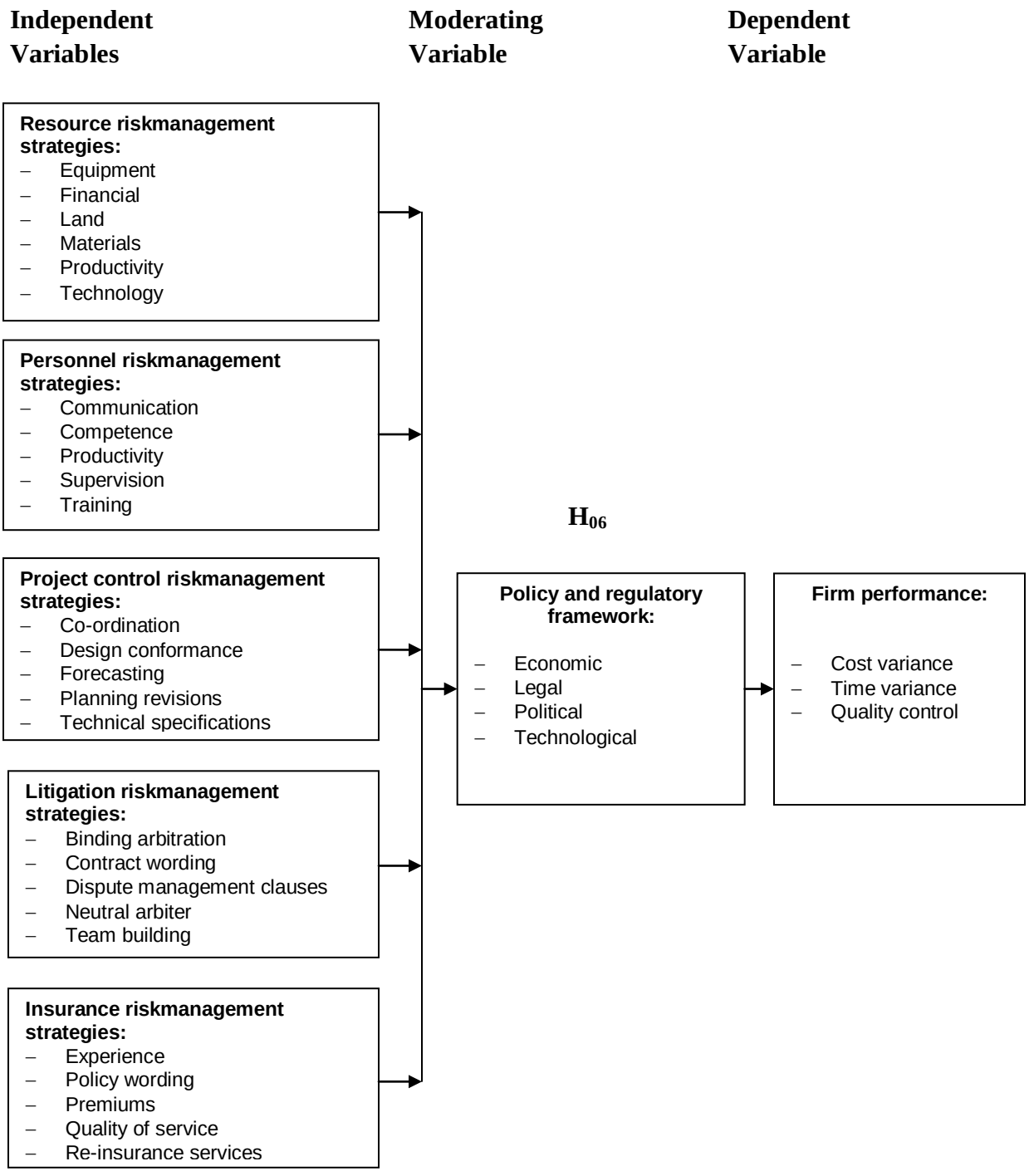


**Figure 2.1 Conceptual Framework**
**Source: Researcher (2016)**

# CHAPTER THREE

# RESEARCH METHODOLOGY

## 3.1 Introduction

This chapter introduces the research methodology including the research philosophy, research design, the empirical model, the operationalization and measurement of the study variables, target population, sampling methodology, data collection instrument, data analysis procedures and ethical considerations.

## 3.2 Research Philosophy

The research philosophy that was used in this study was based on positivism, which holds that reality is concretized and has an independent existence of its own (Ashley&Orenstein, 2005). Positivism as a philosophy adheres to the view that only factual knowledge gained through observation (the senses), including measurement, is trustworthy. In positivism studies, the role of the researcher is limited to data collection and interpretation through objective approaches and the research findings are usually observable and quantifiable. According to the principles of positivism, it depends on quantifiable observations that lend themselves to statistical analysis. This aspect of positivism was relevant to this study as the researcher only based the findings on data collected from the construction firms. Also, the researcher maintained minimal interactions with the research participants, to avoid influencing their responses.

### 3.3 Research Design

This studyusedan explanatoryresearch design, whichconnects ideas to understand causation, meaning the researcher wanted to explain the relationship among the study variables (Saunders, Lewis & Thornhill, 2003). This design was adoptedsince it involved the collection of data from the population, at one specific point in time. Explanatory research looks at how variables come together and interact (Babbie, 2007). Saunders, Lewis and Thornhill (2007) observes that the explanatory design is best suited for gathering information where the researcher wants to elucidate a cause-effect relationship between independent variables and dependent variable in a *post facto* research study. Good explanatory researches effectively answer the why questions in research (Shields & Rangarjan, 2013). Since this study had the prime goal of determining the effect of risk management strategies on performance of construction firms in selected counties in Kenya, which was also subject to micro- and macro-economic variables, the explanatory research design would best help the researcher in understanding how the chosen independent variables affect the dependent variable.

### 3.4 Empirical Model

The study used a multiple linear regression model to establish the relationship between the dependent variable and independent variables. Multiple linear regression was useful for situations in which the researcher wanted to be able to predict the presence or absence of a characteristic or outcome based on values of a set of independent variables (Saunders Lewis &Thornhill, 2003).Given a dependent variable Y and a set of k explanatory variables, $X_1$, $X_{2.....,}X_k$, the general multiple linear regression model was represented by equation 3.1

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon \quad 3.1$$

Where Y was the dependent variable; $X_1$, $X_2$,..., $X_k$were the explanatory variables, $\beta_{i's}$are the regression coefficients and εwas the error term. To establish the direct relationship between the independent variables and the dependent variable the regression equation 3.2 was used.

$$FP = \beta_o + \beta_1 CRR + \beta_2 CPR + \beta_3 CPCR + \beta_4 CLR + \beta_5 CIR + \varepsilon_1 \quad 3.2$$

where:

| | | |
|---|---|---|
| FP | = | Firm performance |
| CRR | = | Construction resource risk management strategies |
| CPR | = | Construction personnel risk management strategies |
| CPCR | = | Construction project control risk management strategies |
| CLR | = | Construction litigation risk management strategies |
| CIR | = | Construction insurance risk management strategies |
| GPRF | = | Government policy and regulatory framework |
| $\beta_0$ | = | Constant |
| $\beta_1$ | = | Coefficient of resource risk management strategies |
| $\beta_2$ | = | Coefficient of personnel risk management strategies |
| $\beta_3$ | = | Coefficient of project control risk management strategies |
| $\beta_4$ | = | Coefficient of litigation risk management strategies |
| $\beta_5$ | = | Coefficient of insurance risk management strategies |
| $\beta_6$ | = | Coefficient of government policy and regulatory framework |
| ε | = | Stochastic error term |

The moderator variable can change the strength and/or direction of any direct relationship. To establish the effect of the moderating variable on the relationship between the independent variables and dependent variables (Sprinthall, 2011), the following regression equation 3.3 was used.

$$FP = \beta_o + \beta_1 CRR + \beta_2 CPR + \beta_3 CPCR + \beta_4 CLR + \beta_5 CIR + \beta_6 GPRF + \varepsilon_2 \quad 3.3$$

Where Government Policy and Regulatory Framework (GPRF)was the moderating variable (Government policy and regulation of the construction sector) and $\beta_6$was the coefficient of the moderating variable.The multiple linear regression model was characterised by the assumptions of linearity, independence of errors, homoscedasticity, normality and collinearity. When assumptions are violated, accuracy and inferences from the analysis are affected. If linearity is violated all the estimates of the regression including regression coefficients, standard errors, and tests of statistical significance may be biased. Independence of errors implied that the subjects are responding independently and do not influence each other. When errors are not independent, standard scores and significance tests will not be accurate and there is increased risk of type I error. This can cause underestimation of standard errors leading to declaration of variables as statistically significant when they are not(Babbie, 2012).

The assumption of homoscedasticity referred to equal variances of errors across all levels of the independent variables and if this assumption is violated, the standard errors will be biased. Collinearity referred to the assumption that the independent variables were not correlated.Multicollinearity occurs when the independent variables are highly correlated with one another, or when one independent variable is a near linear combination of other independent variables. In multiple linear regression, the independent variables are allowed to be correlated to some degree but if correlation is high, interpretations and conclusions based on the size of the regression coefficients, their standard errors, or associated t-tests may be misleading because of the confounding effects of collinearity. Lastly non-normally distributed variables could distort relationships and significance tests (Kothari, 2008).

### 3.5 Operationalization and Measurement of the Study Variables

Table 3.1 Operationalization and Measurement of the Variables

| Variable | Type | Indicators | Operationalization | Measurement |
|---|---|---|---|---|
| Firm performance | Dependent | – Cost variance<br>– Time variance<br>– Quality control | Difference between budgeted and actual values | Monadic Scale 1-5 |
| Resources risk management strategies | Independent | – Adequacy of financing<br>– Appropriate ground and site conditions<br>– Appropriateness of technology used<br>– Availability of proper equipment<br>– Quality, affordability and adequacy of materials<br>– Resource productivity | Resource risk mitigants | Based on monadic scale 1 to 5 (Section C in questionnaire) |
| Personnel risk management strategies | Independent | – Competence of personnel<br>– Continual training of workers<br>– Productivity of workers<br>– Proper communication<br>– Supervisor effectiveness | personnel risk mitigants | Based on monadic scale 1 to 5 (Section D in questionnaire) |
| Project control risk management strategies | Independent | – Effective co-ordination among all stakeholders<br>– Conformity to design at all stages<br>– Proper forecasting<br>– Planning revisions to ensure conformity with scope<br>– Continual monitoring against technical requirements | Project control risk mitigants | Based on monadic scale 1 to 5 (Section E in questionnaire) |
| Litigation risk management strategies | Independent | – Arbitration<br>– Contract provision for dispute resolution<br>– Contract wording<br>– Neutral arbiter | Litigation risk mitigants | Based on monadic scale 1 to 5 (Section F in questionnaire) |

| | | | | |
|---|---|---|---|---|
| | | – Team building | | |
| Insurance risk management strategies | Independent | – Insurance experience<br>– Policy wording<br>– Insurance premiums<br>– Service quality<br>– Reinsurance services | Insurance risk mitigants | Based on monadic scale 1 to 5 (Section G in questionnaire) |
| Government policy and regulation of the construction sector | Moderating variable | – Social<br>– Technological<br>– Economical<br>– Political<br>– Environmental<br>– Legal | Policy and regulatory requirements | Based on monadic scale 1 to 5 (Section H in questionnaire) |

Source: Literature Review

Table 3.1 indicates how the dependent and independent variables were measured, through dimensioning the relevant indicators for each.

### 3.6 Target Population

Table 3.2Presentation of the classification of Micro and Small Enterprises in Kenya

| No. | Category | Head Count | Annual Turn over Limit | Investment in Plant and Machinery + Registered Capital | Equipment Investment + Registered Capital |
|---|---|---|---|---|---|
| 1 | Large | >250 | Not provided | Not provided | Not provided |
| 2 | Medium | <250 | Not provided | Not provided | Not provided |
| 3 | Small | <50 | Between KShs. 0.5 million to KShs. 5 million | More than KShs. 10 million but less than 50 million | More than KShs. 5 million but less than 20 million |
| 4 | Micro | <10 | Not exceeding KShs. 500,000 | Not exceeding KShs. 10 million | Not exceeding KShs. 5 million |

Source: Micro and Small Enterprises Act 2012

The target population was defined as the entire group of people to which the researcher wishes to generalize the study findings(Babbie, 2012). This consisted all the construction firms listed in the contractors register from the Ministry of Transport, Infrastructure, Housing and Urban Development dated July 2011 to June 2012. These were a total of 2,414 construction firms (Ministry of Transport, Infrastructure, Housing and Urban Development,

2012). The construction firms were classified into small, medium and large, in accordance with the classifications of the Micro and Small Enterprises Act 2012. The classification used in this study was based on the firms' number of employees. The rationale employed was that, as with all firms, construction firms can also be divided into small, medium and large-sized units.

Since the classification in relation to annual turn over limits and capital investments for medium and large enterprises was not provided, this study made use of the classification regarding headcount, as illustrated in Table 3.2. Staff numbers were also the most convenient way ofclassifying the firms, given the difficulty faced by the researcher in obtaining information relating to annual turnover limits. The accessible population, for the purposes of the study, is the portion of the population to which the researcher has reasonable access, that is, a subset of the target population (Babbie, 2012). The accessible population consisted of construction firms that are registered and/or operational in Machakos, Nairobi and Nakuru counties.

### 3.6.1 Sampling Design, Procedure and Sample Size

The sample size was computed as per the formula provided by Babbie (2012) given as,

$$n_e = \frac{z^2 \prod(1-\prod)}{(p-\prod)^2}$$

$\prod$ = Sample proportion

p = Population proportion

z = Standard normal deviate at the required confidence level

Since p and Π were unknown, both were set at 0.5, while at a 95 percent confidence level, z = 1.96 and the sampling error of $(p- \Pi)^2$ was taken to be $0.1^2$. Thus, the sample size $n_e$ was computed as:

$$n_e = \frac{(1.96)^2 (0.5)^2}{(0.1)^2} = 97 \text{respondents}$$

This sample size was considered sufficient given the statistical rule of thumb that states that a sample size of 30 respondents or more is representative of any population (Sprinthall, 2011). The sampling strategy used was a simple random sampling, where the respondents were selected at random from the contractors register.

### 3.7 Data Collection Instruments

Data collection involved gathering primary data using asemi-structured questionnaire. Saunders et al. (2003) highlights that a questionnaire gives the respondents' adequate time to give well thought out answers. The questions in the questionnaire were a mix of open-ended, closed-ended and matrix type (monadic-type scales). Babbie (2012) notes that the open-ended types of questions give respondents freedom of response, the forced types facilitate consistency of certain data across respondents, while monadic-type questions help in assessing the level of agreement or disagreement among the respondents, regarding the individual indicators of risk management. The questionnaire was ideal for the survey, as it enabled quick collection of similar data across a relatively dispersed population. Using a questionnaire ensured that information sought was relevant to the objectives of the research, was standard and focused the research on collecting the relevant information.

### 3.7.1 Pilot Study

Before commencing actual data collection, the questionnaires were pre-tested through a pilot study. The pilot study is a feasibility study (trial runs), done in preparation for the main study (Babbie, 2007). This helped in the developing and pre-testing of the research instruments. It also gave advance warning about where the main research project could fail, where research protocols may not be followed, or whether proposed methods or instruments were inappropriate or too complicated. Kothari (2008) also emphasizes the role of piloting in ascertaining the validity and reliability of research instruments.

The research instruments were pretested using 10 respondents as per recommendations by Babbie (2012) who observes that a successful pilot study will use 1 percent to 10 percent of the actual sample size. For large samples, the lower percentage is used while the converse is true for small samples. Since the sample size was small, the larger value of 10 percentwas used in pre-testing. These respondents were selected from the same list of registered firm but were excluded from the final survey (Mugenda & Mugenda, 2003). Procedures used in pre-testing the questionnaire were similar to those used in the actual study.

### 3.7.2 Validity of the Research Instruments

Validity refers to whether the questionnaire or survey measures what it intends to measure (Saunders et al., 2007). Two types of validity were examined, namely, content and construct validity. Content validity examined whether the items in the scale fully captured the true nature of the construct being examined. This type of validity was assured by conducting a comprehensive literature review and confirmed by consulting an expert panel, consisting of

the research supervisors. Further confirmation was done during piloting and after data collection for the main study. Construct validity on the other hand investigated whether the individual scale items correctly operationalized the study variables, as outlined in the theoretical framework. Construct validity was assessed through the expert panel of supervisors.

To ensure high levels of validity, the questionnaire items were aligned with the research objectives. Also, it was important to gather data from respondents who could contribute relevant information, even if they were hard to contact. Internal validity is affected by flaws within the study itself such as not controlling some of the major variables (a design problem), or problems with the research instrument (a data collection problem) (Kothari, 2008). Internal validity was enhanced through careful designation of the study variables, eliminating selection bias through thoughtful sampling, avoiding repeated testing of the subjects to avoid conditioning them, consistently using the research tools, eliminating researcher bias through maintaining high levels of objectivity and training the research assistants.

### 3.7.3 Reliability of the Research Instruments

Reliability of an instrument is the degree of consistency with which it measures a variable (Babbie, 2007). The reliability analysis procedure calculated a number of commonly used measures of scale reliability and provided information on the relationship between individual variables in the scale. All research instruments were pilot-tested in order to check their reliability, which was also done after data collection. This method was ideal for the study because it required a single administration of a test and was the most appropriate type of

reliability for measures that contained a range of possible answers for each item of an instrument.

### 3.8 Data Collection Procedure

A letter of introduction was sought from Kenyatta University and the requisite research permit sought from the National Commission for Science, Technology and Innovation (NaCoSTI). This facilitated easy interaction with the respondents through formal procedures. The questionnaires were administered on the participants by the researcher with the help of one research assistant trained on the structure of the research instruments and their application using the 'drop and pick later' method. The respondents were contacted at their registered offices as contained in the register obtained from the Ministry of Transport, Infrastructure, Housing and Urban Development. Initial contact was through telephone, followed by physical visits to the offices, where the questionnaires were left for respondents to fill. The researcher and respondent agreed on a suitable timeframe after which the questionnaires were collected.

### 3.9 Data Analysis and Presentation

Data obtained through questionnaires were coded, keyed into Statistical Package for the Social Sciences (SPSS) software and edited. Descriptive statistics such as percentages, charts, mean scores and standard deviations were computed to explain the characteristics of the data. Nachmias and Nachmias (2008) explain that the percentage distributions examine the pattern of response to each of the independent variables and the dependent variable under investigation and allow a comparison of two or more distributions. The means and standard

deviations enabled description and comparison of the data using single values for each variable. According to Sekaran and Bougie (2011), frequency distributions provided the basic information and the measures of central tendency and dispersion helped inunderstanding the data better.

Inferential analysis was done using multiple linear regression, which was used to assess the degree and character of the relationship between the independent variables and the dependent variable. Multiple linear regression helped the researcher understand the direction and magnitude of the relationship between firm performance and the independent variables as well as the moderating influence of the moderating variable (Babbie, 2012). The regression coefficients ($\beta_i$'s)indicated the relative importance of each of the independent variables in the prediction of the dependent variable. The regression coefficients were tested at the 5 percent level of significance. To construct variables for the regression, summation of the monadic scale items for each variable were calculated to get a composite index for each variable. To test for the overall significance of the multiple linear regression equation, the F-test was used.

### 3.9.1 Diagnostic Tests

Before performing regression analysis, the assumptions of the regression model were tested. Regression assumptions clarified the conditions under which multiple regression worked well, ideally with unbiased and efficient estimates. Checking the assumptions carried significant benefits for the researcher, reduced error, and increased thereliability and validity of inferences. The coefficient of determination, $R^2$was used to determine the goodness of fit of the regression model since it gave the percentage of the variance in the dependent variable that was explained by the independent variables.The $R^2$ measured the strength of the

relationship between the set of independent variables and the dependent variable. The decision rule was that if $R^2$ is greater than 0.7, it was considered a good fit and if $R^2$ was near zero, it was a poor fit.

The data was tested for multicollinearity using the Variance Inflation Factor (VIF), where the threshold for acceptance was set at VIF ($\beta_i$) $\leq$ 10 (Kutner, Nachtsheim & Neter, 2004). The VIF is a measure of how much the variance of the estimated regression coefficients are inflated as compared to when the predictor variables are not linearly related. They are used to describe how much multicollinearity or correlation between predictors, exist in a regression analysis. In the interpretation of VIF, the decision rule used was VIF = 1 (not correlated), 1 < VIF < 5 (moderately correlated), while 5 < VIF < 10 (highly correlated).Normality was determined using the Shapiro-Wilk test where $H_0$= not normally distributed thus hypothesis was rejected if the *p*-value was less than .05(Black, 2004). The study results were presented using tables and pie charts.

### 3.10 Ethical Considerations

In order to maintain the highest level of ethics, a letter of introduction was sought from KenyattaUniversityintroducing the purpose of the study to the potential respondents. A research permit was also obtained from the NaCoSTI, through Kenyatta University, in compliance with regulatory requirements. The widely accepted ethical framework used presented three fundamental duties of the investigator, namely, respect for persons, beneficence, and justice. Strict observance of these responsibilities addressed the fact that the difference in power between participant and investigator may intentionally or unintentionally result in exploitation.

The researcher observed respect for persons, since a competent individual has the right to self-determination, which addressed the need to seek individual informed consent. Prospective participants were allowed to decide whether or not they wished to participate in the study. The principle of beneficence implied that the investigator made sure the respondents received maximum benefit, free of harm. The principle of collective and distributive justice implied that participants were treated fairly, and the risks and benefits of the activity were distributed equitably and without bias.

# CHAPTER FOUR

# RESEARCH FINDINGS AND DISCUSSION

## 4.1 Introduction

This section presented the research findings and analysis on the basis of the specific objectives and hypotheses.The presentation made use of tables and pie charts to present the data and information.

## 4.2 Sample Characteristics

### 4.2.1 Response Rate

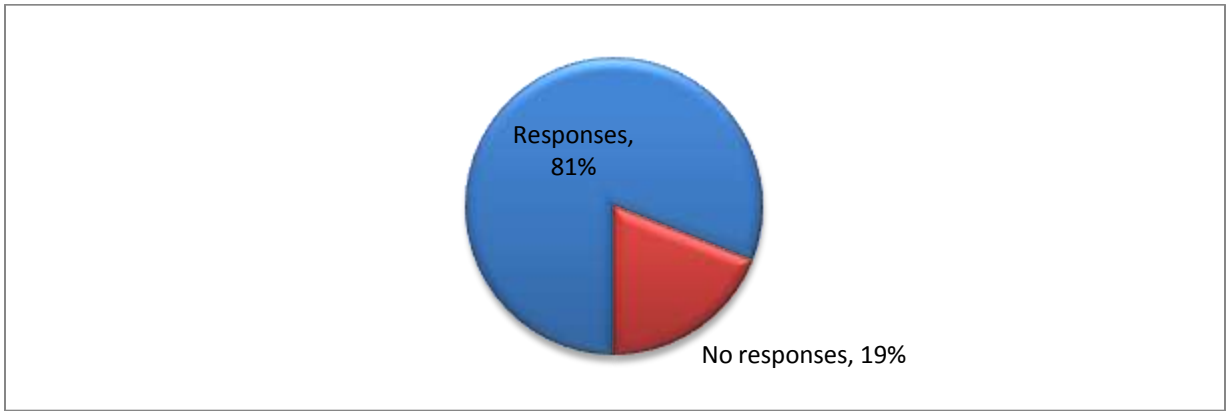


Figure 4.1 Overall Response Rate
Source: Survey Data (2016)

As shown in Figure 4.1, the response rate for the study was 81 percent (n=79, N=97), which was found to be sufficient given the recommendation by Mugenda and Mugenda (2003) that response rates of 50 percent or more are sufficient.

### 4.2.2 Designation of the Respondents

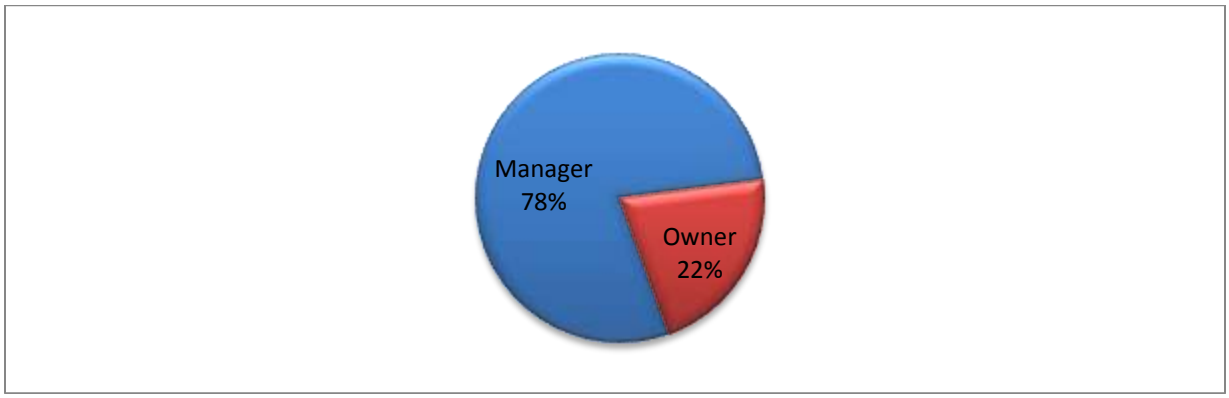


Figure 4.2 Designation of Respondents
Source: Survey Data (2016)

From Figure 4.2, managers constituted the majority of respondents, at 78 percent, with owners being the minority, at 22 percent. These were considered appropriate for the study since they were the people charged with the day to day management of construction work activity. They were thus seen to have the relevant expertise and experience to be able to inform the research.

### 4.2.3 Years Worked in the Construction Industry

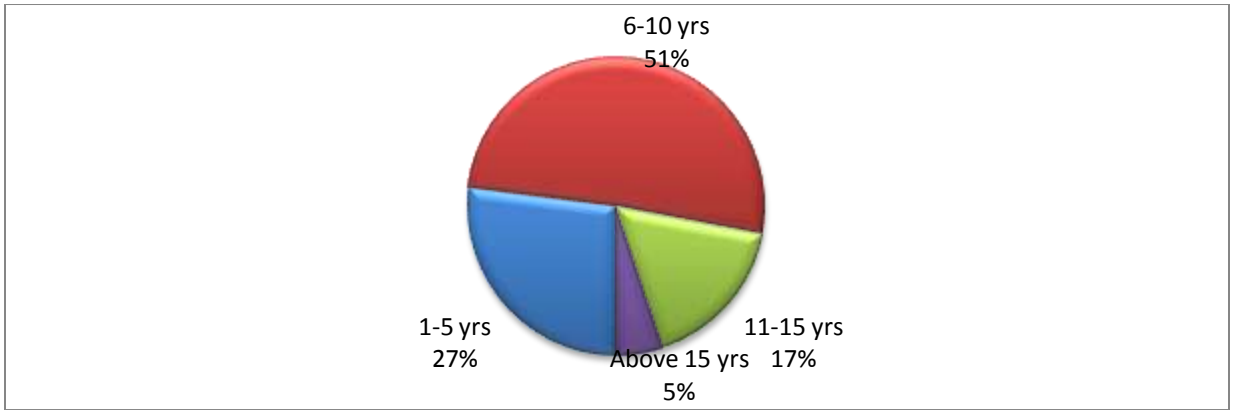


Figure 4.3 Length of Time in the Construction Industry
Source: Survey Data (2016)

Majority of the respondents, 51 percent, had worked between 6 to 10yearsin the industry (Figure 4.3). Therefore, most of the respondents had been in the industry long enough to have developed the depth of experience required to respond objectively to issues relating to construction risk management and influence on firm performance.

### 4.2.4 Gender of the Respondents

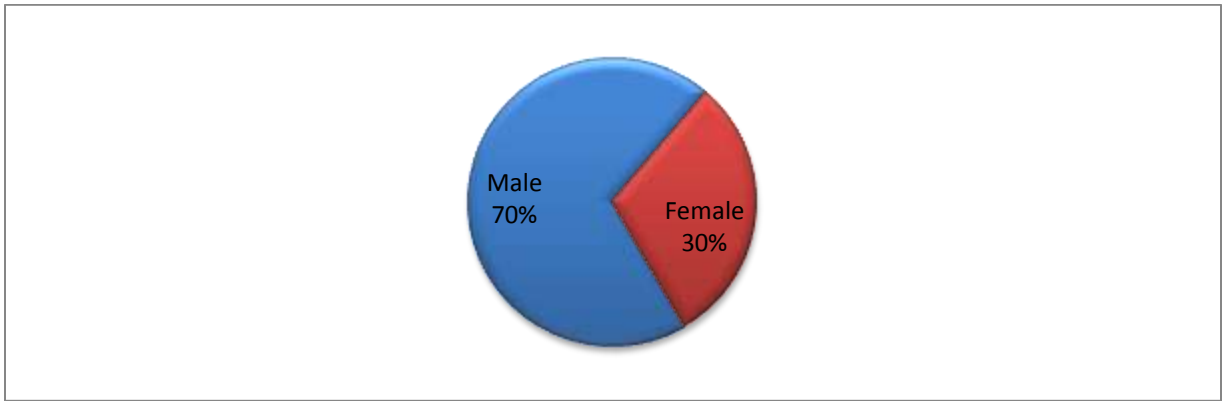


Figure 4.4 Proportion of Respondents by Gender
Source: Survey Data (2016)

Among the respondents, males were the overwhelming majority, at 70 percent, with the proportion of females being 30 percent (Figure 4.4). Thus, the construction firms surveyed may have had a higher number of males charged with the primary function of construction work management.

### 4.2.5 Level of Education

From Figure 4.5, majority of the respondents had a university degree, followed by diploma and high school levels of education. The high number of well educated respondents was a plus in that they were more able to understand and articulate issues relating to risk management practices in the construction sector.

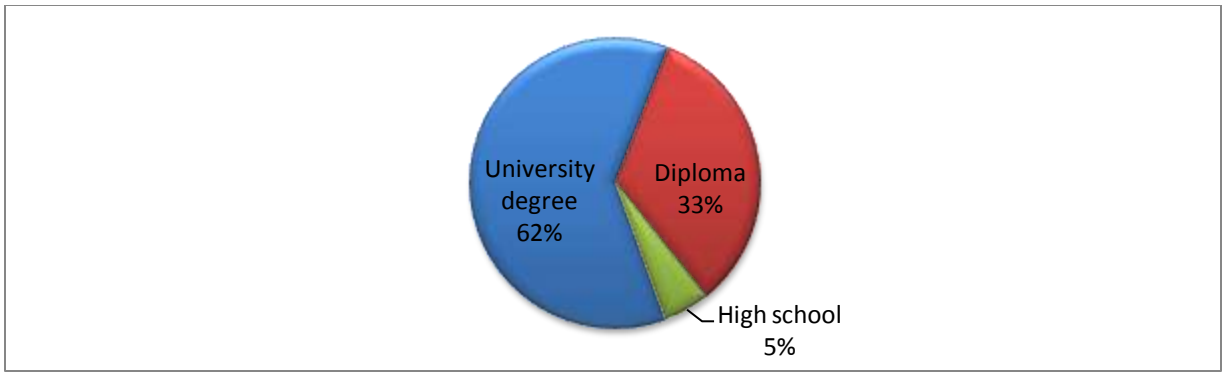

Figure 4.5Respondents Level of Education
Source: Survey Data (2016)

### 4.2.6 Age of Respondents

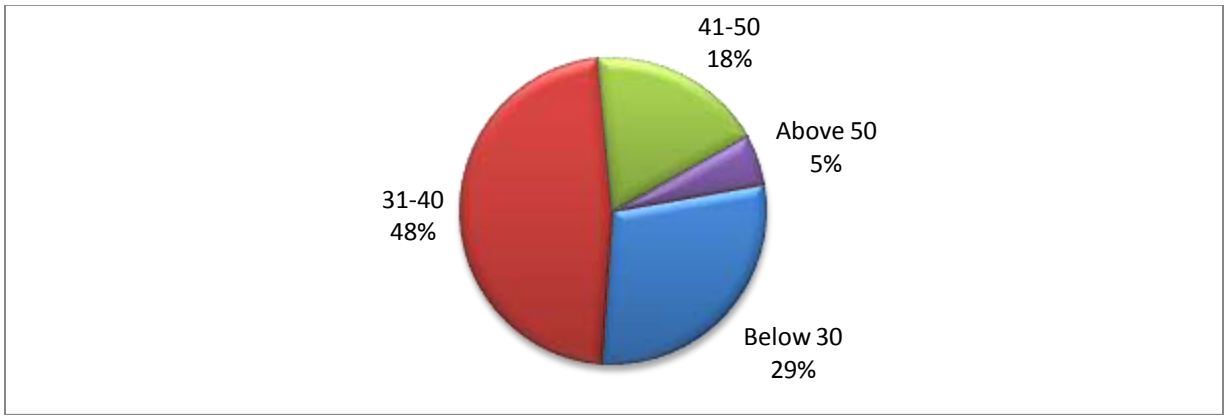

Figure 4.6Respondent Age
Source: Survey Data (2016)

Forty eight percent of the respondents were in the 31 to 40 year age category, with the above 50 year category having the least number of respondents. Combined with the earlier finding that most of the respondents had been on the construction industry for over 6 years, this finding was important since it was an indication of a high level of maturity regarding the respondent's cognizance of construction industry issues.

### 4.2.7 Number of Employees

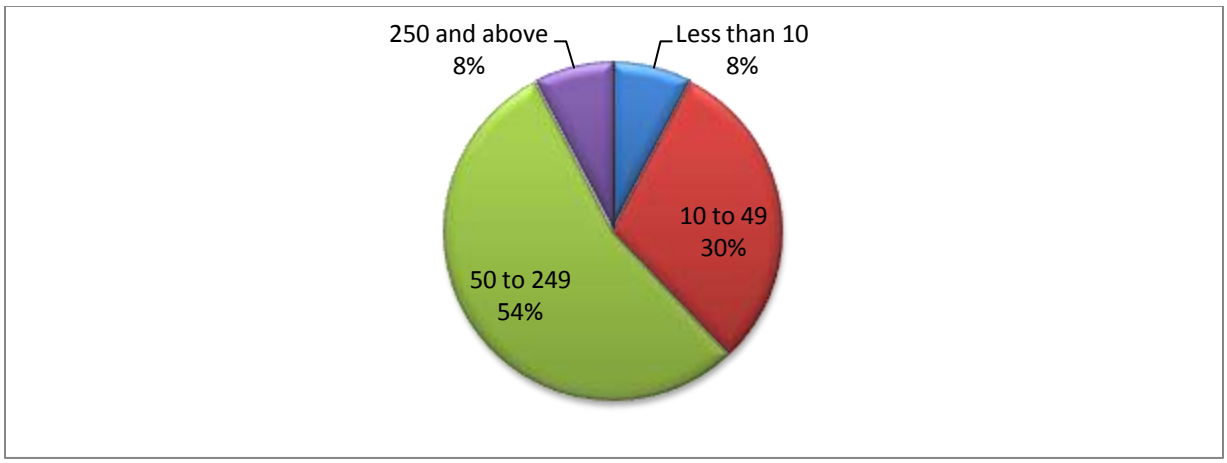


Figure 4.7Proportion of Firms by Employee Headcount
Source: Survey Data (2016)

Firms with 50 to 249 employees (medium-sized enterprises) were the majority, followed by those with 10 to 49 employees (small enterprises), with the other two categories, that is large and micro-enterprises, being evenly distributed. These were the firms that represented the growth sector in any economy and were likely to be most challenged in terms of formalized risk management and therefore, suitable for research enquiry.

### 4.2.8 Type of Company

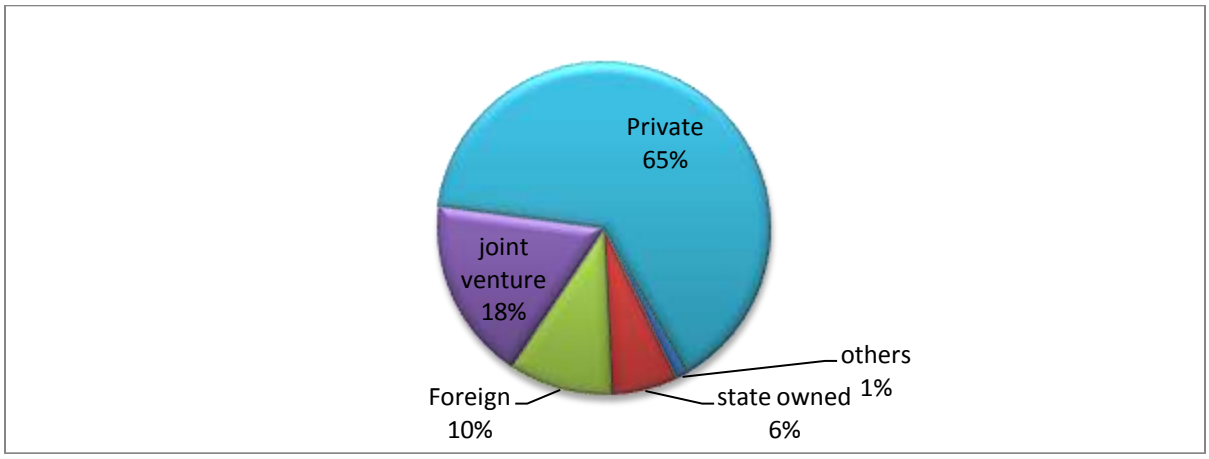


Figure 4.8Ownership Composition
Source: Survey Data (2016)

Majority of the companies were privately owned, with only 6 percent being state owned companies, as shown in Figure 4.8. Given the differences in Corporate Governance between private and public sector firms, this finding was significant in that it formed a basis for recommendations on further investigations into the differences between risk management among the firms based on the nature of their ownership.

## 4.3 Summary of theStudy Variables

This section presenteddescriptive statistics for the study variables.Theindependent variables of the study were resource risk management strategies, personnel risk management strategies, project control risk management strategies, litigation risk management strategiesand insurance risk management strategies. The dependent variable of the study was firm performance.The moderating variable wasgovernment policy and regulation of the construction sector.

### 4.3.1 ResourceRisk Management Strategies

Table 4.1 presented the percentages, means and standard deviation statistics relating to the information measuring the respondents' level of agreement as to how the given indicators of resource risk management strategies influenced performance of constructions firms. The value that had the highest frequency scores among the respondents was the occurrence, agree (value of 4.00 on the monadic scale), as all the indicators for resource risk management under this column had high numbers of respondents. This implied that most respondents tended to agree that the indicators listed for resource risk management influenced firm performance.

Table 4.1Resource Risk Management Strategies and Firm Performance (Percent)

| Resource Risk ManagementStrategies | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Ensuring availability of relevant plant and equipment reduces the risk of time overruns | 2.6 | 7.8 | .0 | 70.1 | 19.5 | 3.96 | .865 |
| Ensuring an adequate supply of construction materials reduces risk of cost and time overruns | 7.8 | .0 | 3.9 | 66.2 | 22.1 | 3.95 | .985 |
| Ensuring good quality of construction materials through an efficient supply chain reduces the risk of quality defects | 10.4 | 2.6 | .0 | 67.5 | 19.5 | 3.83 | 1.105 |
| Use of appropriate technology improves firm performance | 13.0 | .0 | 2.6 | 72.7 | 11.7 | 3.70 | 1.113 |
| Ensuring high productivity of plant and equipment reduces the risk of time overruns | 15.6 | 2.6 | 11.7 | 62.3 | 7.8 | 3.44 | 1.186 |
| Reducing the risk of financial failure and delays in paymentsto contractors, reduces the risk of cost overruns | 19.5 | .0 | 5.2 | 68.8 | 6.5 | 3.43 | 1.251 |
| Ensuring optimal ground and site conditions reduces the risk of defects and cost and time overruns | 36.4 | .0 | .0 | 59.7 | 3.9 | 2.95 | 1.495 |
| Fixing material prices using forward contracts reduces risk of cost overruns, by reducing price volatilities | 40.3 | 3.9 | 2.6 | 45.5 | 7.8 | 2.77 | 1.547 |
| **Overall** | | | | | | **3.50** | **1.193** |

Source: Survey Data(2016)

Table 4.1 also gave the mean values for individual indicators of resource risk management and the respondent's level of agreement on their influence on firm performance. These

werearranged in order from the largest to the smallest mean values. The first four mean values all had values greater than 3.5 and rounded off to a mean of 4.00 (which corresponded to agree on the monadic measurement scale). Thus, the respondents generally agreed on the perceived influence of the first four resource risk management indicators on firm performance, and these had the highest ranking among all the respondents.

Mean values lower than 3.50 rounded off to a mean of 3.00, indicating that these respondents disagreed on the influence of these resource risk management indicators on firm performance. The standard deviations represented the degree to which the responses were dispersed around the mean values. The lower the standard deviation values, the closer the scores clustered together and this was easily observed by comparing the scores for each individual resource risk management indicators. Likewise, fixing material prices through use of forward contracts thus reducing risk of cost overruns, though reducing price volatilities, had the lowest perceived influence on firm performance.

In accordance with Chen et al. (2004) findings, local firms were encouraged to use forward contracts to minimize price escalation during project implementation, thus minimizing cost variance. Also, resource risk management strategies suggested by Ali (2007), involving the use of supply chain management approach, would enhance the construction value-chain. These wouldregularize the flow of goods and services and creating an efficient payments system. This is in agreement with the current study's findings where supply chain management strategies are ranked highly.

### 4.3.2 Personnel Risk Management Strategies

Table 4.2 Personnel Risk Management Strategies and Firm Performance (Percent)

| Personnel Risk Management Strategies | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| A high availability of competent labor lowers the risk of quality non-conformance | 13.0 | .0 | .0 | 67.5 | 19.5 | 3.81 | 1.159 |
| Proper communication between the project participants reduces risk of time overruns and quality non-conformance | 15.3 | .0 | 2.8 | 55.6 | 26.4 | 3.78 | 1.281 |
| Effective supervision of project personnel reduces risk of time overruns | 14.3 | 2.6 | .0 | 63.6 | 19.5 | 3.71 | 1.234 |
| Formal training of construction workers increases firm performance | 14.3 | 3.9 | 5.2 | 50.6 | 26.0 | 3.70 | 1.298 |
| Proper supervision of construction workforce lowers the risk of quality non-conformance in construction projects | 18.7 | .0 | .0 | 60.0 | 21.3 | 3.65 | 1.341 |
| High productivity of personnel reduces the risk of time and cost overruns | 20.8 | 3.9 | 2.6 | 57.1 | 15.6 | 3.43 | 1.381 |
| Poor communication amongst project team increases risk | 26.7 | .0 | 4.0 | 53.3 | 16.0 | 3.32 | 1.472 |
| Lack of commitment among project team members increases | 28.6 | .0 | 3.9 | 54.5 | 13.0 | 3.23 | 1.477 |
| **Overall** | | | | | | **3.58** | **1.330** |

Source: Survey Data (2016)

From Table 4.2, the percentage scores indicated a clustering around the column for ‘agree’. The first five mean values all had values greater than 3.50 and they roundedoff to a mean of4.00 (which corresponded to agree on the monadic-type measurement scale). This implied that the respondents agreed on the perceived influence of the first four personnel risk management indicators on firm performance. Those with deviation values of less than 3.50 indicated a clustering around the mean value of 3.00, or disagree on the measurement scale used. Indicators with low standard deviations had less dispersion about the means than those with high standard deviations. These findings concur with those by Mahamid (2011) who found the need for sufficient and effective supervision, effective communication between parties and sufficient numbers of skilled personnel as key to construction firm performance.

### 4.3.3 Project Control Risk Management Strategies

Table 4.3 presented the findings with regard to project control risk management strategies and their perceived influence on firm performance. The percentage scores indicated a clustering around the column for ‘agree’. The first three mean values all had values greater than 3.50 and rounded off to a mean of 4.00 (which corresponded to ‘agree’ on the monadic-type measurement scale). This implied that the respondents agreed on the perceived influence of how the first four personnel risk management indicators influence firm performance, and these had the highest ranking. Those with mean values of less than 3.50 indicated a clustering around the mean value of 3.00, or ‘disagree’ on the measurement scale used. Indicators with low standard deviations had less dispersion about the means than those with high standard deviations.

Table 4.3 Project Control Risk Management Strategies and Performance (Percent)

| Project Control Risk Management Strategies | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Monitoring the quality non-conformance report ensured minimal variation from quality specification | 12.7 | 6.3 | .0 | 67.1 | 13.9 | 3.63 | 1.189 |
| Adherence to technical specifications improved firm performance | 20.3 | .0 | 2.5 | 55.7 | 21.5 | 3.58 | 1.383 |
| Objectively measuring work progress assisted | 29.1 | 2.5 | 2.5 | 50.6 | 15.2 | 3.20 | 1.514 |
| Effective coordination of project activities | 30.4 | .0 | .0 | 60.8 | 8.9 | 3.18 | 1.474 |
| Developing a time phased budget for each work task | 34.2 | .0 | 3.8 | 49.4 | 12.7 | 3.06 | 1.547 |
| Continual cost revisions reduced risk of cost overruns | 17.7 | 3.8 | .0 | 64.6 | 13.9 | 3.00 | 1.609 |
| Continual schedule revisions reduced the risk of time overruns | 36.7 | 2.5 | .0 | 45.6 | 15.2 | 3.00 | 1.609 |
| Reduced design variations improved | 31.2 | 6.5 | 2.6 | 53.2 | 6.5 | 2.97 | 1.460 |
| Forecasting cost/schedule | 43.0 | .0 | 5.1 | 43.0 | 8.9 | 2.75 | 1.573 |
| **Overall** | | | | | | **3.15** | **1.484** |

Source: Survey Data (2016)

Monitoring the quality non-conformance report against an agreed quality standard ensured minimal variation from quality specification. This was in tandem with what Meredith and Mantel (2006) observed as the need to benchmark in order to ensure compliance with widely agreed upon industrial standards. Ali and Kamaruzzaman (2010) study regarding the need for

forecasting cost and schedule performance in Malaysia appearedinapplicable in the context of this study, given the lowest mean value for this aspect.

### 4.3.4 LitigationRisk Management Strategies

Table 4.4 Litigation Risk Management Strategies and Performance (Percent)

| Litigation Risk Management Strategies | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Allocating fair contract risk reduced risk of litigation | 15.2 | .0 | 5.1 | 62.0 | 17.7 | 3.67 | 1.227 |
| Binding arbitration reduced risk of litigation | 14.3 | 3.9 | .0 | 61.0 | 20.8 | 3.70 | 1.257 |
| Drafting dispute clauses reduced risk of litigation | 20.3 | 2.5 | 7.6 | 43.0 | 26.6 | 3.53 | 1.440 |
| Provision of a neutral arbitrator provides alternative dispute resolution | 18.4 | .0 | 6.6 | 55.3 | 19.7 | 3.58 | 1.329 |
| Team building reduced risk of litigation | 27.8 | 6.3 | .0 | 54.4 | 11.4 | 3.15 | 1.477 |
| Use of contract wording that avoids ambiguity led to improved firm performance | 20.3 | .0 | 12.7 | 63.3 | 3.8 | 3.30 | 1.234 |
| **Overall** | | | | | | **3.49** | **1.327** |

Source: Survey Data (2016)

Table 4.4 presentedsummary statistics of indicators of litigation risk management strategies.The percentages indicated a clustering around the column for ‘agree’. Only two variables had mean values that clustered around a mean value of 3.00 (disagree), while the others clustered around the mean value of 4.00 (agree). Allocating fair risk contract was ranked high in this study, unlike in Jannadiaet al’s. (2000) study, where this attribute was

poorly ranked. This was possible due to the high risk in construction projects locally and the inefficient legal systems that make it costly to resolve issues, making it important to pre-empt risk. Binding arbitration, or out of court settlements, were the most widely used, and this was normal given the fact that they were less likely to result in delays and disruptions that may have resulted in high cost and time variance. Additionally, binding arbitration had the capacity to impose a lasting solution to issues that sped up the dispute resolution process.

### 4.3.5 InsuranceRisk Management Strategies

Table 4.5Insurance Risk Management Strategies and Performance (Percent)

| Insurance Risk Management Strategies | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| High insurance premiums lowered uptake of insurance covers by contractors reducing firms performance | 3.8 | .0 | 2.5 | 83.5 | 10.1 | 3.96 | .688 |
| Lack of re-insurance reduced firm performance | 5.1 | .0 | 6.3 | 75.9 | 12.7 | 3.91 | .804 |
| Experience of a good working relationship improved firm performance | 6.3 | 2.5 | .0 | 79.7 | 11.4 | 3.87 | .882 |
| poor services quality reduced firm performance | 17.7 | .0 | .0 | 64.6 | 17.7 | 3.65 | 1.291 |
| Favorable policy wording increased firm performance | 22.8 | 6.3 | 2.5 | 64.6 | 3.8 | 3.20 | 1.324 |
| **Overall** | | | | | | **3.72** | **0.998** |

Source: Survey Data (2016)

From Table 4.5, the percentages indicated a clustering around the column for ‘agree’. All except one mean value clustered around the average of 4.00 (agree); the findings pointed out

a need for improving insurer coverage through reduction of insurance premiums and use of re-insurance to improve firm performance. Low up-take of insurance products and lack of re-insurance may be consequences of what Martz Jr et al.(2006) observed as a limited spectrum of insurance products and services and that although construction insurance was a huge financial opportunity for insurers, they lacked the depth of experience to exploit such gaps.

### 4.3.6 Government policy and regulation of the construction sector

Table 4.6 Policy and Regulatory Indicators and Firm Performance (Percent)

| Policy and Regulatory Strategies | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Efficiency of the legal system in dispute resolution improved performance | 6.3 | 2.5 | .0 | 70.9 | 20.3 | 3.96 | .940 |
| Enabling political environment improved | 5.1 | 7.6 | 2.5 | 55.7 | 29.1 | 3.96 | 1.043 |
| High interest rate in the economy reduced | 11.4 | 3.8 | 3.8 | 60.8 | 20.3 | 3.75 | 1.171 |
| High level of informal practices reduced firm | 34.2 | 3.8 | .0 | 44.3 | 17.7 | 3.08 | 1.607 |
| Low standards of technology reduced performance | 25.3 | .0 | 10.1 | 58.2 | 6.3 | 3.20 | 1.353 |
| Stringent regulatory requirements for | 31.6 | .0 | 10.1 | 50.6 | 7.6 | 3.03 | 1.450 |
| **Overall** | | | | | | **3.50** | **1.261** |

Source: Survey Data (2016)

From Table 4.6, the indicators clustered at average means values of 4.00 (agree) or 3.00 (disagree). As seen in the literature by Isik et al. (2010), strategic performance of construction firms was influenced through impacting on the differentiation strategies, and

market/project/partner selection strategies. In accordance with the institutional theory of the regulatory environment, formal control was reflected in an efficient legal system and enabling political environment, which had improved construction firm performance.

### 4.3.7 Firm Performance

This section presented findings in relation to how the different risk management strategies influenced firm performance as measured by cost variance, time variance and quality control.

Table 4.7 Influence of Risk Management Strategies on Cost Variance (Percent)

| Cost | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Risk management strategies reduces price escalation | 5.1 | 11.4 | 26.6 | 44.3 | 12.7 | 3.48 | 1.02 |
| Risk management strategies reduces inaccurate costing | 5.1 | 10.1 | 58.2 | 16.5 | 10.1 | 3.16 | 0.93 |
| Risk management strategies reduces supplier/ contractors defaults | 0.0 | 31.6 | 26.6 | 19.0 | 22.8 | 3.33 | 1.15 |
| Risk management strategies improves costs estimation | 0.0 | 13.9 | 27.8 | 22.8 | 35.4 | 3.15 | 1.06 |
| **Overall** | | | | | | **3.28** | **1.04** |

Source: Survey Data (2016)

Table 4.7 presented the findings with respect to cost variance; these indicated that most respondents disagreed or strongly disagreed with the statement that risk management strategies reduced inaccurate costing and supplier/contractors defaults. The respondents further strongly disagreed that risk management strategies improved cost estimation. The observed scores reflected increasing disagreement with the corresponding statements. This

was demonstrated by the mean values for the impact of risk management strategies on cost variance, which clustered around a mean of 3.00.

Table 4.8 Influence of Risk Management Strategies on Time Variance (Percent)

| Time | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Risk management strategies reduces information delay | 0.0 | 1.3 | 17.7 | 48.1 | 32.9 | 4.13 | 0.74 |
| Risk management strategies reduces funding problems | 0.0 | 8.9 | 25.3 | 31.6 | 34.2 | 3.91 | 0.98 |
| Risk management strategies improves project management | 0.0 | 12.7 | 16.5 | 38.0 | 32.9 | 3.04 | 1.03 |
| Risk management strategies reduces disputes | 1.3 | 29.1 | 12.7 | 16.5 | 40.5 | 3.32 | 1.31 |
| **Overall** | | | | | | **3.60** | **1.015** |

Source: Survey Data (2016)

Table 4.8 indicated that most respondents agreed with the statement that 'risk management strategies reduce information delay and risk management strategies improved project management'. The respondents also strongly agreed that risk management strategies reduced funding problems and disputes. This was observed in the mean scores reflecting disagreement and agreement with the corresponding statements.Table 4.9 indicated that most respondents agreed with the statements regarding the influence of risk management strategies on the various aspects of quality control as expressed in the different statements. All the mean values indicated that most responses clustered at the disagree-agree continuum. In accordance with the fuzzy set theory, construction firm management should then focus on enhancing quality control through focusing on resource risk management. Interpreting these

Table 4.9 Influence of Risk Management Strategies on Quality Control (Percent)

| Quality | Neither agree nor disagree | Strongly disagree | Disagree | Agree | Strongly agree | Mean | Standard Deviation |
|---|---|---|---|---|---|---|---|
| Risk management strategies improved fitness for purpose of the construction end product fitness for purpose | 12.7 | .0 | .0 | 70.9 | 16.5 | 3.78 | 1.129 |
| Risk management strategies increased construction safety | 16.5 | 3.8 | 5.1 | 57.0 | 17.7 | 3.56 | 1.298 |
| Risk management strategies reduced design variation | 20.3 | 2.5 | 6.3 | 59.5 | 11.4 | 3.39 | 1.325 |
| Risk management strategies increased stakeholders satisfaction with the construction end product | 21.5 | 2.5 | 7.6 | 60.8 | 7.6 | 3.30 | 1.314 |
| **Overall** | | | | | | **3.51** | **1.267** |

Source: Survey Data (2016)

findings in light of TOC also led to the conclusion that those resource risk management strategies with high mean values were crucial for effective project completion. These also represented those risk management strategies that acted as effective buffers in eliminating quality control constraints. Quality controls revolved largely around the quality of labour and raw materials. Project control risk management parameters entailed proper-budgeting and cost revisions that minimized cost variance, proper scheduling that minimized time variance and quality assurance that optimizedquality controls.

## 4.4 Diagnostics Tests

### 4.4.1 Reliability Statistics

Table 4.10Reliability Item Total Statistics

| Risk Indicators | Scale Mean if Item Deleted | Scale Variance if Item Deleted | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|---|---|
| Ensuring an adequate supply of construction materials reduces the risk of cost and time overruns | 143.02 | 591.890 | .629 | .903. |
| Ensuring availability of relevant plant and equipment reduces the risk of time overruns | 143.03 | 594.749 | .689 | .903 |
| Ensuring good quality of construction materials through an efficient supply chain reduces the risk of quality defects | 143.22 | 590.359 | .565 | .903 |
| Ensuring high productivity of plant and equipment reduces the risk of time overruns | 143.60 | 588.556 | .541 | .903 |
| Ensuring optimal ground and site conditions reduces the risk of defects and cost and time overruns | 144.15 | 583.163 | .510 | .904 |
| Fixing material prices through use of forward contracts reduces risk of cost overruns, though reducing price volatilities | 144.14 | 585.465 | .475 | .904 |
| Reducing the risk of financial failure and delays in payments to contractors, reduces the risk of cost overruns | 143.55 | 621.220 | .003 | .910 |
| Use of appropriate technology improves firm performance | 143.40 | 604.900 | .280 | .907 |
| A high availability of competent labour lowers the risk of quality non-conformance in construction projects | 143.18 | 586.309 | .630 | .903 |

**Reliability Item Total Statistics (continued)**

| | | | | |
|---|---|---|---|---|
| Effective supervision of project personnel reduces risk of time overruns | 143.37 | 584.799 | .592 | .903 |
| Formal training of construction workers increases firm performance | 143.26 | 597.915 | .382 | .905 |
| High productivity of personnel reduces the risk of time and cost overruns | 143.66 | 598.384 | .330 | .906 |
| Lack of commitment among project team members increases the risk of quality non-performance | 143.98 | 583.234 | .502 | .904 |
| Poor communication amongst project team increases risk of time, cost and quality non-performance | 143.74 | 578.290 | .584 | .903 |
| Proper communication between the project participants reduces risk of time overruns and quality non-conformance | 143.26 | 600.040 | .322 | .906 |
| Proper supervision of construction workforce lowers the risk of quality non-conformance in construction projects | 143.22 | 605.265 | .270 | .907 |
| Adherence to technical specifications improved firm performance | 143.43 | 594.468 | .375 | .906 |
| Continual cost revisions reduced the risk of cost overruns | 143.57 | 593.624 | .460 | .904 |
| Continual schedule revisions reduced the risk of time overruns | 143.83 | 580.893 | .517 | .904 |
| Developing a time-phased budget for each work task reduced the risk of incurring time overruns | 144.11 | 595.973 | .327 | .906 |
| Effective coordination of project activities improved firm performance | 143.85 | 597.476 | .330 | .906 |
| Forecasting cost/schedule performance assisted in ensuring compliance with time and cost requirements | 144.40 | 602.588 | .226 | .908 |
| Monitoring the quality non-conformance report against an agreed quality standard ensured minimal variation from quality specification | 143.34 | 606.977 | .250 | .907 |

**Reliability Item Total Statistics (continued)**

| | | | | |
|---|---|---|---|---|
| Objectively measuring the actual physical work progress assisted in ensuring timely completion and budgetary compliance | 143.85 | 586.351 | .468 | .904 |
| Reduced design variations improved firm performance | 144.08 | 582.760 | .520 | .904 |
| Allocating fair contract risk where risk is fairly distributed among all the parties involved reduced risk of litigation | 143.20 | 601.725 | .385 | .905 |
| Binding arbitration entailing use of legally recognizedbodies of industry professionals who are well grounded in the construction value chain and who can provide conflict resolution leadership in the area reduced risk of litigation | 143.43 | 586.343 | .535 | .903 |
| Drafting dispute clauses entailing use of clauses with explicit provisions and instructions for dispute resolution reduced risk of litigation | 143.49 | 585.973 | .490 | .904 |
| Provision of a neutral arbitrator allows for the presence of a neutral entity that provides alternative dispute resolutionchannels in the event that disputes do indeed arise reduced risk of litigation | 143.40 | 592.494 | .458 | .904 |
| Team building for better cooperation and coordinationamong the parties & developing a contractual understanding among all stakeholders towards the achievement of common objectives reduced risk of litigation | 143.82 | 607.715 | .185 | .908 |
| Use of contract wording that avoids ambiguity led to improved firm performance | 143.83 | 582.924 | .596 | .903 |
| Experience of a good working relationship improved firm performance | 143.11 | 596.348 | .642 | .904 |
| Favourable policy wording increased firm performance | 143.78 | 584.547 | .566 | .903 |

**Reliability Item Total Statistics (continued)**

| | | | | |
|---|---|---|---|---|
| High insurance premiums lowered uptake of insurance covers by contractors reducing firm performance | 143.06 | 604.309 | .498 | .905 |
| Lack of re- insurance reduced firm performance | 143.03 | 618.249 | .122 | .908 |
| Poor services quality reduced firm performance | 143.37 | 587.455 | .548 | .903 |
| Efficiency of the legal system in dispute resolution improved the performance of the construction firms | 142.98 | 604.390 | .463 | .905 |
| Enabling political environment improved the performance of the construction firms | 143.17 | 608.737 | .244 | .907 |
| High interest rate in the economy reduced the performance of the construction firms | 143.38 | 591.397 | .486 | .904 |
| high level of informal practices in the industry reduce firm performance | 143.97 | 579.624 | .524 | .903 |
| low standards of permissible technology used by the industry reduced the performance of the | 143.71 | 612.960 | .129 | .909 |
| Stringent regulatory requirements for registration and operations reduced performance of construction firms | 143.92 | 608.541 | .168 | .908 |

Source: Survey Data (2016)

Table 4.10 illustrated the reliability statistics for all the indicators of all the risk management strategies investigated. From Table 4.11, the variable-total statistics revealed that each of the variables had a measure of over 0.7 on the Cronbach's Alpha scale meaning that all of them were reliable. The data collection tools were accepted since they yielded reliability coefficients with a threshold of 0.70 and above as per recommendations by Fornell and Larcker (1981). The findings in Table 4.11 revealed that the variables used in the study were reliable (overall Cronbach's Alpha= 0.908).

Table 4.11Reliability Statistics Summary

| Study variables | Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|---|---|---|---|
| Resource risk | 0.969 | 0.981 | 8 |
| Personnel risk | 0.815 | 0.823 | 8 |
| Project control risk | 0.932 | 0.944 | 9 |
| Litigation risk | 0.902 | 0.903 | 6 |
| Insurance risk | 0.910 | 0.914 | 5 |
| Government policy and regulation of the construction sector | 0.912 | 0.932 | 9 |
| Overall | 0.908 | 0.912 | 45 |

Source: Survey Data (2016)

### 4.4.2 Test of Normality

Table 4.12 Tests of Normality

| | Kolmogorov-Smirnov(a) | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Firm performance indicators | .090 | 79 | .177 | .976 | 79 | .141 |

a. Lilliefors Significance Correction
Source: Survey Data (2016)

Table4.12above presents the normality tests, interpreted at the 5 percent level of significance. Neither the Kolmogorov-Smirnov nor the Shapiro-Wilk tests were statisticallysignificant, and the null hypothesis that the data are normally distributed wasnot rejected, implying that the data was normally distributed. If the data was not normally distributed, then the analysis would have adopted non-parametric tests.

### 4.4.3 Test for Multi-Collinearity

Table 4.13below presented the findings of diagnostic tests for multicollinearity among the risk management strategies. Tolerance was the percentage of the variance in a given predictor that could not be explained by the other predictors. Thus, the tolerances show that 34.6

percent to 63.7 percent of the variance in a given predictor could be explained by the other predictors.

Table 4.13 Variance Inflation Factor Coefficients

| Model | Collinearity Statistics | |
|---|---|---|
| | Tolerance | VIF |
| Resource risk management strategies | .422 | 2.371 |
| Personnel riskmanagement strategies | .363 | 2.758 |
| Project control riskmanagement strategies | .390 | 2.564 |
| Litigation riskmanagement strategies | .436 | 2.294 |
| Insurance riskmanagement strategies | .522 | 1.916 |
| Government policy and regulation of the construction sector | .654 | 1.528 |
| Mean | 0.4645 | 2.2385 |

a. Dependent Variable: Firm performance indicators
Source: Survey Data (2016)

When the tolerances were close to zero, there was high multi-collinearity and the standard error of the regression coefficients was inflated.From Table 4.13, VIF values ranged from 1.528to2.758, and together with the fairly high tolerance values, these implied that the risk management strategies studied were moderately correlated. This didnot attain the threshold of VIF≥10, and therefore, multi-collinearity didnot adversely inflate the results of the multiple regression analysis. Further, this validated the Han and Diekmann (2004) cross-impact model, which identified causal inter-relationships among factors that affected project performance.

### 4.4.4 Goodness of Fit Tests

Table 4:14Regression Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .896(a) | .802 | .798 | .24398 |

a. Predictors: (Constant), resource risk, personnel, project control, litigation risk, insurance risk and Government policy and regulation of the construction sector.
Source: Survey Data (2016)

While ANOVA was a useful test of the model's ability to explain any variation in the dependent variable, it did not directly address the strength of that relationship. The model summary in Table 4.14 reported the strength of the relationship. The R Square value of .802 demonstrated that about 80.2 percentof the variation in the performance of construction firms was explained by the model. That is, the risk management strategies explained over 80 percent of the influence on the performance of construction firms.

This implied that other variables not studied in this research contributed 19.7 percent of the variability in firm performance. Since the value of R Square (.802)was near 1.000, the model was considered a good fit to explain the causal relationship between the selected risk management strategies and firm performance. This was in view of the fact that there were other extraneous variables that may have influenced firm performance, but were not factored into the study.

### 4.4.5 Overall Significance

From Table 4.15 below, the ANOVA table tested the overall significance of the model from a statistical perspective.

Table 4.15Analysis of Variance

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| | Regression | 3.116 | 5 | .519 | 4.720 | .000(f) |
| | Residual | 7.923 | 73 | .110 | | |
| | Total | 11.040 | 78 | | | |

a. Predictors: (Constant), resource risk, personnel, project control, litigation risk and insurance risk.

b. Dependent Variable: firm performance

Source: Survey Data (2016)

The *p*-value was.000, which was significant at the 5 percent level of significance, implying that the variation explained by the model was not due to chance.This implied that the regression model predicted the performance of the construction firms very well. The predictions based on the model could be extrapolated to the population of construction firms from which it was determined, and could be used for predicting values of firm performance, for given values of the independent variables.

### 4.5 Risk Management Strategies and Firm Performance

Table 4.16Coefficients of the Regression Modelwith the Moderating Variable

| Model | Unstandardized Coefficients | | Standardized Coefficients | | |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | t | Sig. |
| (Constant) | 2.919 | .287 | | 10.160 | .000 |
| Resource risk management strategies | -.090 | .055 | -.253 | -1.645 | .004 |
| Personnel risk management strategies | .076 | .080 | .158 | .952 | .003 |
| Project control risk management strategies | .226 | .075 | .480 | 3.003 | .004 |
| Litigation risk management strategies | .060 | .080 | .114 | .751 | .455 |
| Insurance risk management strategies | .083 | .077 | .149 | 1.080 | .284 |
| Government policy and regulation of the construction sector | -.175 | .081 | -.266 | -2.154 | .035 |

a. Dependent Variable: firm performance
Source: Survey Data (2016)

Table 4.16 presented the results of the regression analysis including the moderating variable involved. In explaining the influence on firm performance, resource risk management strategies, personnel risk management strategies, project control risk management strategies and Government policy and regulation of the construction sector were statistically significant at the 5 percent level of significance. The beta coefficients provided information on each

predictor variable necessary to predict firm performance from the risk management strategies. From Table 4.16, after plugging in the unstandardized coefficients, the final form of the regression equation with the moderating variable was presented as:

Firm Performance = 2.919 -.090 CRR +.076 CPR + .226CPCR- .175 GPRF

The interpretation of the above model was that when all other independent variables were held constant, increasing each independent variable by one unit, caused a corresponding increase or decrease in firm performance by the amount (and sign) of the beta coefficient associated with each independent variable. The beta coefficients provided information on each predictor variable necessary to predict firm performance from the risk management strategies. The constant value of 2.919was the intercept, and corresponded to the model-predicted value of firm performance when the value of every predictor was equal to zero.

The findings further indicated that the constant, resource risk management strategies, personnel risk management strategies,project control risk management strategies and Government policy and regulation of the construction sector, were statistically significant at the 5 percent level of significance. Litigation risk management strategies and insurance risk management strategies were not statistically significant at the 5 percent level of significance. Consequently, litigation and insurance risk management strategies did not contribute much to the final model. The values of the standardized coefficients were useful in determining the relative importance of the significant predictors.

When ranking contribution to explaining variation in firm performance, it is the absolute value of the coefficient that was used, since the sign of the coefficient merely indicated the

direction of the relationship, while the value of the coefficient was a measure of the strength of the relationship.Project control risk management strategies contributed most in explaining the variation in firm performance, with standardized coefficients of .226, followed by Government policy and regulation of the construction sector, with standardized coefficients of -.175. Resource risk management strategies were third with a standardized coefficient of -.090 and lastly, personnel risk management strategies, which had a standardized coefficient of .076.

### 4.5.1 Resource Risk Management Strategies and Firm Performance

The first hypothesis of the study, $H_{01}$, stated that resource risk management strategies had no significant effect on the performance of construction firmsin selected counties in Kenya. From Table 4.16, the beta coefficient was -.090, with a *p*-value of .004, which was statistically significant at the 5 percent level of significance. This implied that the null hypothesis wasrejectedindicating thatresource risk management strategies hada significant effect on the performance of construction firms. These findingsare similar to the observations by Panigrahi et al. (2014) who pointed out the need to maintain a timely and consistent availability of sufficient resources.

The beta coefficients also indicated that when all the other variables are held constant, resource risk management strategies decreased firm performance by .090.Resources included adequate working capital, quality materials and appropriate construction technology. When properly managed, construction resources risk management improved firm performance through reducing critical variations between forecasted and actual cash flows among construction firms, as observed by Odeyinka et al. (2008). In addition, as observed by Ali

(2007), a stakeholder approach to managing the supply chain, along with timely payments, had a multiplier effect on reducing quality, time and cost.

### 4.5.2 Personnel Risk Management Strategies and Firm Performance

The second hypothesis, $H_{02}$stated that personnelrisk management strategieshad no significant effect on performance of construction firmsin selected counties in Kenya. The beta coefficient was .076 with a *p*-value of .003,which was statistically significant at the 5 percent level of significance. This implied that the null hypothesis wasrejected,therefore personnelrisk management strategies hada statistically significant effect on the performance of construction firms. The beta coefficient further demonstrated that the personnel risk management strategies resulted in an increase of .076in firm performance, when all other variables were held constant. The significance of personnel risk management strategies cannot be underemphasized, given Han and Diekmann's (2004)observation that qualified personnel should be deployed right at the inception of any construction project, as they are the resource responsible for overall planning, design and project execution.

Zouet al.(2007), in their holistic stakeholder model, also pointed out the need for all participants to work together throughout the entire project life cycle.Use of competent personnel, effective communication and proper supervision,all personnel related risk management strategies, improved firm performance. This wasby reducing delays and disruptions due to design changes, information delays, poor project management, and disagreement on the valuation of work done, as observed by Kikwasi (2012). Proper co-ordination among project participants was also emphasized in this study just as in Chapman and Ward's (2004) study in India. This was also in keeping with Ali et al. (2010) findings

that communication among parties and conformity with the technical specifications of a construction project werecrucial for project success.

### 4.5.3 Project Control Risk Management Strategies and Firm Performance

The third hypothesis, $H_{03}$,stated that project control risk management strategieshad no significant effect on performance of construction firmsin selected counties in Kenya.The *p*-value was .004, which was statistically significant at the 5 percent level of significance, while the beta coefficient was .226. This implied that the null hypothesis was rejected thusproject controlrisk management strategies hada significant effect on the performance of construction firms. Further, whenall the other variables wereheld constant,project control risk management increasedfirm performance by .226.These findings were similar to those of Ling and Ang (2013), who posit that effective control systems were crucial for concretizing effective project performance.

Project control systems were vital in that they provided a basis for continual evaluation of project performance. Moselhi et al. (2004) observed that this enabled project planners to continually revise project performance on the basis of cost, time and quality. Thus, project control risk management strategies were crucial in that they allowed timely revision of project activities to avoid deviations that may impact adversely on project performance. This impact on the revision of the overall construction strategy provided an explanation on the significant causal relationship observed between these control strategies andconstruction firm performance.

### 4.5.4 Litigation Risk Management Strategies and Firm Performance

The fourth hypothesis, $H_{04}$, stated that litigationrisk management strategieshad no significant effect on performance of construction firms in selected counties in Kenya.The beta coefficient was .060, while the*p*-value was .455, which wasnot statistically significant at the 5 percent level of significance. This implies that the null hypothesis wasnot rejectedthuslitigationrisk management strategies hadnosignificant effect on the performance of construction firms.The findings of this study contradicted the reviewed literature from Jannadia et al. (2000), on the effect of litigation risk, which indicated a significant role played by litigation in enhancing construction firm performance.

As observed by Bayliss (2002), litigation risk management was about the use of dispute resolution mechanisms, which reduced the time taken to resolve disagreements and thus, reduce unwanted cost and time variances.Findings by Jannadia et al. (2000) further indicated that most contracts tended to have the formal law as their reference point, leaving arbitrators with few avenues for manoeuvring. Owner's ranked arbitration low, as to them this represented a ceding of control. On the other hand, contractors ranked it high, as they prefer low cost and speedy avenues for dispute resolution, compared to litigation.

### 4.5.5 Insurance Risk Management Strategies and Firm Performance

The fifth hypothesis,$H_{05}$,stated that insurance risk management strategieshad no significant effect on performance of construction firms in selected counties in Kenya.The beta coefficient was .083, while the*p*-value was .284, which wasnot statistically significant at the 5 percent level of significance. This implied that the null hypothesis wasnot

rejectedthereforeinsurancerisk management strategies hadno significant effect on the performance of construction firms.The findings of this study contradicted the observation that insurance risk management had been found to result in an increase in the value of firms, by lowering the adverse financial impact of material damages and third party damages among others. These findingswere explained byMartz Jret al.(2006), who found that there were many challenges construction firms faced in accessing insurance products. This included high premiums and lack of appropriateproducts, such as re-insurance, thus discouraging use.

### 4.5.6 Government Policy and Regulatory Framework and Firm Performance

The sixth hypothesis,$H_{06}$, stated that government policy and regulation of the construction sector had no significant moderating effect on the relationship between risk management strategies and financial performance of construction firms in selected counties in Kenya. The beta coefficient was -.175, while the *p*-value was .035, which was statistically significant at the 5 percent level of significance. This implied that the null hypothesis was rejected, implying that government policy and regulation of the construction sector had a significant moderating effect on the relationship between risk management strategies and financial performance of construction firms.

The beta coefficient further demonstrated that government policy and regulation of the construction sectordecreasedfirm performance by .175, when all other variables were held constant.This was in line with the literature as observed by Farooqui and Ahmed (2008), where government policy and regulation of the construction sector was seen as both an enabler of innovation and performance, depending on the type of legislation.

Performanceorientedregulation, which encourages growth, innovation and use of new technologies, may improve construction firm performance, while restrictive policies may hinder performance. Performance oriented policies may include an efficient legal system, enabling political environment and affordable interest rates.

### 4.5.7 Summary of the Findings

Table 4.17Decision on Strategies relating to Firm Performance

| Hypothesis | p-value | Decision |
|---|---|---|
| Resource risk management strategies have no significant effect on the performance of construction firms in selected counties in Kenya | .004 | Resource risk management strategies had a significant effect on the performance of construction firms in selected counties in Kenya |
| Personnel risk management strategies have no significant effect on performance of construction firms in selected counties in Kenya | .003 | Personnel risk management strategies had a significant effect on performance of construction firms in selected counties in Kenya |
| Project control risk management strategies have no significant effect on performance of construction firms in selected counties in Kenya | .004 | Project control risk management strategies had a significant effect on performance of construction firms in selected counties in Kenya |
| Litigation risk management strategies have no significant effect on performance of construction firms in selected counties in Kenya | .455 | Litigation risk management strategies had no significant effect on performance of construction firms in selected counties in Kenya |
| Insurance risk management strategies have no significant effect on performance of construction firms in selected counties in Kenya | .284 | Insurance risk management strategies had nosignificant effect on performance of construction firms in selected counties in Kenya |
| Government policy and regulation of the construction sector, have no significant moderating effect on the relationship between risk management strategies and financial performance of construction firms in selected counties in Kenya | .035 | Government policy and regulation of the construction sector, had a significant moderating effect on the relationship between risk management strategies and financial performance of construction firms in selected counties in Kenya |

Source: Survey Data (2016)

# CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

## 5.1 Introduction

This chapter presented a summary of the findings of this study, conclusions, recommendations and suggestions for further research.

## 5.2Summary

The general objective of this study was to determine how risk management strategies influence performance of construction firms in selected counties in Kenya. The specific objectives were to determine the influence of resource risk management strategies, personnel risk management strategies, project control risk management strategies, litigation risk management strategies, insurance risk management strategies on the performance of construction firms in selected counties in Kenya and assess the moderating role of government policy and regulation of the construction sector on the relationship between risk management strategies and performance of construction firms in selected counties in Kenya. Performance was measured as a function of cost variance, time variance and quality control.

The literature review presented the theoretical framework, the empirical literature and the conceptual framework for the study. The theoretical framework was consisted of the Theory of Constraints, the Fuzzy Set Theory, the Institutional Theory, the Financial Economics Theory and the Shareholder Value Maximization Theory. The empirical review revolved around the six objectives of the study and were mainly focused on providing objectively

verifiable evidence that supported or that did not support the role of risk management strategies in influencing the performance of construction firms. Finally, the conceptual framework illustrated the relationship between seven study variables.

Under methodology, the study employed an explanatory research design with a simple random sampling strategy. The research instrument was a semi-structured questionnaire, while data analysis entailed the use of descriptive and inferential statistics. The findings indicated that the overall response rate was 81.4 percent, while majority of the respondents were from medium sized firms (50 to 249 categories).Also, most of the respondent firms were privately owned (65 percent) and majority of those who responded were managers (78 percent), while segregation by gender revealed majority to be male (70 percent). In terms of level of education, most respondents had a university degree (62 percent), with most lying in the 31 to 40 age categories (48 percent). Further findings relating to the influence of the independent variables, the moderating variable and the dependent variable are presented below.

### 5.2.1 Resource Risk Management Strategies andFirm Performance

The first objective was to determine the influence of resource risk management strategies on performance of construction firms. The findings indicated that ensuring availability of relevant plant and equipment, thus reducing time overruns, ensuring an adequate supply of construction materials thus reducing the risk of cost and time overruns, and ensuring good quality of construction materials through an efficient supply chain thus reducing the risk of quality defects, had the highest perceived influence on firm performance.

Further, results showed that fixing material prices through use of forward contracts thus reducing risk of cost overruns, though reducing price volatilities, had the lowest perceived influence on firm performance.From the multiple linear regression findings, the beta coefficient for resource risk management strategies was -.090, with a p-value of .004, which was statistically significant at the 5 percent level of significance. This implied that the null hypothesis was rejected indicating that resource risk management strategies had a significant effect on the performance of construction firms.

### 5.2.2 Personnel Risk Management Strategies andFirm Performance

The second objective was to establish the influence of personnel risk management strategies on performanceof construction firms in selected counties in Kenya. The findings indicated that a high availability of competent labor lowering the risk of quality non-conformance in construction projects, proper communication between the project participants that reduces the risk of time overruns and quality non-conformance and effective supervision of project personnel reduces risk of time overruns, had the highest perceived influence on firm performance.

On the other hand, lack of commitment among project team members increases the risk of quality non-performance, had the lowest perceived influence on firm performance.The multiple linear regression findings indicated that the beta coefficient for personnel risk management strategies was .076 with a p-value of .003, which was statistically significant at the 5 percent level of significance. This implied that the null hypothesis was rejected, and therefore personnel risk management strategies hada statistically significant effect on the performance of construction firms.

### 5.2.3 Project Control Risk Management Strategies andFirm Performance

The third objective was to assess the influence of project controlrisk management strategiesonperformance of construction firms in selected counties in Kenya. From the findings, monitoring the quality non-conformance report against an agreed quality standard ensuring minimal variation from quality specification, adherence to technical specifications leading to improved firm performance and continual cost revisions thus reducing the risk of cost overruns, had the highest perceived influence on firm performance.

Forecasting cost/schedule performance to ensure compliance with time and cost requirements, had the lowest perceived influence on firm performance. Linear regression findings indicated that the *p*-value for project control risk management strategieswas .004, which was statistically significant at the 5 percent level of significance, while the beta coefficient was .226. This implied that the null hypothesis was rejected thus project control risk management strategies hada significant effect on the performance of construction firms.

### 5.2.4 Litigation Risk Management Strategiesand Firm Performance

The fourth objective was to determine the influence of litigation risk management strategiesonperformance of construction firms in selected counties in Kenya. Binding arbitration, allocating fair contract risk and provision of a neutral arbitrator had the highest perceived influence on performance. Use of favourable contract wording and team building had the lowest perceived influence on firm performance. Regression results indicated that the beta coefficient for litigation risk management strategies was .060, while the *p*-value was .455, which was not statistically significant at the 5 percent level of significance. This

implies that the null hypothesis was not rejected and thus litigation risk management strategies hadno significant effect on the performance of construction firms.

### 5.2.5 Insurance Risk Management Strategies and Firm Performance

The fifth objective of this study was to establish the effect of insurance risk management strategies on performance ofconstruction firms in selected counties in Kenya. High insurance premiums lowered uptake of insurance covers by contractors thereby reducing firm performance, lack of re- insurance thus reducing firm performance and experience of a good working relationship that improved firm performance, had the highest perceived influence. On the other hand, favourable policy wording that increased firm performance was the lowest perceived influence on firm performance. Multiple linear regression findings indicated that the beta coefficient for insurance risk management strategies was .083, while the *p*-value was .284, which was not statistically significant at the 5 percent level of significance. This implied that the null hypothesis was not rejected and therefore insurance risk management strategies hadno significant effect on the performance of construction firms.

### 5.2.6 Government Policy and Regulation of the Construction Sector

The sixth objective of this study was to assess the moderating role ofGovernment policy and regulation of the construction sector on the relationship between risk management strategies and performance of construction firms in selected counties in Kenya. Findings from the research indicated that efficiency of the legal system in dispute resolution firms and enabling political environment were the Government policy and regulation of the construction sector indicators that most respondents perceived influenced firm performancethe most. Stringent

regulatory requirements for registration and operations thus reducing performanceof the construction firmshad the lowest perceived influence.

The Ministry of Transport, Infrastructure, Housing and Urban Development thus exerted a significant influence in the sector and indicators are for further performance-based regulations to increase sectoral performance. The beta coefficient for government policy and regulation of the construction sector was -.175, while the p-value was .035, which was statistically significant at the 5 percent level of significance. This implied that the null hypothesis was rejected, implying that government policy and regulation of the construction sector had a significant moderating effect on the relationship between risk management strategies and financial performance of construction firms.

### 5.3 Conclusion

Resource risk management, personnel risk management and project control risk management strategies,hada statistically significant effect on performance of construction firms in selected counties in Kenya. Also, government policy and regulation of the construction sector had a statistically significant moderating effect on the relationship between risk management strategies and performance of construction firms in selected counties in Kenya. This implied that the influence of these three risk management strategies on firm performance, was not due to chance alone, but could be explained as a having an impact that enhanced construction firm operations and subsequent performance. Further, litigation risk management and insurance risk management strategies had no statistically significant effect on construction firm performance, indicating that any influence of these strategies on firm performance could be due to chance and not due to any real impact on firm performance.

## 5.4Recommendations

Resource risk management strategies and government policy and regulation of the construction sector on firm performance had a negative influence on firm performance. Additionally, litigation and insurance risk management strategies had no statistically significant influence on firm performance.In relation to the study objectives, these findings point out the need todeepen the application and implementation of the given risk management strategies in the sector.This may be achieved throughincreasedengagement in capacity building activities in risk management and construction project management in general. This would help equip project management with the requisite managerial tools and techniques to effectively run construction projects.

There should also be a higher level of involvement of construction sector professionalscharged with offering expert advice and assistance on implementation of risk management strategies. Awareness creation among clients was another front that was encouraged in order to optimize the benefits of risk management practice implementation, through increased uptake and compliance. Lastly, the government should encourage activities that encourage proper risk management and risk sharing cross the entire construction value chain. This would enable firm management make informed choices when assigning resources to maximize on efficiency and effectiveness in the construction firms leading to reduced risks and increased shareholder value.

The study also acknowledges scope for replicating the findings of this study in developing countries other than Kenya, given that they are all faced with similar challenges. This could for example, be the case for international construction firms seeking growth opportunities

through partnership with firms in these developing nations. The findings of this study would form a basis for a preliminary assessment of the extent of adoption and usage of risk management practices among the targeted local firms. This would not only inform on the current state of readiness of these firms with respect to risk management practices, but would form a basis for identifying capacity gaps and areas for further research.

In terms of contribution to new knowledge, there is not much existing research work done, regarding the current levels of awareness, utilization, benefits realization and uptake of risk management practices in the construction industry in selected counties in Kenya today. This study helps in increasing the level of insight into how construction firms in selected counties in Kenya implement risk management practices. The study also informs on the extent to which the given risk management practices are utilized and the levels of awareness regarding these practices. Construction practitioners will be able to draw from these findings and upscale their risk management strategies. Equally, business and academic researchers may use these findings to identify gaps in the formulation and implementation of risk management practices and develop themes for further inquiry.

### 5.5 Suggestions for Further Research

This study examined only a limited number of risk management parameters and their influence on firm performance. This study examined the use of risk management practices in construction firms mainly drawn from the greater Nairobi county and two counties external to the capital city, mainly Nakuru and Machakos. This makes the study Kenya-specific and County-specific and therefore, difficult to apply directly to other contexts. However, given the differences in the micro- and macro-economic parameters from country to country, it

would be useful to replicate this study elsewhere in the developing world. This would help in providing new insights into the state of risk management strategies in the construction industry in those locations.

Further research could examine the state of risk management using comparative case studies and could expand the sampling base. These studies could also expand the range of possible independent variables and dependent variable. The findings indicate that these risk management strategies explain only a partial level of variability observed in firm performance. This implies the existence of other variables, both internal and external to the firm, which would need to be scrutinized in order to further elucidate the relationship between the dependent variable and independent variables. This may include, but not limited to corporate governance (internal) and trade unions (external), that impact on the firm's micro- and macro-environment.

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## APPENDIX 1 RESEARCH PERMIT

THIS IS TO CERTIFY THAT:
*MR. ALFAYOS ELIJAH ONDARA*
of KENYATTA UNIVERSITY, 43844-100
NAIROBI,has been permitted to conduct
research in *All Counties*

on the topic: *RISK MANAGEMENT STRATEGIES AND PERFORMANCE OF CONSTRUCTION FIRMS IN KENYA*

for the period ending:
*13th April,2017*

Permit No : NACOSTI/P/16/73392/9362
Date Of Issue : 13th April,2016
Fee Recieved :Ksh 2,000

.....
*Applicant's Signature*

.....
*Director General*
*National Commission for Science, Technology & Innovation*

CONDITIONS

1. You must report to the County Commissioner and the County Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two(2) hard copies and one(1) soft copy of your final report.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice

REPUBLIC OF KENYA

NACOSTI

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No. A 8611

CONDITIONS: see back page

## APPENDIX 2LETTER OF INTRODUCTION

Mr. Alfayos E. Ondara,
Kenyatta University,
School of Business,
P.O. Box 43844-00100,
Kenya.
Telephone: 0722 291 500
E-mail: ondaraone@yahoo.com

17 August 2018

Dear Sir/Madam,

***Re: Doctorate Research***

I am a postgraduate student undertaking a doctorate degree at Kenyatta University. I am currently doing a study whose theme is to investigate risk management strategies and performance of construction firms in selected counties in Kenya. To this end, I kindly request you to provide the requested information by filling out the attached questionnaire. The information required is purely for academic research purposes only and in no way will your name or that of your institution be implicated in the research findings. Your cooperation and quick response shall be highly appreciated.

Yours respectfully,

Alfayos Ondara

## APPENDIX 3 QUESTIONNAIRE

***The following questionnaire is designed to obtain information regarding risk management strategies in the construction industry ;please fill out the blanks to the best of your knowledge***

### Section A: Contractor bio-data

1. Title of Respondent _____
2. Telephone contact _____
3. For how long have you been in the construction industry? _____ years
4. Gender of the contractor: Male ☐ ; Female ☐
5. Level of education:

   University degree ☐; Diploma ☐; High school ☐; Primary school ☐
6. Age: Below 30 ☐; 31-40 years ☐; 41-50 years ☐; above 50 years ☐

### Section B: Firm Bio-Data

7. Current number of employees.

   ☐ Less than 10 ; ☐ 10-49 ; ☐ 50-249; ☐ 250 and above
8. Please indicate the type of your company from the options below

   State-owned company ( ); Private company ( ); Foreign company ( ); Joint Venture company ( ); Other (please specify): _____

**Section C: Resource RiskManagement Strategies and Firm Performance**

9. By ticking the box in the table, indicate your level of agreement to which the given indicators of resource risk management strategiesinfluence performanceof constructions firms on a scale ranging from "strongly disagree to strongly agree".

Key:

***1=Neither agree nor disagree;2=Strongly disagree;3=Disagree; 4=Agree; 5=Strongly agree***

| **Resource Risk Management Strategies Indicators** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Ensuring an adequate supply of construction materials reduces the risk of cost and time overruns | | | | | |
| Ensuring availability of relevant plant and equipment reduces the risk of time overruns | | | | | |
| Ensuring good quality of construction materials through an efficient supply chain reduces the risk of quality defects | | | | | |
| Ensuring high productivity of plant and equipment reduces the risk of time overruns | | | | | |
| Ensuring optimal ground and site conditions reduces the risk of defects and cost and time overruns | | | | | |
| Fixing material prices through use of forward contracts reduces risk of cost overruns, though reducing price volatilities | | | | | |
| Reducing the risk of financial failure and delays in payments to contractors, reduces the risk of cost overruns | | | | | |
| Use of appropriate technology improves firm performance | | | | | |
| **Others (Indicate and Rank)** | | | | | |
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**Section D: Personnel Risk Management Strategies and Firm Performance**

10. By ticking the box in the table, indicate your level of agreement to which the given indicators of personnel risk management strategies influenceperformance on a scale ranging from "strongly disagree to strongly agree"

Key:

***1=Neither agree nor disagree*;*2=Strongly disagree*;*3=Disagree*; *4=Agree*; *5=Strongly agree***

| **Personnel Risk Management Strategies Indicators** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| A high availability of competent labour lowers the risk of quality non-conformance in construction projects | | | | | |
| Effective supervision of project personnel reduces risk of time overruns | | | | | |
| Formal training of construction workers increases firm performance | | | | | |
| High productivity of personnel reduces the risk of time and cost overruns | | | | | |
| Lack of commitment among project team members increases the risk of quality non-performance | | | | | |
| Poor communication amongst project teamincreases risk of time, cost and quality non-performance | | | | | |
| Proper communication between the project participants reduces risk of time overruns and quality non-conformance | | | | | |
| Proper supervision of construction workforce lowers the risk of quality non-conformance in construction projects | | | | | |
| **Others (Indicate and Rank)** | | | | | |
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**Section E: Project Control Risk Management Strategies and Firm Performance**

11. By ticking the box in the table below, indicate your level of agreement to which the given indicators of project control risk management strategies influence firm performance on a scale ranging from "strongly disagree to strongly agree"

Key:

***1=Neither agree nor disagree*;*2=Strongly disagree*;*3=Disagree*; *4=Agree*; *5=Strongly agree***

| **Project Control Risk Management Indicators** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Adherence to technical specifications improved firm performance | | | | | |
| Continual cost revisions reduced the risk of cost overruns | | | | | |
| Continual schedule revisions reduced the risk of time overruns | | | | | |
| Developing a time-phased budget for each work task reduced the risk of incurring time overruns | | | | | |
| Effective coordination of project activities improved firm performance | | | | | |
| Forecasting cost/schedule performance assisted in ensuring compliance with time and cost requirements | | | | | |
| Monitoring the quality non-conformance report against an agreed quality standard ensured minimal variation from quality specification | | | | | |
| Objectively measuring the actual physical work progress assisted in ensuring timely completion and budgetary compliance | | | | | |
| Reduced design variations improved firm performance | | | | | |
| **Others (indicate and rank)** | | | | | |
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## Section F: Litigation Risk Management Strategies and Firm Performance

This section is intended to determine attitude to alternative dispute resolution mechanisms in out of court settlements

12. By ticking the box in the table, indicate your level of agreement to which the given indicators of litigation risk management strategies influence firm performance on a scale ranging from "strongly disagree to strongly agree"

Key:

***1=Neither agree nor disagree;2=Strongly disagree;3=Disagree; 4=Agree; 5=Strongly agree***

| **Litigation Risk Management Strategies Indicators** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Allocating fair contract risk where risk is fairly distributed among all the parties involved reduced risk of litigation | | | | | |
| Binding arbitration entailing use of legally recognized bodies of industry professionals who are well grounded in the construction value chain and who can provide conflict resolution leadership in the area reduced risk of litigation | | | | | |
| Drafting dispute clauses entailing use of clauses with explicit provisions and instructions for dispute resolution reduced risk of litigation | | | | | |
| Provision of a neutral arbitrator allows for the presence of a neutral entity that provides alternative dispute resolution channels in the event that disputes do indeed arise reduced risk of litigation | | | | | |
| Team building for better cooperation and coordination among the parties&developing a contractual understanding among all stakeholders towards the achievement of common objectives reduced risk of litigation | | | | | |
| Use of contract wording that avoids ambiguity led to improved firm performance | | | | | |
| **Others (indicate and rank)** | | | | | |
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**Section G: Insurance Risk Management Strategies and Firm Performance**

13. By ticking the box in the table, indicate your level of agreement to which the given indicators of insurance risk management strategies influence performance of construction firms on a scale ranging from "Strongly disagree to strongly agree"

Key:

***1=Neither agree nor disagree*;*2=Strongly disagree*;*3=Disagree*; *4=Agree*; *5=Strongly agree***

| **Insurance Risk Management Strategies Indicators** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Experience of a good working relationship improved firm performance | | | | | |
| Favourable policy wording increased firm performance | | | | | |
| High insurance premiums lowered uptake of insurance covers by contractors reducing firms performance | | | | | |
| Lack of re-insurance reduced firm performance | | | | | |
| Poor service quality reduced firm performance | | | | | |
| **Other (please specify and rank)** | | | | | |
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**Section H: Government Policy, Regulatory Framework and Firm Performance**

14. By ticking the box in the table, show your level of agreement on how the below Government policy and regulation of the construction sector indicatorsinfluence performance of construction firms on a scale ranging from "strongly disagree to strongly agree".

Key:

***1=Neither agree nor disagree*;*2=Strongly disagree*;*3=Disagree*; *4=Agree*; *5=Strongly agree***

| **Policy and Regulatory Indicators** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Efficiency of the legal system in dispute resolution improved the performance of the construction firms | | | | | |
| Enabling political environment improved the performance of the construction firms | | | | | |
| High interest rates in the economy reduced the performance of the construction firms | | | | | |
| High levels of informal practices in the industry reduced firm performance | | | | | |
| Low standards of permissible technology used by the industry reduced the performance of the construction firms | | | | | |
| Stringent regulatory requirements for registration and operations reduced performance of construction firms | | | | | |
| **Other (please specify and rank)** | | | | | |
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**Section I: Firm Performance**

15. By ticking the box in the table below, show your level of agreement with regard to how well risk management strategies influences cost variance

Key:

***1=Neither agree nor disagree; 2=Strongly disagree; 3=Disagree; 4=Agree; 5=Strongly agree***

| **Cost Variance** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Risk management strategies reduces price escalation | | | | | |
| Risk management strategies reduces inaccurate costing | | | | | |
| Risk management strategies reduces supplier/contractors defaults | | | | | |
| Risk management strategies improves costs estimation | | | | | |
| **Other (Please Indicate & Rank)** | | | | | |
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16. By ticking the box in the table below, show your level of agreement with regard to how well risk management strategies influence time variance.

Key:

***1=Neither agree nor disagree; 2=Strongly disagree; 3=Disagree; 4=Agree; 5=Strongly agree***

| **Time Variance** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Risk management strategies reduces information delay | | | | | |
| Risk management strategies reduces funding problems | | | | | |
| Risk management strategies improves project management | | | | | |
| Risk management strategies reduces disputes | | | | | |
| **Other (Please Indicate & Rank)** | | | | | |
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17. By ticking the box in the table below, show your level of agreement with regard to how well risk management strategies influence quality control.

Key:

***1=Neither agree nor disagree; 2=Strongly disagree; 3=Disagree; 4=Agree; 5=Strongly agree***

| **Quality Control** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| Risk management strategies improved fit for purpose of the construction end product fitness for purpose | | | | | |
| Risk management strategies increased construction safety | | | | | |
| Risk management strategies increased stakeholder satisfaction with the construction end product | | | | | |
| Risk management strategies reduceddesign variations | | | | | |
| **Other (Please Indicate & Rank)** | | | | | |
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# Thank You for Your Co-Operation