FINANCIAL RISK MANAGEMENT INSTRUMENTS, COMMUNICATION STRATEGY, CONTRACT MANAGEMENT AND PERFORMANCE OF HYDROELECTRIC ENERGY PROJECTS IN KENYA

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DECLARATION

This thesis is my original work and has not been presented for any award in any university

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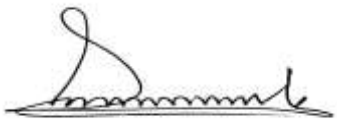
Signature:  Date: 17th May, 2022

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DEDICATION

This thesis is dedicated to my mother, Magret Okuna for her social and inspirational support during this research process.

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LIST OF ABBREVIATIONS AND ACRONYMS

AHP	Analytic Hierarchy Process
ANOVA	Analysis of Variance
ART	Alternative Risk Transfer
CAT bonds	Catastrophic bonds
CDM	Clean Development Mechanism
CERC	Central Electricity Regulatory Commission
Coco	Contingent capital
Cocos	Contingent Capitals
DFI	Development Finance Institutions
EEA	European Environment Agency
EPC	Engineering Procurement and Construction
ERC	Energy Regulatory Commission
EU	European Union
FiT	Feed in Tariff
FPDS	Federal Procurement Data System
GDC	Geothermal Development Company
GDP	Gross Domestic Product
IEA	International Energy Agency
ILW	Industry Loss Warranties
IPP	Independent Power Producer
IRA	Insurance Regulatory Authority
IRENA	International Renewable Energy Agency
KenGen	Kenya Energy Generating Company
KETRACO	Kenya Electricity Transmission Company
KPI	Key Performance Indicator
KPLC	Kenya Power and Lighting Company
LCPDP	Least Cost Power Development Plan
MDB	Medium Development Bank
MOE	Ministry of Energy
NAPCC	National Action Plan on Climate Change
NSE	Nairobi Securities Exchange
OECD	Organization for Economic Co-operation and Development

PDEs	Procuring and Disposing Entities
PPP	Public Private Partnership
R&D	Research and Development
REA	Rural Electrification Authority
REC	Renewable Energy Certificate
RES	Renewable Energy Sources
RPO	Renewable Purchase Obligation
SERC	State Electricity Regulatory Commission
SPSS	Statistical Package for Social Sciences
SREP	Scaling-up Renewable Energy
UK	United Kingdom
USA	United States of America
VFM	Value for Money
WBG	World Bank Group

ABSTRACT

Renewable energy investment has been under exploited in Africa in spite its ability to increase the estimated average regional Growth Domestic Product from the current 4% to more than 10%and Kenya in specific due to investor's negative perception of the regions high investment risk and low creditworthiness which retards the degree of private capital penetration. The purpose of the study was to establish the influence of financial risk management instruments, communication strategy, and contract management on performance of hydroelectric energy projects in Kenya. The objectives of the study were: to establish how Alternative Risk Transfer influence performance of hydroelectric energy projects in Kenya; to examine how Contingent capital influence performance of hydroelectric energy projects in Kenya; to assess how Credit enhancement influence performance of hydroelectric energy projects in Kenya; to determine how Hedging derivatives influence performance of hydroelectric energy projects in Kenya; to examine how Insurance influence performance of hydroelectric energy projects in Kenya; to assess how the combined financial risk management instruments influence performance of hydroelectric energy projects in Kenya; to assess the moderating influence of Communication strategy on the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya; to assess the mediating influence of Contract management on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya. The study was grounded on Prospect theory, Goal-Setting theory, Diffusion of innovation theory, and Agency theory. The study was underpinned on pragmatism paradigm, mixed method approach, descriptive survey and correlational research design. Structured questionnaires and interview guide were used to collect quantitative and qualitative data from a census of 94 participants. Validity test was done on the instruments and a coefficient of 0.775 obtained while reliability coefficient was 0.781. Analysis involved both descriptive statistics of mean and standard deviation and inferential statistics of Correlation and Regression at a significance level of 0.05 with the aid of SPSS version 25 and thematic content analysis of qualitative data for triangulation. Eight hypotheses were tested at $\alpha=0.05$ and the results were: 1. H0: There is no significant relationship between Alternative Risk Transfer and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$; 2. H0: There is no significant relationship between Contingent capital and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$; 3. H0: There is no significant relationship between Credit enhancement and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$; 4. H0: There is no significant relationship between Hedging derivatives and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$; 5. H0: There is no significant relationship between Insurance and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$; 6. H0: There is no significant relationship between the combined financial risk management instruments and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$; 7. H0: Communication strategy does not significantly moderate the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$;and 8. H0: Contract Management does not significantly mediate the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$. Therefore the study concluded that Alternative Risk Transfer, Contingent Capital, Credit Enhancement, Hedging Derivatives and Insurance have a significant influence on performance of hydroelectric energy projects. Equally, the moderating effect of Communication Strategy and mediating effect of Contract Management have a significant influence on the relationship between financial risk management instruments and performance of hydroelectric energy projects. It is recommended that Project management and policy makers should integrate appropriate financial risk management instruments to improve performance of hydroelectric energy projects besides developing targeted policies for strengthening implementation of the financial risk management instruments to boost investors and lenders confidence.

CHAPTER ONE
INTRODUCTION

1.1 Background of the study

Hydroelectric power is a form of renewable energy derived from water while renewable energy is a form of energy derived from constantly replenished natural sources including solar, biofuels, biogases, geothermal, wind, hydropower and wave tides (International Energy Agency, 2016). Hydroelectric power constitutes 17.5% of global electricity, with Norway having 99%, Canada 57%, Switzerland 55%, Sweden 40% and USA 7% (Akan, Selam, Fırat, Kara and Özel, 2015). In 2010 renewable energy indicated fastest growth from 10% to 15% of electric power generation against fossil fuel increase from 3% to 4% on the backdrop of advocacy for environmental sustainability, climate change adaptation and increased energy demand globally (Luis, Sidek, Desaand, and Julien, 2013).

The Organization of Economic Cooperation and Development (OECD) countries have implemented energy efficiency policies including Feed-in tariffs (FiT); Fiscal incentives; Power Purchase Agreements; Production tax credit; Renewable energy certification (REC) and Renewable portfolio standardization (RPS) to reduce market information asymmetry, relax restrictive regulations and facilitate public private partnership (Gómez-Baggethun and Muradian, 2015). United States as a consumer of 19.2% of the global energy has developed remarkable renewable energy policy, the American Recovery and Reinvestment Act (ARRA) 2009 focusing on subsidies, grants, tax reduction and loan guarantees to double renewable energy development and halve the net fossil fuel imports by 2020 (Frisari and Micale, 2015). However, the policy fails to address utilization of financial risk management instruments in de-risking renewable energy projects.

The European Union in 1990 adopted long-term targets of 20% renewable energy use by 2020; 27% by 2030; 80% greenhouse gas emissions reduction levels by 2050 and full dependence on renewable energy by end of 21st century (European Environment Agency, 2016). The supportive policy, the Renewable Energy Directive 2009/28/EC is on track of meeting a renewable energy consumption target of 27% by 2030 supported by strategic FiT, investment grants and tax incentives, quota obligations and financing support as reflected by the increased consumption of 16.7% in 2015 from 9% in 2005 (EEA, 2016). The EU has equally ratified the Paris Agreement aimed at reducing the rising global temperatures to below 2°C and zero by 2060 (EEA, 2017). However, policy gaps in addressing utilization of financial risk management instruments in de-risking renewable energy projects remains a

challenge and this might compromise the achievement of the set targets. Thus, the financial markets must stimulate private investments into the renewable energy projects estimated to cost a massive £1.1tr by bringing into focus the utilization of financial risk management instruments to cushion the investors (Rezec and Scholtens, 2017).

Although China as the world's largest energy consumer accounting for 20% with an expected increase of 60% by 2030 has embarked on policies regarding energy conservation, utilization efficiency and reduction in emission in order to be a global lead frontier in renewable energy capacity installation, little attention has been given to the use of financial risk management instruments in renewable energy projects to demystify private investors' negative perception of the projects (Masato, Candice and Jaewon, 2016). India has shown laxity in harnessing renewable energy despite its high potential of 249,188 MW, as figures show that as of 2014 a paltry 12.95% of the renewable energy potential had been harnessed due to the inability of investor to access securitized funds (Akan *et al.*, 2015).

Although India has enacted regulatory, fiscal incentives and capital subsidies and rebates policies to catalyze renewable energy development, they do not address the inclusion of financial risk management instruments in securitizing renewable energy projects. The policies include: Electricity Act 2003 giving every State Electricity Regulatory Commission (SERC) an autonomy on regulating the minimum power purchase agreement, Central Electricity Regulatory Commission (CERC) setting of preferential tariff besides licensing renewable energy producers; National Electricity Policy 2005, facilitates SERC in setting preferential tariff for renewable energy; National Tariff Policy 2006, requiring SERC to provide competitive bidding of renewable power purchase obligation; Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) 2005, supporting 90% cost subsidy on capital equipment to spur rural electrification; Eleventh Plan 2007–2012, targeting 10% of overall power generated to be renewable energy by 2012 pegged on performance-based incentives; National Action Plan on Climate Change (NAPCC) 2008, promoting development goals with mitigated greenhouse gas emission adaptation besides the ratification of Kyoto Protocol of Clean Development Mechanism (CDM), on renewable energy projects (Akan *et al.,* 2015).

Expanding economic demand has necessitated investment in power infrastructure in Sub-Saharan Africa and this if well implemented, can increase the estimated average regional Growth Domestic Product (GDP) from the current 4% to more than 10% (Rosnes and Vennemo, 2009). However, most of Africa's renewable energy sources are under-exploited

as only 7% of the hydro potential has been harnessed due to financial access constraints and underdeveloped capital markets involved in providing financial risk management instruments to securitize renewable energy (Frisari, Hervè-Mignucci, Micale, and Mazza, 2013).

In Kenya only 9 massive hydropower projects have been done since independence out of the potentially mapped 18 projects (Gitone, 2014) and this is alluded to the investors negative perception of Kenya's high investment risk and low creditworthiness impeding the degree of private capital penetration (Organization of Economic Cooperation and Development, 2013). The general energy generation input in Kenya comprises of 45% hydroelectric; 24% thermal and 31% other renewables (Ministry of Energy, 2015c). Even though the peak load projection is about 15,000 MW by 2030 and the energy sector is expected to gradually increase their installation capacity to 19,200 MW by 2030 to cater for the increased energy demand, the actual implementation of the plan is slow as a paltry 2,150MW of energy had been installed by 2014 (Ministry of Energy, 2015). This capacity growth projection has been further hindered by the existing barriers to renewable energy development including huge sunk capital cost, insufficient data on renewable energy reservoirs, long distances from the grids, constraints in credit access and technical and high resource risk (Gitone, 2014).

As an intervention, Kenya has developed funding plans for renewable energy investments such as Rural Electrification Master Plan; Sessional Paper No. 4, 2004; Energy Act, 2006; Least Cost Power Development Plan (LCPDP); National Climate Change Response Strategy 2010; Draft Energy Bill, 2015; and FiT Policy anchored in Kenya's Vision 2030 for quality, affordable and cost effective energy supply (Hansen, Pedersen and Nygaard, 2015). Further, renewable energy's ability as climate change mitigate is recognized under draft Energy and Petroleum Policy while Part IV of draft Energy bill 2015 promotes renewable energy through FiT System (Ministry of Energy, 2015). Though the draft policy demonstrates government's commitment in increasing renewable energy capacity installation, they do not address the use of financial risk management instruments to securitize renewable energy project.

Additionally, institutional structures have been created under the Ministry of Energy to promote renewable energy development including Kenya Energy Generating Company (KenGen), Geothermal Development Company (GDC), Kenya Electricity Transmission Company (KETRACO), Rural Electrification Authority (REA), Kenya Power and Lighting Company (KPLC), and Energy Regulatory Commission (ERC) (Ministry of Energy, 2015). Equally, initiatives by American government through Power Africa helps in developing

renewable energy by offering finances, technical aid and investment promotion (Gitone, 2014) which in the long run stimulates private investment in renewable energy projects.

In order to increase investment in renewable energy projects that are perceived as risky, financial risk management instruments utilization becomes essential for reducing private capital cost. Despite their effectiveness, financial risk management instruments wide-spread provision has been very limited due to the perceived high transaction cost, reluctance of investors and financial institutions in provision of the instruments and constraints of demand and supply (Frisari and Micale, 2015) as they are only used in Mega infrastructure projects funded by World Bank Group and forming an aggregate 4.5% of largest six multilateral development finance institutions (DFIs) total financing (IEG, 2009). According to Gómez-Baggethun and Muradian (2015), there exists the risk of framing and commoditization of environmental resources which requires the input of institutional investors to assess from a portfolio perspective (tradable assets) the renewable energy projects in relation to financial risk management (Gitone, 2014). However, current adjustments on policies regarding risk mitigation instruments by the WBG such as guarantee products modernization to reduce the cost of transaction and introduce flexibility in their payment is expected to improve their replication potential (Frisari and Micale, 2015). The financial giants' potential can thus be harnessed through securitization of energy project debt into investable assets for benchmarking of their financial performance.

However, the current policies, regulations and strategies do not specifically address utilization of financial risk management instruments in securitizing renewable energy projects to improve their performance in terms of implementation within time, cost and quality. Since renewable energy projects major hindrance to growth is difficulty in access to finance, financial risk management becomes a key element, however minimal attention has been paid to the appropriate mitigate instruments especially in developing countries (Mutua, Waiganjo and Oteyo, 2014).

1.1.1 Performance of Hydroelectric Energy Projects

Hydroelectric energy is a vital economic development tool due to its negligible greenhouse gas emission, low cost of production, adjustability to meet consumer demands, economic performance in terms of revenue flow, low maintenance cost, and positive environmental impact (Luis *et al.,* 2013). A Study by Sibiya, Aigbavboa and Thwala (2015) alluded that achievement of quality, time and cost to capture performance of projects as the fundamental

cornerstones of a successful project is far from the truth and therefore, there is need to further identify the right KPI for specific projects like hydroelectric energy projects which are usually unique for success to be realized. De Waal (2003) defined performance as the organization's ability to accomplish tasks against predefined standards of value, accuracy, time and completeness.

Elbatran, Abdel-Hamed, Yaakob, Ahmed, and Ismail (2015) in their study of hydropower technologies and turbines found that performance of hydro power systems are measured in terms of increase in generating capacity, efficiency of hydroelectric facilities, environmental effects reduction, reduced cost of capital, increased households connection, reduced failure rates and reliable low operation and maintenance cost. Other scholars like Shamshirgaran, Nouzari, Assadi, Najafzadeh, and Bayati (2016) evaluated power plants performance in form of energy efficiency, water efficiency and effluent emission efficiency while Pramangioulis, Atsonios, Nikolopoulos, Rakopoulos, Grammelis, and Kakaras (2019) identified performance indicators for hydroelectric power plant as technical performance, friendly environmental effect, economic performance, cost-effectiveness, efficient operation, quality of supply, social performance, user-friendly and legislative performance. This study defines performance of hydroelectric energy projects as the success in meeting predefined measurable standard objective indicators of quality and affordable electricity supply, project cost reduction, increased generation capacity, implementation time schedule, operational efficiency, customer satisfaction, positive environmental effect and increased profitability.

1.1.2 Financial Risk Management Instruments

Financial risk management instruments are approaches for transferring certain risks away from lenders and sponsors of projects to insuring entities with broader underwriting capacity including (re)insurance, ART, risk financing, contingent capital, hedging derivatives and credit enhancement (Suprapto, Bakker, Mooi and Hertogh, 2016). Financial risk management instruments such as Alternative risk transfer (ART), hedging derivatives, contingent capital, credit enhancement and insurance, if used appropriately, could reduce renewable energy projects' cost as risks will be transferred away from investors and lenders (Suprapto *et al.*, 2016). This study defines financial risk management instruments as approaches to risk mitigation for renewable energy projects and they include alternative risk transfer, contingent capital, hedging derivatives, credit enhancement, and insurance. These are further explained in the subsequent sub-themes:

1.1.2.1 Alternative risk transfer

Alternative Risk Transfer systems originated in the 1950's in USA when organizations began to comprehensively embrace risk management concepts (Doherty, 2000) and exhibited a sustained growth in 1970's through 1990's due to a pattern of insurance capacity crises (Eling and Schnell, 2017). Cummins (2008) defined Alternative risk transfer as the hedging and transfer of risk away from the risk bearer in a similar way to traditional insurance or reinsurance mechanisms using alternatives while Eling and Schnell (2017) defined Alternative risk transfer as the provision of coverage to risk-bearing entities through alternative non-traditional insurance and reinsurance techniques. This study defines ART as the application of alternative non-traditional insurance and reinsurance techniques to offer protection to the risk bearing entities in the capital markets in the form of securitization of risk, risk standardization and non-indemnity trading, and funding risk transfer.

Schanz (1999) postulate that initially companies could easily apply ART products such as captives and risk retention groups to insure their own risks but in 1990's broadened to cover risk transfer and finite insurance and reinsurance with tax deductibility benefits via capital markets (Forent, 2003). The main functions of ART are risk securitization, risk standardization and non-indemnity trading, funding risk transfer and financial reinsurance in various forms (Cummins, 2008). Thus Alternative risk transfer instruments like Reinsurance Sidecars, Industry Loss Warranties (ILW), CAT bonds, Options, futures, and captives can be used to access additional funds in the capital market (Chieh, 2010).

1.1.2.2 Contingent capital

In spite of insurance industry ability to provide risk transfer and protection at affordable price by pooling together individual insurance risks, their capacity may not sustain enormous financial crisis (Vall´ee, 2016) and in such a financial distress that leads to capital adequacy ratio falling below threshold (trigger event), contingent capital comes handy in provision of automatic recapitalization through conversion of the debt instrument to equity (Calomiris and Herring, 2013). Tobias and Christoph (2015) defined contingent capital as a debt instrument which automatically converts into equity in a crisis or upon meeting a predefined trigger while Calomiris and Herring (2013) referred to contingent capital as an off-balance-sheet arrangement through which a company ensures that a given amount of funding is available upon a predefined trigger occurrence, such as, natural disaster or upon reaching threshold price of a raw material. This study defines contingent capital as a debt instrument that auto-

converts into equity upon reaching a trigger condition or during a financial distress thereby keeping down the cost of capital. Even though contingent capital has gained prominence among regulators, market participants still have some doubts due to its nacency and the limited market experience (Vall´ee, 2016; Sundaresan and Wang, 2013), but in the future is expected to gain significance on insurers balance sheet (Tobias and Christoph, 2015). If appropriately utilized, contingent capital can reduce systemic risks and default probability compared to pure debt instrument (McDonald, 2011).

1.1.2.3 Hedging derivatives

Hedging derivatives like Swaps, Forwards, Options and Futures have been used by firms to hedge against systemic risks or market risks such as interest rate risk, currency exchange risk, inflation risk besides commodity risk (Giraldo-Prieto *et al.,* 2017) thereby nourishing the liquidity depth and improves the efficiency of financial markets (Sharpe *et. al.,* 2012). Basha (2013) described hedging derivatives as risk management instruments using underlying assets or bonds or market bench marks such as interest rates to derive their value for example interest rate futures and over-the-counter (OTC) derivatives while Waswa and Wepukhulu (2018) conceived derivatives as any security instruments deriving its value from the value of a different asset for example forwards, futures, options and swaps. This study defines hedging derivatives as contractual agreements on a security deriving its value from the value of a different asset for example forwards, futures, options and swaps.

The origin of derivative instruments dates back to early 17th Century in Dojima Rice Exchange in Japan where commodity derivatives or futures were initially used (Waswa and Wepukhulu, 2018) which was later advanced in 1848 by Chicago Board of Trade (CBT) in USA that established formal hedging contracts as a solution to credit risk (Cheptorus *et al.*, 2017) and expanded to Europe after demutualization and deregulation in the 1980's and 90's. India's Securities and Exchange Board in 2000 endorsed reintroduction of derivatives trading (Vashishtha and Kumar, 2010). In Egypt it can be traced to Alexandria's market cotton futures of 1865 and legalization of cotton forward contracts in 1909 while emerging in Kenya in mid-2000's amongst financial sector stakeholders (Mutende, 2013) though Murage, Murungi and Wanjau (2014) held a contrary observation that it's not yet fully developed. Generally, derivative instruments enhance financial market efficiency through increased liquidity depth (Sharpe *et al.*, 2012).

1.1.2.4 Credit enhancement

Credit enhancement in a PPP project provides stakeholders with a comprehensive risk mitigation in areas such as political risk coverage and cost overrun risk mitigation besides improving project's creditworthiness in pooling resources (Dhruba, 2018). For the past three decades, developing nations and development agencies have made it their agenda to develop credit enhancement products (Dhruba, 2018); However, initial attempts to introduce these systems by lending agencies for subsidized and directed credit failed overwhelmingly (Dhruba, 2018), though currently structures to stimulate market-based systems have become dominant (Chowdhury, Chen and Tiong, 2015).

Chowdhury, Chen and Tiong (2015) defined Credit enhancement as an instrument of risk mitigation used by financial markets to improve their credit profile for a better access to market borrowings while Dhruba (2018) broadened the definition that Credit enhancement is a financial instrument designed to lower repayment risk of debt and security instruments thus improving the credit profile of borrower. This study defines credit enhancement as a financial instrument used to improve credit profile of the borrower, enabling access to the financial market and reducing credit risk of an obligation through its products such as subordinated loan, Credit guarantees, Escrow agreement, Political risk insurance, Public finance stakes/credit support and Co-financing. Credit enhancement strategies when properly designed and implemented can provide a fulcrum for cost effective resource mobilization and leverage besides offering a support for the development of local debt market (Dhruba, 2018).

1.1.2.5 Insurance

Insurance companies as the paramount financial organizations in any surviving economy, underwrites the unwanted risks by the insuring public, thus acting as a financial security tool and economic protection in situations of risks (Soye, Adeyemo and Ayo, 2017). Insurance companies charge premiums for accepting various risk types with the expectation of generating adequate return on capital even after indemnifying the insured upon claim in case of any loss eventuality. Insurance is defined as a mechanism of transferring risk where by individuals or corporate organization shift some life uncertainties to other business enterprises' shoulders and in return pay premiums for the risk transfer (Soye, Adeyemo and Ayo, 2017). Although insurance companies underwrite the risks of the insured companies, mitigating their own risk is a real challenge that requires reinsurance. The reinsurance

decision is a specialized form of risk finance that may further lead to the relaxation of regulatory constraints on capital ratio threshold to insurance companies, improve underwriting capacity, expected bankruptcy costs, and capital management decision (Garven and Tennant, 2003) with the net impact of broader securitization capacity of hydroelectric projects at cheaper cost. Munich Reinsurance America (2010) sees Reinsurance as transaction whereby a reinsurer commits to indemnifying the cedant comprehensively or in part in circumstance of loss against an issued policy while this study defines re-insurance as an agreed upon contract between the cedant company and the reinsurer to indemnify the cedent partially or in part as per the policy document when a loss is incurred thus increasing the underwriting capacity of the cedent company, reduces their cost of capital and ensures distribution of risks.

1.1.3 Communication Strategy

Good communication strategies and plans enable projects to achieve success and should incorporate the media, government, the community and regulatory liaisons with clear processes for internal stakeholders involvement (Chihuri and Pretorius, 2010); thus helping in adopting and utilizing the appropriate instrument for risk management besides precise understanding of the KPI for effective success measurement. Njagi, Mbabazi and Kibachia (2016) defined communication as the creation and sharing of information by parties for mutual understanding and achievement of project objectives thus enabling the reduction of risks associated with cost, time and quality. This study defines communication as the flow of information amongst project parties to minimize information asymmetry risks such as adverse selection, moral hazard and holdup thus improving performance of the project.

1.1.4 Contract management

Contract management practices are a necessity that project stakeholders must adhere to for purposes of achieving project objectives of quality delivery, effective cost of running the project, client satisfaction and completion of projects within scheduled time (Silvana, 2015). Other scholars like Subramaniam and Shaw (2002) postulate that enhanced contract management practice is a panacea for improving the performance of projects and integrating transparency and accountability into the system while in contrast Saxena (2008) argued that contract management is not an end unto itself but should rather focus on the outcomes to be achieved and thus the contract managers should equip themselves with relevant skills. According to Yegon and Mbeche (2018), a contract is a legally binding written agreement between two or more parties to

fulfill agreed upon terms and conditions while contract management is an organized systematic process that ensures the project parties meet their contractual obligations as per contract document for quality achievement, cost reduction and completion within time schedule (Arrowsmith, 2010). This study defines contract management as the effectiveness and efficiency by which project parties accomplish their respective obligations as per the contract agreement for the delivery of quality electricity within time and cost with client satisfaction.

1.2 Statement of the problem

A financial market gap that offers limited range of financial risk management instruments has constrained the financing of renewable energy projects development which are perceived by the investors as highly risky even in the event that the project satisfies the economic feasibility in the long run especially in developing nations like Kenya. This situation is made worse with an ineffective communication strategy regarding financial risk management instruments utilization in de-risking hydroelectric energy projects. Equally, even in the event that financial risk management instruments are availed and an effective communication strategy adopted, the performance of hydroelectric energy projects can still be constrained by improper contract management as an external environmental factor.

However, the financial risk management instruments replication potential has been hindered by the extra access cost and the supply and demand constraints limiting their use to only very large projects, forming an aggregate of 4.5% of total funding by the six largest multilateral DFIs and World Bank Group projects (Green Climate Fund, 2017). According to IRENE (2016) reports, renewable energy development is hindered by investor's negativity in risk perception and a financial market gap that offers limited range of financial instruments hence resulting into high cost of accessing finance for the projects development. The negativity in risk perception of renewable energy projects by the investors is due to information asymmetry created by the credit rating agencies that have always downgraded the projects (Kaminker and Stewart, 2012). Thus, a clear communication strategy and a capital market that supports the provision of financial risk management instruments such as credit enhancement, contingent capital, Alternative risk transfer, hedging derivatives and insurance are critical for pooling securitized funds and mitigation of credit, exchange, interest rate and liquidity risks in renewable energy projects.

Further, Hilscher and Raviv (2011) observed that despite the maturity of derivative markets in hedging financial risks at affordable rates, they may not be capable of containing a serious

financial distress thus requiring the integration with other instruments such as contingent capital, an issue that prompted the current research to ascertain the truth. Equally, Vall´ee (2016) postulate that contingent capital utilization poses conflict between regulators and market participants as regulators have high regards concerning its effectiveness while market participants are skeptical due to its nascence, thus prompting the need for firsthand data to verify the situation. In Kenya, Noor and Abdalla (2014) observed that the use of derivatives for risk mitigation in green energy is unpopular while Cummins (2008) found that securitization of ART instruments forms a small proportion of insurance market's overall capital across the globe, an issue that needs further investigation for results generalization.

If well implemented, renewable energy projects have the potential to spur the GDP of Sub-Saharan Africa from the current average estimate of 4% to more than 10% to meet the ever growing economic demand (OECD, 2013). However, without financial risk management instruments for securitizing renewable energy projects, private capital penetration will remain low leading to underinvestment in such projects as investors perceive developing nations as high risk investment environments with unproductive creditworthiness. Thus, DFIs support in provision of financial risk management instruments for de-risking renewable energy projects and lowering private investment cost becomes handy. A proper communication strategy can address issues of information asymmetry may arise leading to moral hazard, hold up and adverse selection of financial instruments. The study thus helps in formulation of appropriate policies on adoption and implementation of financial risk management instruments besides identifying the appropriate instruments for every risk class in a project.

1.3 Purpose of the study

The study sought to establish the influence of financial risk management instruments on performance of hydroelectric energy projects in Kenya. The study further examined the moderating and mediating influence of communication strategy and contract management on the relationship between financial risk management instruments on performance of hydroelectric energy projects in Kenya.

1.4 Objectives of the study

The study was guided by the following objectives:

i. To establish the extent to which Alternative Risk Transfer influence performance of hydroelectric energy projects in Kenya

ii. To examine how Contingent capital influence performance of hydroelectric energy projects in Kenya

iii. To assess the extent to which Credit enhancement influence performance of hydroelectric energy projects in Kenya

iv. To determine the extent to which Hedging derivatives influence performance of hydroelectric energy projects in Kenya

v. To examine how Insurance influence performance of hydroelectric energy projects in Kenya

vi. To assess the extent to which combined financial risk management instruments influence performance of hydroelectric energy projects in Kenya

vii. To assess the moderating influence of Communication strategy on the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya

vii. To assess the mediating influence of Contract management on the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya

1.5 Research Questions

The study was guided by the following research questions:

i. To what extent does Alternative Risk Transfer influence the performance of hydroelectric energy projects in Kenya?

ii. How does Contingent capital influence performance of hydroelectric energy projects in Kenya?

iii. To what extent does Credit enhancement influence the performance of hydroelectric energy projects in Kenya?

iv. To what extent do Hedging derivatives influence the performance of hydroelectric energy projects in Kenya?

v. How does insurance influence performance of hydroelectric energy projects in Kenya?

vi. To what extent do the combined financial risk management instruments influence performance of hydroelectric energy projects in Kenya?

vii. How does Communication strategy moderate the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya?

viii. How does Contract management mediate the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya?

1.6 Research Hypotheses

In this study the following Null hypotheses were tested:

1. H_0: There is no significant relationship between Alternative Risk Transfer and performance of hydroelectric energy projects in Kenya
2. H_0: There is no significant relationship between Contingent capital and performance of hydroelectric energy projects in Kenya
3. H_0: There is no significant relationship between Credit enhancement and performance of hydroelectric energy projects in Kenya
4. H_0: There is no significant relationship between Hedging derivatives and performance of hydroelectric energy projects in Kenya
5. H_0: There is no significant relationship between Insurance and performance of hydroelectric energy projects in Kenya
6. H_0: There is no significant relationship between the combined financial risk management instruments and performance of hydroelectric energy projects in Kenya
7. H_0: Communication strategy does not significantly moderate the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya
8. H_0: Contract management does not significantly mediate the relationship between financial risk management instruments and performance of hydroelectric energy projects in Kenya

1.7 Significance of the Study

The study aimed at contributing valuable knowledge on financial risk management instruments for securitizing hydroelectric energy projects for efficient access of the capital markets and to suggest appropriate policies for strengthening their implementation to boost investors and lenders confidence. Equally, the study expounded on efficient communication strategy for diffusion of information concerning the capabilities of financial risk management instruments besides giving insights into appropriate KPI of hydroelectric energy projects. Further, the study came up with and suggested efficient contract management practices which meet project stakeholder needs, ensures quality delivery within time and cost with minimal risks. The study also provides a reference to other researchers and policy developers on information concerning financial risk management instruments utilization for optimal performance of hydroelectric energy projects. The study anticipates that if risks are not properly managed with appropriate instruments through proper communication strategies and efficient contract management, then the delivery of bankable hydroelectric energy projects remains a pipe dream as risks like cost and time overrun, substandard quality products, incomplete projects, lost revenue and damage

claims may overshadow the project. This study thus helps in formulation of appropriate policies on adoption and implementation of innovative financial risk management instruments in hydroelectric energy projects.

1.8 Basic Assumptions of the Study

The study assumed that respondents within hydroelectric energy projects delivered honest opinion and true information that guided the study concerning financial risk management instruments, communication strategy, contract management and performance of hydroelectric energy projects. The study equally assumed that the study findings could be used for generalization for hydroelectric energy projects.

1.9 Limitations of the study

This study had limited local precedence to be used to compare findings, however, results from previous studies from other developing economies were used to compare the current study findings and for purposes of generalization. The study was conducted during health pandemic of COVID-19 making the activities to be expensive and time consuming; however, efficient cooperation between the ministry of health in issuing COVID-Certificate for clearance by the research parties, adherence to COVID-19 rules by research assistants during data collection and complete digitization of research process by the University of Nairobi enhanced the undertakings.

1.10 Delimitation of the study

The study area covered the entire 12 hydroelectric energy projects implemented by Kenya Energy Generating Company (KenGen) and Independent Power Producers (IPPs) as shown in Table 3.1 and distributed across the country covering Central, Nyanza, Western, Eastern and Rift Valley regions where the projects are complete and operational with connection to the national grid. The selection of different hydroelectric energy projects ensured accommodation of diversity, wider scope of coverage and proper representation which conformed to arguments by Kombo and Tromp (2006). The project sites included Tana, Masinga, Kamburu, Gitaru, Kindaruma, Kiambere, Turkwel, Sondu, Sang'oro, Imenti Tea Factory, Gikira small hydro and Regen-Teremi as shown in appendix 4. The availability of operational hydroelectric energy projects connected to the national grid in the regions and utilization of financial risk management instruments informed their choice. The study respondents were restricted to project managers, finance managers, communication managers, quality assurance managers, hydroelectric plant technicians, hydroelectric operators, and hydroelectric engineers only as

they were privileged to the privy of relevant management information and requisite exposure and experience concerning the utilization of financial risk management instruments, the existing communication strategies, the system of contract management and the performance of hydroelectric energy projects.

1.11 Definition of Significant Terms used in the Study

The following terms bore the stated meanings for purposes of this study:

Financial risk management instruments: Approaches to risk mitigation such as alternative risk transfer, contingent capital, hedging derivatives, insurance and credit enhancement used to transfer systemic and market risks to entities better suited to handle them in a financial transaction hence reducing the risk burden on sponsors and lenders.

Credit enhancement: A financial security guarantee used by investors to secure funding in a financial market by improving the project's credit rating, attracting financial pool, enhancing debt amortization rate and reducing borrowing cost of an obligation.

Alternative risk transfer: A financial instrument that uses techniques such as securitization of risk, standardization and trading of risk in the form of non-indemnity, and funding risk transfer in innovative ways other than the traditional insurance and reinsurance to provide protection to risk bearing entities in capital markets.

Contingent capital: A financial debt instrument that auto-converts into equity upon meeting a trigger threshold of either a catastrophe or financial distress condition thereby enabling moral hazard reduction, capital reserve balance; financial distress cost reduction and harmonized debt amortization of the project.

Hedging derivatives: A financial instrument involving a contractual agreement on a security deriving its value from the value of a different asset for market risk reduction, cheaper capital and liquidity flow improvement in projects

Insurance: A financial instrument involving the transfer of risks by projects to other business enterprises' shoulders for indemnification in case of loss sustained under a policy and in return pay premiums for the risk transfer.

Communication strategy: A mechanism of sharing information between project parties to realize project objectives of minimizing risk and improving performance by observing standards of communication flow structure, channels, management tools, and information quality

Contract management: A process of ensuring project parties in a contract effectively and efficiently accomplishes their respective obligations for delivery of project objectives with standard quality, within cost and time and client satisfaction as per the agreement statement.

Performance of hydroelectric energy projects: The success in meeting predefined measurable standard objective indicators of quality electricity supply, production cost reduction, increased generation capacity and profitability, implementation within time, operational efficiency, customer satisfaction, and environmental safety.

1.12 Organization of the study

The study was organized into five chapters. Chapter one introduced the study by detailing its background, statement of the problem, purpose, research objectives, research questions and research hypothesis, significance of the study, basic assumptions, limitations, delimitations, definition of significant terms used in the study and organization of the study. Chapter two contained the reviewed empirical literature starting with introduction, Alternative Risk Transfer and performance of hydroelectric energy projects, Contingent capital and performance of hydroelectric energy projects, Credit enhancement and performance of hydroelectric energy projects, Hedging derivatives and performance of hydroelectric energy projects, Insurance and performance of hydroelectric energy projects, communication strategy and performance of hydroelectric energy projects, contract management and performance of hydroelectric energy projects, theoretical and conceptual frameworks and summary of reviewed literature with identified gaps. Chapter three presented research methodology, research paradigm and research design, target population, sample size and sampling procedure, data collection instruments, pilot testing, validity and reliability of instruments, data collection procedure, data analysis techniques, ethical considerations and operationalization of the variables. Chapter four entails data analysis, presentation, interpretation and discussion of the study results under themes in line with the study objectives. Chapter five contain summary of the findings, conclusions and recommendations for policy action, contribution to the body of knowledge and suggestion for further research.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This Chapter reviewed scholarly empirical and theoretical literature in accordance to the variables under study. The themes used for review included: Performance of hydroelectric energy projects; Alternative risk transfer and performance of hydroelectric energy projects; Contingent capital and performance of hydroelectric energy projects; Credit enhancement and performance of hydroelectric energy projects; Hedging derivatives and performance of hydroelectric energy projects; Insurance and performance of hydroelectric energy projects; Communication strategy and performance of hydroelectric energy projects; and Contract management and performance of hydroelectric energy projects. The section also reviewed the theoretical and conceptual frameworks, the summary of reviewed literature and knowledge gaps.

2.2 Performance of Hydroelectric Energy Projects

An assumption that a successful project is only architect on achieving time schedule, cost budget and quality production "iron triangle", is far from the truth as there are other significant measures such as user satisfaction, safety conditions and efficiency factors that needs further scrutiny (Sibiya, Aigbavboa and Thwala, 2015). The precision of performance indicators a project is necessary to limit chances of ambiguity while achieving the project objectives (Ofori-Kuragu, Baiden and Badu, 2016). Therefore there is need to identify the right KPI for success to be realized in hydroelectric energy projects. A study by Pramangioulis *et al.,* (2019) in Europe through desk review identified performance indicators for hydroelectric plant as technical performance, friendly environmental effect, economic performance, cost-effectiveness, efficient operation and electricity supply, quality of supply, social performance, user-friendly and legislative performance while Elbatran *et al.,* (2015) in their desk review study of hydropower technologies and turbines found that performance of hydro power systems are measured in terms of increased electricity generation capacity, efficiency of hydroelectric facilities, environmental safety, reduced cost of capital, increased households connection, reduced failure rates and low operation and maintenance cost.

An empirical study in the construction Industry by Sibiya, Aigbavboa and Thwala (2015) explored the significant KPI in South Africa's construction projects through quantitative survey design and data collected using Likert scale questionnaire amongst professionals including quantity surveyors, engineers, project managers and architects while analysis was descriptive involving measures of standard-deviation and mean to rank the KPIs. Findings

revealed that construction time, profitability, competitive procurement, risk management, quality assurance, safety, client satisfaction, productivity, project management and time predictability are the most significant KPIs in a construction project. Though the KPIs were identified their number was big creating redundancy in measurement of success for instance construction time and time predictability can be merged into time schedule as an indicator while project management can be domiciled under productivity; and effective procurement handling and management can be merged into effective procurement factor thus reducing the indicators from eleven to eight indicators as postulated by Ofori-Kuragu, Baiden and Badu (2016).

Another study by Ofori-Kuragu, Baiden and Badu (2016) to establish the common KPIs for Ghanaian contractors adopted pragmatism philosophy to conduct a mixed method survey and collecting data through questionnaire and expert interview from a census of 139 contractors while analysis was done through descriptive technique of percentage ranking. The study observed that a set of nine (9) KPIs are being applied by Ghanaian contractors including cost, quality, time, client satisfaction, safety, profitability, productivity, social friendliness, which were not only precise but equally measurable for successful project implementation. Locally, Waweru and Rambo (2017) investigated determinants of effective hydroelectric power production in Kindaruma Power Station project, in Machakos County, Kenya through descriptive survey design with questionnaire and interview schedule to collect data from a census of 36 respondents while analysis involved descriptive and inferential statistics. Findings revealed that technological upgrade, human resource competency, financial support and management support significantly influence the effectiveness of hydroelectric power generation in terms of profitability, increased power supply, improved customer satisfaction and increased household connectivity. The study was comprehensive in methodology with findings answering to the objectives within a local context which provides an impetus to the current study. However, the sample size was small but current study intends to use 94 respondents to improve results generalizability.

Despite previous studies precision and convergence in the measurement of performance in hydroelectric power projects in terms of quality electricity supply, project cost reduction, increased generation capacity or scope, adherence to implementation time schedule, operational efficiency, customer satisfaction, environmental safety and increased profitability (Pramangioulis *et al.*, 2019; Waweru and Rambo, 2017; and Elbatran *et al.*, 2015), none

focused on how the performance of hydroelectric energy projects can be influenced by financial risk management instruments, a gap to be filled by the current study through descriptive survey design and descriptive and inferential statistical analysis.

2.3 Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

Insurers have over the years used Alternative Risk Transfer (ART) products such as Catastrophic bonds, options, CAT futures, and Industry Loss Warranties (ILW) to access additional capitals and to directly transfer parts of their risk exposure to the capital markets thereby absorbing the resulting losses in cases of mega catastrophe while for the investors ART forms a different asset class for enhancing returns while controlling the portfolio variance (Sibindi, 2015).

A study by Bouriaux and MacMinn (2009) through a desk review assessed the development of insurance securitization and the growth potential of insurance-linked securities (ILS) and derivatives in USA catastrophe (CAT) – linked capital markets besides the critical regulatory and technical issues on securitization market growth. Findings indicated that despite the ILS nascence and negative impact of 2007/08 financial crisis in the capital markets the future of ILS market, especially CAT bond remained robust while in 2006 and 2007 before the financial crisis CAT bonds performance were record-breaking both in the secondary and primary markets. Further, the utilization of parametric, hybrid triggers and index have significantly increased resulting into enhanced market standardization and trading while in contrast the exchange –traded derivatives future remains uncertain due to lack of contract standardization, basis risk and low volume in the cash market for catastrophe risk (Bouriaux and MacMinn, 2009). Though the study was comprehensive it failed to address the technical and regulatory issues influencing the market growth of insurance linked securitization.

A similar study was conducted by Cummins (2008) on use of risk linked securities by (re)insurance companies to source risk capital in USA through desk review and findings showed that risk-linked securities enables the selling of insurance risk to capital market to raise funds for insurers and reinsurance for settlement of claims when mega catastrophes occur or loss event with CAT bond being the most significant in use. However, in comparison to the overall nonlife reinsurance market the CAT bond market is smaller but hold significance compared to property catastrophe reinsurance market. Analysis of industry expert's observation further showed that non-traditional risk financing instruments like risk swaps, CAT bonds, ILWs and sidecars constitute more than 50% of property-catastrophe

retrocession market (Cummins, 2008). The findings by Cummins (2008) and (Bouriaux and MacMinn, 2009) concur that risk-linked securities are suitable instruments in risk mitigation, thus, if properly utilized can improve project performance.

Further, Chieh (2010) developed a simulation catastrophic risk model to analyze hybrid-trigger CAT bonds on risk reduction and moral hazard; to examine effect of pari-mutuel mechanism on hedging risk-averse investors against catastrophic losses and to examine the effect of climate change and associated uncertainties. Findings showed that both basis risk and moral hazard can simultaneously be reduced by hybrid-trigger CAT bonds while pari-mutuel mechanism hedges risk-averse investors against losses due to catastrophes, for instance, without transaction charges and taxation, pari-mutuel insurance intrinsically results into underinsurance of participants as a result of basis risk but pari-mutuel insurance does not guarantee the underlying risk borne by the issuer (Chieh, 2010). The success of the simulation hybrid CAT bond model provides evidence that alternative risk transfer instruments can actually mitigate risks by transferring them away from lenders and sponsors of a project company to the capital markets and as such the model should be put into practice.

In the African context representing the developing economies, Sibindi (2015) in a comparative study analyzed the motivation and nature of ART products utilization and efficacy in Zimbabwe and South Africa and found that the ART market development in Zimbabwe is still nascent while the ART segment in south Africa is fully developed with functional products like captives, finite insurance, insurance derivatives, enterprise wide risk management, Multiyear-Multiline Products (MMPs) covers while insurance linked securitization (ILS) and contingent capital were not used in both countries, indicating inadequacy of financial risk management instruments integration in capital markets of African countries and developing economies in general. To achieve the above finding, the study adopted longitudinal descriptive survey to concurrently collect both quantitative and qualitative data via questionnaire and interview from a sample 28 participants selected through stratified and judgmental sampling out of a target population of 253 short-term insurance players while analysis was done through descriptive statistics. The small sample size used out of a large target population compromises distribution normalcy and results generalization as postulated by Mugenda and Mugenda (2003). The key drivers of south Africa's ART segment include cost dynamics, corporate and brokers demand pressure, integrated financial market, competitive advantage gains and change in insurance cycles while in Zimbabwe it’s due to

insurance cycle or macro/micro-economic difficult environments.

Scholarly research has equally been furthered in ART utilization in renewable energy projects development as documented by Wing and Jin (2015). Wing and Jin (2015) through a desk review sought to establish risk management mechanisms in renewable energy projects to provide stakeholders like lenders, sponsors, policy makers and providers of risk management instruments with a better understanding and attraction of future investment. Findings showed that Catastrophe bonds enables the transfer of operational risk to bond investors thereby enabling renewable energy developers to secure low cost capital in the financial market which conquers with Chieh (2010) observation. Wing and Jin (2015) further argued that a comprehensive operational risk management model can mitigate operation risk while liquidity risk can be reduced through pooled funds, monitored revenue flow, debt financing and effective liquidity risk management model. The scarcity of literature linking the utilization of ART on performance of hydroelectric energy projects is a gap which the current study will bridge.

In general, developed nations have integrated alternative risk transfer instruments into their capital markets unlike in the developing economies like South Africa that only utilize a small proportion of the ART instruments while in Kenya their utilization has not been documented as per the reviewed empirical literature. Though the methodologies mostly involve desk review (Wing and Jin, 2015; Bouriaux and MacMinn, 2009; and Cummins, 2008) and simulation models (Chieh, 2010), a real life test of the ARTs influence on performance of hydroelectric energy projects would be appropriate as will be done by the study.

2.4 Contingent Capital and Performance of Hydroelectric Energy Projects

Contingent capital provides banks with strong and efficient recapitalization incentives when they experience significant equity loss or upon reaching a trigger threshold (Calomiris and Herring, 2013). CoCos can equally be used by regulated banks as risk governance tools for limiting regulatory forbearance and supervisors' reluctance to recognize losses (Vall´ee, 2016). For effectiveness, CoCos have to be relatively larger in quantity in comparison to common equity; conversion pricing should be based on moving average market value to equity ratio; all Contingent capital must convert upon trigger; and the conversion ratio has to be dilutive of equity holders' pre-existing value (Tobias and Christoph, 2015). Regulatory objectives for CoCo requirements differs and can range from signaling of bank risk, ensuring that banks that suffer significant losses voluntarily and timely offer equity into the market and

facilitation of bail-ins (Sundaresan and Wang, 2013).

Tobias and Christoph (2015) assessed CoCo bonds conversion price effects on equity holders' incentives by formulating three hypothetical statements: contingent capital instruments' contract design benefits equity holders through increased bank assets riskiness at contingent bond owners expense; the contract design is reflected by contingent capital instruments prices; and CoCos being a proportion of equity holders capital structure provides an avenue for increasing the riskiness of their assets. The study adopted a theoretical model of Duffie-Lando type and used descriptive techniques and inferential techniques of correlation and regression to analyze first and second hypothesis using panel data of contingent capital issued by three major banks from 2009-2013. Findings showed that CoCo bonds have a magnitude five times greater compared to straight bonds thus banks equity holders can use it to create perverse incentives. By exclusively using regulatory triggers holders' of CoCo bonds transfer wealth to equity holders upon conversion, thus, living the equity holders with the discretion and incentive of increasing asset riskiness "asset substitution" and equally the disincentive of raising fresh equity in a financial distress "debt overhung". This is a strong indicator of how contingent capital can help reduce liquidity risk in a project.

A simulation model design of a convertible contingent debt requirement for solving the "Too-big-to-fail problem" was developed by Calomiris and Herring (2013) with secondary data from European big banks and findings showed that CoCos can ensure provision of adequate lower cost capital relative to risk compared to contemporary equity requirement besides maintaining a threshold minimum standard of book value of equity-ratio requirement, hence effectively solving the too-big-to-fail problem. Contrary to literature claims by banking and finance scholars that CoCos usually suffer multiple equilibrium, the simulation demonstrated otherwise. The simulation findings assert the observation held by Tobias and Christoph (2015) but its real life application would make more sense.

On the same note, Sundaresan and Wang (2013) evaluated a market triggered contingent capital design by adopting analytical approach of default structural models drawn from Merton (1974) and Black and Cox (1976) models that incorporate default-risky subordinated and senior debt security and facilitating stochastic analysis of bank's asset value with jumps. Findings showed that market triggered contingent capital does not give a competitive equilibrium to direct stakeholders when they have no choice for optimal conversion policies, unless at conversion the value transfer is not expected ex ante. Lack of equilibrium creates

multiplicity with a potential of uncertainty in price, manipulation of the market, inefficiency in capital allocation besides frequent conversion errors while on the other hand lack of value transfer restriction acts as a regulatory control tool that penalizes rogue bank managers for taking excessive risk (Sundaresan and Wang, 2013). Holders of Contingent Capital and equity holders motive is inverse hence may result into market manipulation thus distorting equity prices when approaching trigger point. The pricing problem is a regulatory challenge to the regulators in that a good intended regulation can interfere with markets leading to uncertainties and markets can constrain the regulation's function to be ineffective (Sundaresan and Wang, 2013). To contain the equilibrium problem, market triggered contingent capital should be handled cautiously as a regulatory tool.

Further, Vall´ee (2016) through desk review explored the effects of triggering contingent capital instrument as a form of liability management exercise and found that subordinated debt bond investors experienced significant losses due to the massive implementation of liability management exercises by the financial institutions following the 2007/08 financial distress. For higher economic performance, liability management exercises are important as they preserve the lending activity from their own users thereby robustly controlling seasonal equity offering and government bail-outs. Observations also showed that contingent capital offers cheaper recapitalization costs compared to ordinary equity offerings, hence limiting the cost of financial distress (Vall´ee, 2016). These findings further strengthens simulation results of Sundaresan and Wang (2013) and Calomiris and Herring (2013) that contingent capital can reduce financial distress by injecting liquidity to the project hence reducing risks and improving performance of renewable energy projects.

Similarly, Shang (2013) through desk review explored the contingent capital market, its key features, pricing and valuation tools and its insurance industry application. Findings indicated that contingent capital increases loss absorption capacity "risk tolerance" and lowers cost of capital compared to subordinated debt instrument and equity respectively. Though contingent capital has received significant acceptance amongst regulators its success still remains in doubt since designing appropriate trigger without multiple equilibrium

is a tall order as a slight change can lead to a huge impact on its effectiveness of reducing default chances and; the rational and irrational behavior of stakeholders in relation to the trigger threshold needs closer observation as this may further drag down the issuer near conversion instead of helping stay above as intended thus creating complexity and

uncertainty in valuation, risk assessment and pricing of contingent capital (Shang, 2013). The models for contingent capital analysis are heavily data driven and thus not very useful before a liquid market emerges because setting of a fair price are more of artistic than mathematical challenge and therefore the models should be tested in real life projects to gauge their viability in reducing systemic risks and default risk leveraging investors from incurring huge additional cost of capital. Achieving this would require application of pragmatism approach as the area remains grey. At no point has research linked contingent capital utilization and performance of hydroelectric energy projects, an issue that this research intends to investigate. More so, contingent capital seems to have been acknowledged in mature financial markets as financial risks mitigate but not in developing financial markets like that of Kenya (Vall´ee, 2016; Sundaresan and Wang, 2013).

2.5 Credit Enhancement and Performance of Hydroelectric Energy Projects

Credit enhancement in the global financial market has been instrumental in strengthening the credit profile of participants to fulfill financial obligations at a cheaper cost thereby reducing the demand pressure on the banking system (Dhruba, 2018; Chowdhury, Chen and Tiong, 2015). Credit rating of the credit enhancement products is the surest way of making them tradable in the capital markets as it provides market signal for placement, bond pricing and access to bank financing (Dhruba, 2018; IRENE, 2016). However, renewable energy projects have suffered a setback due to low credit ratings due to technology risk, insufficient track record, policy uncertainties, and long gestation period resulting into under investment effects, thus credit rating of renewable energy projects should integrate economic and green characteristics (Clean Bonds Initiative, 2017). For instance, due to the high degree volatility and underperformance of wind energy projects, S&P and Fitch lowered ratings from BB to B, with a negative outlook (Kaminker *et al.*, 2013).

However in developed nations with high sovereign ratings the credit ratings have improved unlike in developing countries with weaker sovereign rating and higher degree of political risk, hence limiting access to institutional finance as postulated by Inderst and Stewart (2014) that concerns about political economy in developing countries can increase borrowing cost by 2% to 6%. In contrast, Dhruba (2018) argued that rating agencies tends to overstate renewable energy projects credit risk by failing to incorporate positive green factors towards achievement of sustainability into the rating system. The recent launching of green bonds assessment and evaluation products offering a standardized evaluation framework by Moody

and Standard & Poor respectively has come as an intervention (IRENE, 2016). The inclusion of green factors "positive externality factors" into renewable energy projects credit ratings can reduce credit risk in the log-run and this will give confidence to institutional investors and commercial banks to inject finances into renewable energy projects thereby correcting the credit market failure or lowers the interest rates charged on borrowings for the projects (Clean Bonds Initiative, 2017; Yoshino and Taghizadeh-Hesary, 2015).

A study by Chowdhury, Chen and Tiong (2015) sought to establish credit enhancement factors in Independent Power Producers (IPP) projects and how they can minimize risks through descriptive survey design and questionnaire used for collecting data from a sample of 120 participants in Asian countries of China, India, Thailand, Pakistan, Indonesia, Philippine and Bangladesh while analysis involved descriptive technique and factor analysis. Findings indicated that credit enhancement provided by the host government and MDBs have positive significant influence on IPP project structure and risk management by increasing the project parties' creditworthiness to access cheaper capital in the capital markets. The comparative cross-country research on the influence of credit enhancement products offered a better understanding of results generalization as postulated by Kothari (2004).

Another research done in India by Atal, Shrimali, and Singh (2018) sought to lay out a credit enhancement payment support mechanism for single Distribution Company (DISCOM) off-takers through desk review of quantitative data and analysis done through Z-score and regression analysis. Findings showed that counterparty risk was the most significant due to delays and defaults in fulfilling contractual obligations by the state own institution to power producers resulting into additional 1.07% risk premium cost of debt in renewable energy projects besides limiting capital access. However, short-term solutions such as guarantee mechanisms or Payment Security Mechanisms can indirectly mitigate counterparty risk for sponsors and banks thereby reducing the cost of borrowings or increasing access to finance due to improved investment grading status (Atal, Shrimali and Singh, 2018). Improvement in investment grading of projects can attract both foreign and domestic investors who traditionally shy away owing to their low risk tolerance.

In a similar vein, Dhruba (2018) focused his study on the implications of credit rating for credit risk assessment of renewable energy projects through a desk review and found that higher credit rating reduces capital cost for development of renewable energy projects besides mitigating credit risk. Even though credit enhancement products have been used extensively

in the global financial markets, their application to renewable energy sector has experienced challenges which have made access to affordable financing a nightmare for such projects. Common credit enhancement products in the global market include: credit guarantees, public finance stake, payment security mechanisms, insurance products, bonds, loans, receivables and swaps which aids in improving participants' credit worthiness in a financial transaction and attracting new financing sources.

Concerning renewable energy projects in Europe, Kidney, Giuliani and Sonerud (2017) through a desk review sough to analyze mechanisms of stimulating private market development in green energy securitization and found that securitization as a financial instrument is suitable for addressing challenges of small and fragmented renewable energy projects as entire reliance on the developers' balance sheet, utilities, public entities and banks for such investments is not cost-effective to meet an estimated €5.7 trillion required annually for low-carbon investment globally. Further, Kidney, Giuliani and Sonerud (2017) argued that to stimulate the growth of green securitization markets a number of interventions should be put into place including: standardization of green assets for renewable energy projects portfolio support, developing standardized green loan contracts, Initiating financial warehousing of standardized green loans, providing credit enhancement to support demand, and incorporate environmental factors into risk weightings through targeted policy framework. If these interventions are appropriately implemented then performance of energy projects will be improved through lower interest rates on loans.

Focusing on risk management, Frisari and Micale (2015) through a desk review investigated the risk management instruments in renewable energy projects in developing economies with focus in 250MW Bujagali Hydroelectric project in Uganda and found that public financial institutions have been instrumental in provision of risk management instruments which have led into high mobilization of private funding due to reduction in credit and debt repayment risks with lowed cost of borrowings to develop renewable energy projects. However, these instruments like partial risk guarantees and political risk insurance offered by Multilateral Investment Agencies respectively remains underutilized in renewable energy projects (Frisari and Micale, 2015).

Based on the reviewed literature credit enhancement has a positive significant influence on performance of renewable energy projects as it improves investors' credit profile thereby reducing the cost of debt capital besides provision of finance pool and acting as umbrellas for

political risks thus managing default risks ex ante. Empirical literature about credit enhancement utilization in renewable energy projects in Kenya remain scarce and further research in the area would yield better understanding of the phenomenon.

2.6 Hedging Derivatives and Performance of Hydroelectric Energy Projects

Hedging derivatives are important financial risk management instrument that can be used in a project to prevent losses and maintain high returns (Basha, 2013). However, scholars like Giraldo-Prieto, Uribe, Bermejo and Herrera (2017) believe that the instruments themselves carry with them certain risks such as counterparty risk and legal risk which may make the contract enforceable when it's required to perform and thus adequate understanding and supervision of derivatives transaction should be done with maximum accuracy. A study by Giraldo-Prieto *et al.,* (2017) sought to establish the influence of derivatives utilization on the value of Colombian companies through descriptive survey design and questionnaire used for collecting data from a sample size of 975 respondents drawn from 39 listed firms listed in stock market in Colombia since 2008-2014 while analysis involved regression technique. Findings showed that derivatives use has a significant positive influence on company's market value in terms of profitability, market recapitalization and leverage while companies engaging in foreign trade and using derivatives had a significant positive market value and leverage than those that do not hedge using derivatives. The findings implied that derivative instruments can help hedge most of currency and foreign exchange risks amongst the foreign companies besides the internal risk mitigation. The use of a large sample size improves generalization precision as postulated by Mugenda and Mugenda (2003).

In Sri Lanka, Fernando, Hosseini, Zavadskas, Perera and Rameezdeen (2017) sought to establish the influence of hedging techniques in managing financial risks of contractor's in construction projects through descriptive survey design and questionnaire and interview schedule used for collecting data from a sample size of 33 participants while analysis involved Analytical Hierarchy Process (AHP) methodology. Findings indicated that forward contract was used to hedge price risk that happened to be dominant amongst contractors. However, the use of a sample size reduces the significance of results generalizability as portended by Kothari (2003). In another study, Basha (2013) investigated derivatives effectiveness in managing financial risk in the energy industry in India by adopting desk review and found that commonly used derivatives in mitigating currency exchange and interest rate risks are forwards, futures, options and swaps; hence it shows that the Indian

financial market is highly developed to protect highly risky projects against systemic risks. A contrary opinion was precluded that derivatives themselves contain risks like counterparty risk and legal risk of a party lacking capacity to perform, hence rendering the contract to be enforceable, which necessitates proper understanding on derivatives transaction supervision.

In Kenya, Waswa and Wepukhulu (2018) examined the effect of the utilization of derivative instruments on performance of NSE listed non-financial companies through descriptive survey design and questionnaire used for data collection from a sample size of 11 non-financial companies out of a census of 47 with annual audited financial reports used to gather secondary data in the period 2013-2017 while analysis involved both descriptive and inferential techniques of regression, correlation and ANOVA. Findings showed a positive relationship between derivative usage and financial performance of NSE listed non-financial companies while the usage varied with forwards representing 66.7%, swaps 22.22% and options and futures 11.11% in order to mitigate financial risks. The application of inferential analysis techniques of ANOVA, Regression and correlation gives an impetus to the generalization of the findings as relationships can be drawn from the samples to the population (Waswa and Wepukhulu, 2018; Giraldo-Prieto *et al.,* 2017). However, these studies did not link to renewable energy projects thus prompting further research to provide project context understanding away from the conventional cooperate world.

Away from the cooperate world, Bhattacharya, Gupta, Kar and Owusu (2015) investigated weather derivatives as risk hedging strategies in renewable energy projects in USA through a simulation model from past data and analysis done using Kurtosis and regression methods. Findings showed that weather derivatives have a positive significant relationship on demand and supply risk mitigation in renewable energy projects in circumstance of variations of weather conditions. In specific, power options hedge quantity risks resulting from competitive wholesale electricity market; fixed price load servicing entities risk can be hedged using Value-at-risk (VaR) hedging policy; and an optimal static hedging policy can be used to hedge against volumetric and price risks, while decentralized hedging policy optimizes the cost of consumer electricity procurement. Thus, weather derivatives, "Heating Degree Days/Cooling Degree Days" (HDD/CDD contracts) on temperature, average daily electrical load demand location and radiation can be used as financial derivative instruments to develop a hedging strategy with weather related risk factor (Bhattacharya *et al.,* 2015). Bhattacharya *et al.,* (2015) study provides an impetus into the utilization of weather

derivatives in hedging demand and supply risks which usually increases the cost of renewable energy projects but this is practiced only in developed economies that have commoditized renewable energy products into investable units while the developing nations have not, a situation that prompts this study to ascertain the truth.

2.7 Insurance and Performance of Hydroelectric Energy Projects

Insurance companies as the paramount financial organizations in any surviving economy, have the prime business function of accepting and underwriting unwanted risk on insuring public's behalf at a premium (Soye, Adeyemo and Ayo, 2017). To underwrite their own financial risk resulting from market imperfection and increase the risk acceptance capacity, insurance companies have to be reinsured (Swiss Reinsurance Company, 2002). Reinsurance enable primary insurance companies with underwriting assistance and technical aid in new business lines (Patrik, 2001); increasing underwriting capacity of the cedant (Obonyo, 2016); reducing financial distress in the phase of rapid premium growth on the cedant's surplus; facilitating stabilization of insurance companies by smoothening overall operating results created by socio-economic and natural factors annually; acting as a marketing tool through insurance companies expanded capacity to accommodate more risks (Swiss, 2002); provides a buffer for catastrophe control which require huge sums of money for indemnification (International Association of Insurance Supervisors, 2012) and reduces high premium loads usually paid to compensate the insurer's bankruptcy cost resulting from large policies in absence of reinsurance (Outreville, 2002) besides acting as a specialized form of risk finance with the capability to substitute the regulatory constraint on the insurance's capital ratio (Lee and Lee, 2012). These findings converge to the fact that reinsurance significantly leads to risk diversification among policy holders such as renewable energy investors hence leading to reduced cost of project capital. However, Choi and Elyasiani (2011) held a divergent opinion that views reinsurance as negatively related to ceding companies revenue flow since they will be sharing the would be sole profits of the cedant, thus drawing down their operational cost of revenue which cascades into higher charges of insurance premiums (Adebowale and Adebayo, 2018).

In the context of renewable energy projects, Gatzert and Kosub (2015) and Swenja (2013) studies standout. Gatzert and Kosub (2015) through desk review sought to establish the current risks and mitigate for offshore and onshore renewable wind energy projects in European market. Results revealed that technical risks are comprehensively covered by

modern insurance products while construction, operation and policy and regulatory risks coverage by such insurance products remain limited and this would require a collaboration with international financial institutions like World Bank that have already developed a partial risk guarantee for certain policy risks. Renewable energy as a new technology remains a challenge to the insurance companies due to the difficult in their pricing and demand for a higher underwriting capacity, hence requiring innovative insurance instruments to mitigate the emerging risk classes (Gatzert and Kosub, 2015).

On the other hand, Swenja (2013) through a desk review explored the capability of insurance risk transfer in harnessing investment for environmental protection in developing nations, a case of climate change. Findings showed that to provide environmental protection insurance risk transfer can aid in incentivizing risk reduction efforts, transfer investment risks and compensate victims and funding of clean-up process. The compensation element in the context of climate change remains ambiguous as it lacks a clear legal interpretation for damages of greenhouse gas emissions. Insurance schemes have been used to incentivize efforts of risk reduction in developing countries besides adoption of regulatory compliance, though it has not been adequately designed to handle all risks in renewable energy projects (Swenja, 2013). The transfer of investment risk has the ability to stimulate private funding of climate change while existing insurance products have managed common project risk as well as political risks relating to adaptation and mitigation investments. In some specific risks insurance cover have not been developed and only public-private partnerships can offer their risk transfer (Swenja, 2013). Insurance risk transfer application in climate change investment remains relatively nascent and its efficiency and effectiveness remains grey.

In the construction sector, scholarly work has been articulated by Macharia and Caleb (2018) and Halwatura (2015). Halwatura (2015) while assessing contractor all risk (CAR) insurance policy effectiveness in road construction projects in Sri Lanka employed descriptive survey design with questionnaire and interview for data collection from a sample size of 150 participants selected through simple random sampling. Results showed that the existing conditions and guidelines are not project specific thus requiring an amendment to include protection against potential catastrophes that can arise and further, the complexity of insurance policy wordings has made it difficult for policy holders to understand and interpret them effectively and has thus led to information asymmetry in favor of the insurer. This proved that proper insurance coverage for the scope of work is vital and is no longer a

financial waste. In Kenya, Macharia and Caleb (2018) investigated the effects of risk transfer on performance of housing projects in Secondary schools in Murang'a County through descriptive survey design with structured questionnaires for collecting data from a sample size of 136 respondents while analysis involved both descriptive and inferential techniques of regression. Findings showed a significant positive relationship between risk transfer and performance of construction projects in form of time schedule, implementation cost, quality production and customer satisfaction. Though the two studies showed that insurance and performance of projects are positively significantly related, there is the obvious gap to the renewable energy projects which are considered more risky to both the investors and lenders thereby calling for project specific research (IEG, 2009).

Other scholars have gone further to assess the relationship between reinsurance and performance of projects, for instance, Adebowale and Adebayo (2018) investigated the reinsurance utilization and performance of non-life business in the Nigerian insurance industry through adoption of mixed method design of exploratory and longitudinal descriptive designs for collection of both quantitative data from annual accounts of all 41 non-life insurance firms operating in Nigeria between 2006 to 2015 and qualitative study measured the non-financial performance through semi-structured interview from heads of reinsurance department while analysis involved descriptive and inferential statistics of regression and thematic content analysis. Findings established a significant negative relationship between reinsurance utilization as a risk management technique and performance of non-life insurance firms in Nigeria in terms of customer satisfaction, claims management procedure and time lag (Adebowale and Adebayo, 2018). The findings by Soye, Adeyemo and Ayo (2017) that insurance companies benefit from reinsurance as a mode of risk diversification is in contrary to findings by Adebowale and Adebayo (2018) who found a negative relationship between insurance companies that undertake reinsurance and their eventual market performance, an issue that the current research intends to investigate. A focus on renewable energy projects will probably yield more interesting findings as the world has geared itself towards clean energy requiring massive secured financial investment.

2.8 Communication Strategy and Performance of Hydroelectric Energy Projects

An effective communication strategy and plan that integrates media, government, public, project stakeholders and regulatory liaisons body is de facto to a project's success (Chihuri and Pretorius, 2010); as it helps in timely and accurate propagation of the required

information concerning financial risk management instruments utilization and understanding PKI of projects to achieve optimum performance. Communication in project risk management facilitates monitoring and review processes for appropriate corrective measures to be taken (Serpell, Ferrada, Rubio and Arauzo, 2015). However, due to the conflicting interest amongst project partners, risk communication remains a challenge as each partner tries to gain advantage over the other by exercising information asymmetry (Ahmed *et al.,* 2010), thus, a well-organized communication strategy is of essence to facilitate timely risk identification, analysis and response using appropriate risk mitigation instruments (Ceric, 2014). Scholars opine that for communication strategies to be effective there needs to be a clear communication flow structure, innovative communication management tools, well operational communication channels and propagated information must be of quality (Project Management Institute, 2013; Ghassemi and Becerik-Gerber, 2011).

A number of scholars have studied communication in relation to projects performance for instance, in renewable energy projects, Hermawati and Rosaira (2017) conducted an exploratory study to investigate sustainability factors in renewable energy projects in Indonesia through descriptive survey design and data collected using interviews from project owners and managers while analysis was thematic in nature. Results indicated that active communication and proper planning through stakeholder engagement is fundamental to the successful implementation of renewable energy projects. A study by Forcada, Serrat, Rodríguez and Bortolini (2017) investigated communications' key performance indicators for in successful construction projects through quantitative survey with Likert scale questionnaires as instruments for collecting data from a sample size of 390 construction partners in Spain while analysis involved ordinal logistic regression and Chi-square (x^2) test. Findings revealed that information quality is the most significant communication KPI while communication flow structure, communication channels and information management are relevant aspects of project success. This study provided strong inferential analysis techniques that showed the relationships between the variables under study which eventually led to clarity of findings on the communication KPI and their influence on performance of projects.

In Rwanda, Njagi, Mbabazi and Kibachia (2016) evaluated the effect of communication on risk management in Bastinda II housing project by adopting descriptive survey design and semi-structured questionnaires used for collecting data from a sample of 116 participants while analysis involved descriptive and inferential techniques of regression, correlation, t-test

and ANOVA. Results showed a significant negative relationship between poor communication skills amongst project members and risk management, implying that risk communication to the relevant audience for appropriate action remains a challenge. The use of t-test was inappropriate since the sample size was greater than 30 and instead ought to have used Z-test as postulated by Kothari (2004). In Uganda, Ssenyange, Katerega, Masaba and Sebunya (2017) assessed the influence of communication on performance of construction projects in public Universities through quantitative survey design and questionnaires used for collecting data from a sample of 127 participants out of a target population of 150 project managers while analysis involved correlation and regression techniques. Findings showed a significant positive relationship between communication and performance of projects since communication provides clarity on project objectives and means of collaboratively achieving them, thus, much emphasize should be put on awareness and information flow models to all the stakeholders.

In Kenya, Mugo and Moronge (2018) investigated the relationship between communication and implementation of construction projects within Nairobi County by adopting descriptive survey design and questionnaires used for collecting data from a sample size of 74 respondents consisting of engineers, architects and quantity surveyors while analysis involved descriptive and inferential statistics of Correlation, Regression and ANOVA. Findings revealed that communication framework with clear roles and communication plan enhances project implementation and; efficient communication channel ensures relay of information to targeted audience and improved team coordination, increases synergy and trust hence performance improvement. The use of inferential data by Mugo and Moronge (2018) provides a better ground for generalization as the sample size is equally large to reflect the salient characteristics in the general population. Thus effective communication significantly influence performance of the projects in achieving cost reduction, scope coverage, time schedule, risk management and quality of the products. Further, investors will have a clear understanding of the appropriate financial risk management instruments to be utilized in achieving project objectives.

2.9 Contract Management and Performance of Hydroelectric Energy Projects

Contract management entails the process of delivering project objectives as per the obligations of the respective parties in the project contract to achieve value for money (Yegon and Mbeche, 2018). Effective contract management should ensure that stakeholders are

satisfied, quality products are delivered, cost is reduced, and competitive procurement is stimulated, and risks and liabilities are managed. United States' Department of Defense (DoD) as the single largest contracting agency with an estimated procurement capacity of $370 billion in FY2009 (FPDS, 2010) faced contract management deficiencies due to ineffective administration and contractor oversight according to records by Government Accountability Office (GAO) (Rendon and Snider, 2008). Similarly, in Uganda constraints in monitoring and execution of contracts were experienced by some procuring and disposing entities (PPDA Capacity Building Report, 2010) thus calling for the need to offer innovative strategies and skills on contract management. Kenya's state corporations have equally experienced challenges in the management of long term procurement contracts leading to low productivity and high cost and time overruns (Yegon and Mbeche, 2018) and therefore transparency in contract management is a panacea to enhanced project performance (Subramaniam and Shaw, 2002).

An intercontinental study by Píchaa, Tomekb and Löwittc (2015) investigated the causes of disputes in EPC contracts through a desk review of quantitative data of four EPC power projects case studies in the Czech Republic, Sultan of Oman and Russian Federation with an interview follow-up involving 13 interviewees comprising project owners, lawyers and EPC contractors. Findings indicated that standardization of EPC contracts; efficient contract management and adequate understanding of contract details can significantly reduce the claims frequency, time and cost overruns, but in instances where the contractor is unwilling to bear the risk magnitude due to the EPC contract then multi-contacting or strategic alliance is appropriate. In Nigeria, Opawole and Jagboro (2017) evaluated the factors influencing performance of the private party in a concessional contract by adopting a survey design with questionnaires used to collect data from 81 respondents in Southwestern Nigeria while analysis was done through relative significance index (RSI). Findings indicated the existence of significant relationship between knowledge of PPP contract terms, exchange rates, policy provisions and performance of projects.

In Kenya, Lucas and Rambo (2016) examined concessional factors influencing financing and performance of BOT railway project through causal-comparative design and semi-structured questionnaires for collecting data from a sample of 348 respondents out of a target population of 402 senior managers while analysis involved descriptive and inferential statistics of Chi square tests, one- way ANOVA and Relative Importance Index (RII). Findings revealed that

understanding concessionaire's technical capacity, revenue flow structure and concession fee charges and concession period in the contract document is directly significant to the performance of BOT projects. Other local studies done by Nyamwange and Nyang'au (2018) and Yegon and Mbeche (2018) observed a positive significant relationship between contract management and successful construction projects completion. Nyamwange and Nyang'au (2018) assessed factors influencing completion efficiency of airport construction projects by adopting descriptive survey design and questionnaires used for collecting data from a census of 122 respondents while analysis involved descriptive statistics and inferential statistics of regression. Findings revealed a positive significant relationship between contract budgeting, staff competency, M&E and completion of projects. Yegon and Mbeche (2018) examined procurement contract management and completion of construction projects through descriptive survey design with structured questionnaire used for data collection from a sample size of 96 respondents while analysis involved descriptive and inferential techniques of regression. Findings showed that contract terms compliance has a negative significant effect on effectiveness of contract management while the quality of contract documentation had a positive significant relation to effectiveness of contract management. A good contract management practice is therefore of essence to every project to reduce instances of time and cost overruns, poor quality production and substandard safety conditions.

2.10 Theoretical Framework

This study is grounded on four theories including Prospect theory, Diffusion of innovation theory, Goal-Setting theory and Agency theory as captured in the subsequent sub-themes.

2.10.1 Prospect Theory

The study is anchored on prospect theory propounded by Kahneman and Tversky (1979) which is viewed as a descriptive decision making model under uncertainty (Han and Hsu, 2013) to examine financial risk management instruments in securitizing hydroelectric energy projects. Under prospect theory, investors evaluate risk based on gains and losses value function, are concave over gains and convex over losses. The theory explains why investors venture in risky projects with higher returns if proper risk management strategies are put in place, for instance, in the study context investors would find it more tenable to venture into risky hydroelectric energy projects if adequate financial risk management instruments are integrated into the project. Since financial risk management instruments cushions projects from uncertainties if implemented from the origin and as such ensures the project does not suffer from revenue loss or cost and time overruns, the public and private risk averse

investors would gain confidence as the probability to gain remains high. Further, the investors have the ability to gauge the specific financial risk management instrument such as ART, contingent capital, credit enhancement, hedging derivatives and insurance fits better into every project based on the amount of gains calculated on accumulative basis. When financial risk management instruments are not integrated into the project the risk averse investors perceive such projects as loss holes and would continue not supporting them thereby creating economic under investment.

The Prospect theory has been equally advanced by Tversky and Kahneman (1992) who advocated for utilization of cumulative density function "cumulative prospect theory" which explains lenders and investors behavior in engaging in risky but more paying projects with risk reduction strategy. Prospect theory has been applied in portfolio choices and trading behavior of investor (Andries, 2012); asset pricing “anomalies” of equity premium puzzle, excess volatility, IPO underpricing (Barberis, 2013). Based on the reviewed literature financial risk management instruments in hydroelectric energy projects has not been understood within the principles of prospect theory which the current study intend to bridge. In general probability of gains accruing due to integration of the financial risk management instruments can be calculated on the basis of the outcome of performance of hydroelectric energy projects. The linking of prospect theory to financial risk management instruments in securitizing hydroelectric energy projects will enable us understand how investors can be attracted into funding risky but high return oriented hydroelectric energy projects with guaranteed revenue flow and debt repayment even in the event of uncertainty.

2.10.2 Goal-Setting Theory

The study while trying to clarify performance of hydroelectric energy projects adopted goal-setting theory of motivation founded by Locke in 1968 (Locke and Latham, 2006). The theory postulates that for effective performance of a project, the goals or indicators of the performance must be clear and measurable, should be decently difficult to motivate project parties towards their achievement while the project parties should be committed to achieving the set goals, there needs to be a feedback mechanism on the progress of the set goals and goal complexity should be well understood for adequate time allocation (Lunenburg, 2011). For a project to achieve its objectives, value and strategic advantage the project parties must understand and prioritize the goals effectively (Lunenburg, 2011). Precise and difficult goals stimulate innovative strategies and sustained task performance for achievement of project

success (Locke and Latham, 2002). Through strategic communication goal commitment can be achieved as project parties will be inspired to rally around and prioritize their work-units to achieve success of the project objectives. Though the theory of goal setting has been used previously in other studies based on the reviewed literature none focused on the context of hydroelectric energy projects which the current study intends to domesticate. In this study therefore performance has been described in the form of efficient risk mitigation, project cost reduction, operational efficiency, implementation schedule time adherence, increased production capacity, enhanced profitability, environmental safety, quality electricity supply, customer satisfaction, affordable electricity supply, ease of electricity access. If all these are achieved in a project then it's considered to have performed effectively.

2.10.3 Diffusion of Innovation (DOI) Theory

Communication strategy has been underpinned on the theory of diffusion of innovation founded by Rogers (1962) that explains why, how and at what rate a new idea, innovation or technology can spread and be applied in any environment, which in the study context are financial risk management instruments in hydroelectric energy projects. The theory espouses that for an innovation to perform and self-sustain it has to be communicated over time amongst project parties in the social system and must be widely adopted. Thus, for an innovation to spread effectively four elements must be observed: the innovation itself, communication time, communication channels and social systems which encompass human capital competence. Timely and effective communication between project parties through a well thought out strategy that explains how performance of project can be achieved is essential. To achieve quality communication there needs to be a clear communication flow structure, organized communication management tools, cost-effective communication channels, and a well-defined communication scope.

Equally, communication strategy enhances the understanding of the project party's characteristics on grounds of human capital competency in the utilization of the financial risk management instruments and knowledge on drivers and barriers so that all the adopters like early adopter, early majority, late majority and laggard are incorporated into the system (Gilardi, 2010). Therefore for an innovation to be adopted and diffusion accomplished there needs to be awareness creation, open decision to accept or reject the new idea, and implementation of the idea, for instance, the diffusion of innovation theory demands that project parties should at initial stages have adequate knowledge of financial risk management

instruments, adequate persuasion should be done by their providers to the project parties for integration into hydroelectric energy projects, and the instruments should be voluntarily used in the projects for achievement of project objectives. This should be done with a feedback mechanism to ascertain the effectiveness of the instruments.

Effective communication strategy in the project environment ensures proper evaluation of the relative advantage of financial risk management instruments, enhances their compatibility with the system, eases their application complexity, and triggers chances of reinvention potential to mitigate any risk effects and lower potential loss. Since projects are an aggregate of individuals and its own system of set objectives and processes which creates adoption complexity, it's therefore important to develop an efficient communication strategy to understand the parties' motivation and ability, compatibility of the innovation into the system and finally assess the implications of financial risk management instruments in hydroelectric energy projects. The theory has been used successfully in other fields including communication, public health, political science, project management and marketing (Nyandika and Ngugi, 2014) but has not been used to understand the moderating effect of communication strategy on the relationship between financial risk management instruments and performance of hydroelectric energy project, a gap to be addressed by the current study. Therefore, the current study will apply diffusion of innovation theory to help understand the moderating effect of communication strategy on the relationship between financial risk management instruments and performance of hydroelectric energy projects.

2.10.4 Agency Theory

In trying to understand the necessity of effective contract management in hydroelectric energy projects the study has adopted agency theory founded by Jensen and Meckling (1976). The theory explains how the principle-agency conflict in a project can be managed through clear optimal contracts with set obligations to be fulfilled for achievement of project performance. In any project the agent tries to maximize their own gains while minimizing principal's economic objectives and in a vice versa the principal tries to maximize his benefits while minimizing agent's reward and in the process there exists information asymmetry for either party to benefit more than the other, thus calling for a contract agreement for a balanced trade-off. Agency theory is built on the assumption that the principal's wealth would not be maximized due to agent-principal goal differences, information asymmetry between the agent and the principle and agent-principle propensity differences towards risk. Agency

theory in this study aids in understanding to what extent contract management mediates the relationship between financial risk management instrument and performance of hydroelectric energy projects. Contract management investigates whether project parties fulfill their contract mandate of meeting stakeholder needs, achieving optimum conditions, ensuring efficiency in funding, stimulating competitive procurement, managing risks and potential liabilities, ensuring consistent quality, implementation schedule and cost effectiveness. These may eventually have an influence on performance of hydroelectric energy projects.

Informed by the four theories, it is evident that the extent to which the project parties understand, accept and adopt financial risk management instruments depends on the level of communication strategy used to introduce the idea targeted at enhancing performance of hydroelectric energy projects besides an effective contract management. Based on this understanding the study conceptualized that performance of hydroelectric energy projects is dependent on the utilization of financial risk management instruments like ART, Contingent capital, credit enhancement, hedging derivatives and insurance which together is moderated by communication strategy and mediated by contract management.

2.11 Conceptual Framework

The conceptual framework presents the relationship between independent variables and dependent variable and how this relationship is influenced by the moderating variable and the mediating variable besides showing the simultaneous influence of independent variables on dependent variable, thus, the framework integrates all the conceptualized variables of the study.

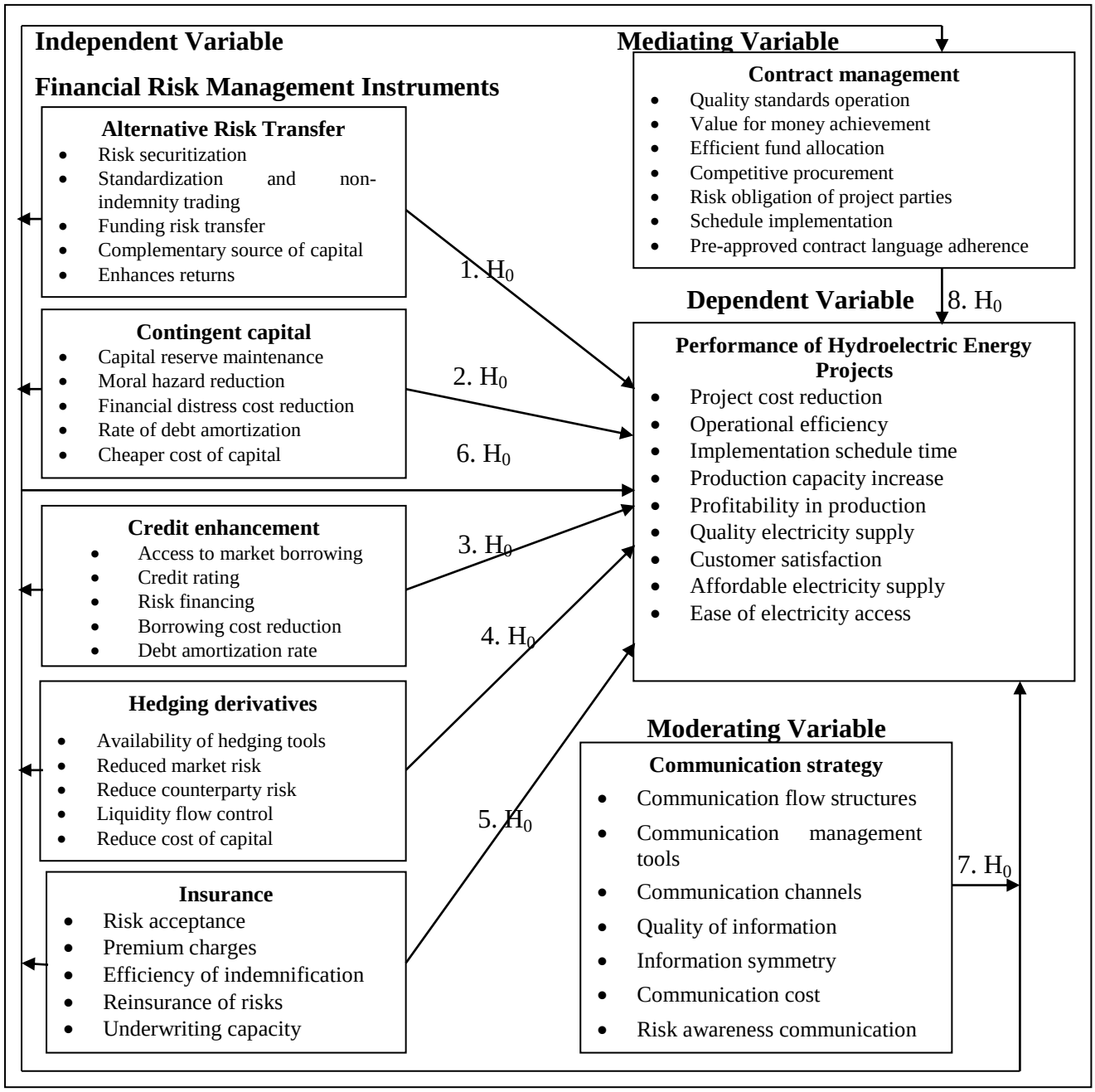

Fig. 1: A Conceptual Framework of the relationship between financial risk management instruments, communication strategy, contract management and performance of hydroelectric energy projects

The Conceptual framework displays Independent variables like ART, Contingent capital, Credit enhancement, hedging derivatives and Insurance and interacts with the dependent variable, Performance of hydroelectric energy projects on the right hand side. A two level interaction was involved: direct individual independent variable interacting with dependent variable as shown in hypotheses 1. H_0, 2. H_0, 3. H_0, 4. H_0, 5. H_0 and the combined independent variables influence on dependent variable under hypothesis 6. H_0. The combined

effect is moderated by communication strategy which either increases or reduces the influence of the five variables on dependent variable depending on the intensity of communication effectiveness and is presented as hypothesis 7. H_0 while the intervening influence of contract management on combined relationship between financial risk management instruments and performance of hydroelectric energy projects is represented by hypothesis 8. H_0. A mediating variable hypothetically affect the cause-effect relationship of independent and dependent variables indirectly, for instance, contract management can either increase or decrease correlation on performance of hydroelectric energy projects thereby affecting indirectly the relationship between financial risk management instruments and performance of hydroelectric energy projects. Performance is thus the end result of the individual and collective effect of the five financial risk management instruments moderated by the strength of communication strategy or mediated by contract management. The framework further depicts that the degree to which individual independent or dependent variables are realized depend on the extent to which their corresponding indicators are achieved.

2.12 Summary of Literature Reviewed

The study has reviewed both empirical and theoretical literature with a focus on financial risk management instruments as an independent variable which was unpacked into five sub-variables of Alternative Risk Transfer, Contingent capital, Credit enhancement, Hedging derivatives and Insurance and their individual influence evaluated against performance of projects. The influence of Communication strategy and Contract management has separately been reviewed against performance of projects. The reviewed literature showed that the use of ART, contingent capital, insurance, credit enhancement, and hedging derivatives all have an influence on performance of projects.

Credit enhancement mitigates risks through improvement of financial marketer's credit profile for cheaper access to market borrowings. Alternative Risk Transfer acts as a complementary capital source for absorption of losses resulting from mega catastrophes besides enabling insurers to transfer portions of risk exposures to capital markets besides while constituting a different asset class for enhancing return and portfolio variance for investors. Contingent capital provides a strong incentive for effective risk governance by limit financial distress costs in times of stress through automatic conversion of the debt instrument into equity at a cheaper cost compared to ordinary equity capital issuance.

Hedging derivatives prevent the inherent market and transaction risks while Insurance as a financial security tool protects projects from incurring identified risks and when reinsured acts as a specialized form of risk finance with the capability to substitute the regulatory constraint of capital to insurance ratio, improve underwriting capacity, and capital management decision.

Communication strategy determines the level of stakeholder engagement on risk awareness and appropriate contingency plans for adoption of appropriate risk management instruments in projects. Thus, communication can help in moderating the utilization of the instruments for each risk class besides inculcating the understanding of KPI for project success. Contract management ensures project parties in the agreement fulfill their obligations effectively to deliver the project objectives and get value for money and as such is a significant factor that can negatively or positively influence the dependent variable even if the independent variables are adequately utilized. The relevant theories on which the study is grounded include Prospect theory, Diffusion of Innovation (DOI) theory, Goal-Setting theory and Agency theory. The theories enabled the development of an appropriate conceptual framework for the study to include independent, moderating, intervening and dependent variables under study.

Though most of the studies have shown association between individual independent variables under investigation to performance of projects none has studied the combined parent variable to performance of hydroelectric energy projects. Further, none has studied the moderating influence of communication strategy or intervening influence of contract management on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects. This study adopts pragmatism paradigm and descriptive design to collect both qualitative and quantitative data to assess the association between variables under study. This approach opens a new ground in knowledge and hopefully would significantly contribute to the future management of financial risks in projects.

2.13 Knowledge Gaps

The study was guided by the knowledge gaps as follows

Table 2.1: Knowledge gaps

Variable	Author (year)	Title of the study	Findings	Knowledge gap
Alternative risk transfer	Bouriaux and MacMinn (2009)	Insurance- Linked Securities for Catastrophic Risks	The study through desk review assessed the recent developments in insurance securitization using insurance -linked securities market in USA and found that despite the nascence and temporary negative impact of 2007/08 financial recession ILS development remains robust especially the CAT bond market due to their enhanced standardization and secondary market trading.	The study was comprehensive in content but only focused on standardization and trading of ARTs but failed to address it as a complementary source of secured capital which the current study context in hydroelectric energy projects through descriptive survey design and inferential statistics.
	Cummins (2008)	Risk-linked securities market and development	The study assessed risk-linked securities such as CAT bonds as risk financing source for insurance and reinsurance firms in USA through desk review and found that as an innovative financial instrument they are used to raise additional funds for insurance and reinsurance entities when traded in capital markets for settling claims arising from mega-catastrophes.	The study was done in a developed economy and corporate world while the current study is done in a project context in a developing economy like Kenya through descriptive survey design rather than desk review.
	Chieh (2010)	Managing Catastrophic risk by alternative risk transfer instruments.	Through a simulation model the study analyzed the effect of hybrid-trigger CAT bond on reduction of basis and moral hazard risks and found that basis risk and moral hazard can be simultaneously be reduced through hybrid-trigger CAT bonds and catastrophe risk through pari-mutuel mechanism.	Simulation models are more of data driven and conducting a descriptive survey on an actual project like hydroelectric energy projects provide evidence into the validity of the previous findings.
	Sibindi (2015)	Alternative risk transfer methods in Africa	The study analyzed the utilization of ART products in South Africa and Zimbabwe through longitudinal descriptive survey design and data collected using questionnaire and interview schedule from a sample size of 28 respondents out of a target population of 253 while analysis involved descriptive statistics. Results indicate that ART market is fully developed in South Africa and effectively utilized due to high demand by the corporate sector, favorable cost dynamics, a well-integrated financial market, and pressure in the insurance cycle unlike in Zimbabwe where it's still nascent and only driven by macro and micro economic factors.	The study is instrumental as it's the only one of the kind that touched on developing nations and provides an impetus on how to handle the current study. However, the use of descriptive data analysis technique alone without inferential statistics cannot provide a distinctive picture into the magnitude of the relationship between ARTs and performance of projects, a gap which the current study addresses by adopting inferential statistics.
	Wing and Jin (2015)	Risk management techniques for renewable energy	The study sought to establish risk mitigation mechanisms in renewable energy projects through desk review and findings showed that Catastrophe bonds are used to manage operational risks and obtain lower cost capital from capital markets for implementation of renewable energy projects.	Though the study was elaborate on the risk mitigation mechanisms in renewable energy projects it failed to articulate issues of standardization of ARTs which the current study intends to do.
Contingent	Tobias	Contingent capital as	Through a theoretical model of Duffie-Lando type the study assessed the	The study was comprehensive and the model proved

capital	and Christoph (2015)	risk management strategy	effect of CoCo bond conversion price on equity holder's incentives through descriptive and Inferential statistics of correlation and regression. Findings showed that by exclusively using regulatory triggers, equity holders are provided with the incentive to raise assets' riskiness (assets' substitution) and disincentive of raising fresh equity in a financial distress (debt overhang)	valuable in understanding how contingent capital operates in the banking sector while the current study ushers in project life of hydroelectric energy projects through descriptive survey to give firsthand information instead of using models which are highly data driven hence not that useful before the market liquid.
	Calomiris and Herring (2013)	Designing Contingent Convertible Debt in a project	Through a simulation model with secondary data the study assessed the effectiveness of a contingent convertible debt in solving the too-big-to-fail problem in projects and results indicated that a well design CoCo requirement solves the too-big-to-fail problem by ensuring sufficient capital relative to the risk is availed at a lower cost than ordinary equity requirement.	Though the methodology was comprehensive and findings answered the objectives, findings contradicted literature claims by banking and finance scholars that CoCos usually suffer from multiple equilibria, an issue that the current study investigates through Key informant interview in context of hydroelectric energy projects.
	Sundaresan and Wang (2013)	On the Design of Contingent Capital with a Market Trigger.	The study evaluated a market triggered contingent capital design by adopting an analytical approach of a structural default model derived from Merton (1974) and Black and Cox (1976) models while analysis was Stochastic in nature. A market trigger contingent capital where direct stakeholders do not hold the power of choice for optimal conversion policy, do not support a competitive pivot except if conversion value transfer is not determined ex ante and as such penalizes bank managers in case they take excessive risk. However, the existence of equilibrium multiplicity can lead to price uncertainty, capital allocation inefficiency, multiple conversion errors and market manipulation.	The study did not handle the pricing challenge which regulators typically face when they interact with the market which the current study intends to handle through descriptive survey research to generate primary data from hydroelectric energy projects.
	Vall´ee (2016)	Contingent Capital and Liability Management	The study through desk review explored the effects of contingent capital on liability management and found that liability management due to higher economic performance and better preserved lending enable robust control of government bail-out and seasoned equity offering during financial distress but impose significant losses to subordinated debt bond investors. Contingent capital reduces the cost of capital at times of financial distress, thus replacing the higher cost of ordinary equity capital.	The study explored contingent capital use in financial institutions while the current study is context in the light of hydroelectric energy projects.
	Shang (2013)	Understanding Contingent Capital.	The study through desk review of a quantitative case study assessed contingent capital's key features in relation to its application in the insurance industry and found that contingent capital increases the insurance capacity to absorb loss relative to subordinated debt instrument and provides lower cost of capital relative to ordinary equity thus reducing the cost of financing projects in distress.	The study was comprehensive enough and the current study will test contingent capital concepts such as loss absorption and low cost capital provision in the context of hydroelectric energy projects.
Credit enhancement	Chowdhury, Chen and Tiong	Credit enhancement in Asian IPP projects	The study examined credit enhancement facilities for independent power producers in Asia through descriptive survey and questionnaire for collection of data from a sample of 120 participants while analysis involved	Though the study findings fulfilled its objectives, the descriptive technique used in analysis could not show the relationship between the variables while the current study

	(2015)		descriptive and factor analysis. The use of credit enhancement products provided by the host government, MDBs, ECAs and multilateral agencies significantly influence performance of IPP projects as it reduces risks and increases the projects creditworthiness for better financing.	uses inferential techniques to bring out the strength of the relationship between the variables in hydroelectric energy projects in Kenya.
	Atal, Shrimali, and Singh (2018)	Credit Enhancement in Renewable energy Projects in India	The Technical paper on Climate Policy Initiative assessed credit enhancement mechanism for single DISCOM off-takers in renewable energy projects in India through quantitative survey of secondary data and analysis involved Z-score and regression analysis. Credit enhancement improves the credit profile of the off-taker to secure additional funds in the capital markets. Counterparty credit risk increases premium cost of debt by about 1.07% and to mitigate it credit guarantees provided by financial institutions are preferred.	The methodology did not provide the sample size of the case study to determine whether the correct analysis techniques were applied and further, regression analysis technique was not applied as purported leaving a gap on how the relationship of the variables could have varied in strength. The current study addresses these methodology lapses by involving inferential statistics to provide a generalization ground for the findings.
	Dhruba (2018)	Credit Risk management and Green energy financing	According to the ADBI Working Paper 855 done through desk review, Credit risk has remained a barrier in accessing affordable financing for the renewable energy projects. However capital markets have used credit enhancement to cover financial obligations like loans, bonds, swaps and receivables. Credit enhancement improves credit profile of project parties in the financial markets to attract new financing sources and lowering borrowing pressure from local banks.	The use of desk review as a methodology limits the research scope in expanding the empirical observations a gap which the current study fills by undertaking descriptive survey to get first hand data on how the credit enhancement influence the performance of hydroelectric energy projects.
	Kidney, Giuliani and Sonerud (2017)	Stimulating private market growth in green securitization in Europe.	A Policy paper articulated through desk review found that to stimulate the growth of green securitization markets a number of interventions including standardization of renewable energy asset portfolio, standardization of green loan contracts, warehousing of standardized green loans, providing credit enhancement, and integrating green factors in risk weightings besides formulating target policies are fundamental.	The study was comprehensive; however, it was done in a developed economy while the current study involves developing economy to checkmate on the similarity of the findings.
	Frisari and Micale (2015)	Risk Mitigation Instruments: A Case of 250MW Bujagali Hydropower project in Uganda	The policy report was done through desk review to investigate the risk mitigation instruments in renewable energy and results indicated that the public financial institutions have been instrumental in provision of risk management instruments which have led into high mobilization of private funding and reduced cost of borrowings to develop renewable energy projects as the credit and debt repayment risks are significantly reduced. However, these instruments like partial risk guarantees and political risk insurance offered by Multilateral investment agencies remains underutilized in renewable energy projects.	The study showed that credit enhancement reduces the cost of capital, however they remain underutilized in renewable energy projects and this prompts further research to a certain the reasons as to why their adoption has been wanting, a gap which the current study fills through Key Informant response.
Hedging derivatives	Giraldo-Prieto et al. (2017)	Hedging derivatives on market value of Colombian companies	The study assessed the link between financial hedging derivatives and value of Colombian companies through descriptive survey design and questionnaire used for data collection from a sample size of 975 respondents while analysis involved regression. Findings showed that Financial hedging	The study was comprehensive with right methodology adoption, linking of findings to objectives in the corporate world while the current study is context on hydroelectric energy projects.

			derivatives have a positive significant influence on market value of companies through higher leverage, efficient market capitalization and higher net profitability.	
	Fernando et al. (2017)	Financial risk management in construction industry in Sri Lanka	The study sought to establish hedging techniques for financial risks facing construction contractors through descriptive survey and questionnaire and interview used for collecting data from a sample of 33 respondents while analysis involved Analytic Hierarchy Process (AHP). The most significant financial risk affecting construction contractors leading to cost overrun is price risk while the hedging instrument used was forward contract.	The qualitative data was not properly triangulated with the quantitative data while the current study bridges the gap through thematic content analysis of qualitative data before triangulating it with the quantitative data for in-depth information regarding hydroelectric energy projects.
	Basha (2013)	Derivatives and risk management in Project Finance	The study through desk review investigated the effectiveness of derivatives on management of financial risks in energy industry in India and found that India's financial market has integrated derivative products like forwards, futures, options and swaps to manage currency exchange risk and interest rate risk which has led to increased investment in renewable energy development. However, contrary opinion precludes that derivatives themselves curry with them some risks such as counterparty risk.	The contrary opinion which precludes that derivatives are prone to certain risks themselves prompts empirical test to be conducted by this study through descriptive design rather than desk review to a certain the truth.
	Waswa and Wepukhulu (2018)	Derivative instruments and performance of listed firms in NSE, Kenya.	The study assessed derivatives usage and performance of listed non-financial firms in NSE through descriptive survey design and questionnaire used for collecting data from a sample of 11 respondents out of a target population of 47 companies while secondary data was sourced from annual report and analysis done through descriptive and inferential statistics of regression, correlation and ANOVA. Derivatives usage has a positive effect on performance of listed firms with proportion of usage being Forwards (66.67%), Swaps (22.22%) and Futures and Options (11.11%).	The study was comprehensive in methodology with findings linking to the objectives and providing local context of the application of derivatives. However, their application in hydroelectric energy projects remain unclear which the current study intend to do.
	Bhattacharya et al. (2015)	Hedging Risk Strategy in Renewable Energy project	The study investigated the influence of hedging weather derivative strategies in renewable energy projects in USA through a simulation model with secondary data while analysis involved Kurtosis and regression methods. Findings showed that weather derivatives such as calls puts and collars have a positive significant influence on management of demand and supply risk of renewable energy in the course of variations of weather conditions.	Since simulation models are highly data driven there is need to do a survey research to complement the simulation model's findings as intended in the current study. Further, the study shows that the developed nations have commoditized renewable energy products for investible units, a condition which the current study tests in a developing economy.
Insurance	Gatzert and Kosub (2015)	Risk Mitigation in Wind Energy Projects	The study through desk review sought to establish the risk management techniques in off-shore and on shore wind energy projects in Europe and found that Innovative insurance products provide coverage for technical risks while the coverage for construction, operation and regulatory risks remains limited. However, new technologies pose challenge to the insurance	The study used desk review on wind projects while the current study uses descriptive survey design to bring the matter into context in view of hydroelectric energy projects.

			companies due to pricing and underwriting difficulty, thus the development of targeted products for specific risk coverage would be more appropriate.	
	Swenja (2013)	Insurance risk transfer and climate investment	The study explored the application of insurance risk transfer mechanisms in harnessing investments in environmental protection in developing countries through desk review. Insurance risk transfer can achieve environmental protection through victim compensation and funding of clean-up process, providing incentives in risk reduction efforts and developing a de-risked environmental investment. Insurance products for project risks and political risk are equally vital risk mitigates in enhancing access to financial pools.	The utilization of insurance risk transfer in climate-related investments is a novel area and an assessment of efficiency of the solutions offered has not been comprehensively conducted, a gap which the current study fills by domesticating the research specifically to hydroelectric energy projects.
	Halwatura (2015)	Contractor's all risk insurance and performance of road construction projects in Sri Lanka.	The study assessed contractor's all risk (CAR) insurance effectiveness in road building projects in Sri Lanka through descriptive survey design and questionnaire and interview guide used for collecting data from a sample of 150 respondents. Findings show that the existing conditions and guidelines of insurance are not project specific thus requiring an amendment to include protection against potential catastrophes that can arise. Further, the complexity in the wordings of insurance policy makes it difficult for policy holders to understand the contract terms, thus creating information asymmetry in favor of insurer which increases construction cost.	The research was comprehensive in nature and a replication in the current study is to ascertain whether the findings in a developed economy like Sri Lanka are similar to that of a developing nation like Kenya taking into account the differences in context areas of construction and hydroelectric energy projects.
	Macharia and Caleb (2018)	Risk transfer and performance of construction projects in Kenya	The study investigated the effects of risk transfer on performance of housing projects in Secondary schools in Kenya through descriptive survey design and questionnaire used for collecting data from a sample of 136 respondents while analysis involved descriptive and inferential techniques of regression. Risk transfer has a significant positive effect on performance of construction projects by completing the project within quality, budget and time, with customer satisfaction.	The research was coherent from the methodology with findings that answered the objectives; however the study was not in the context of hydroelectric energy projects which the current study intend to do to enable a decision to be made on the generalizability of the findings.
	Adebowale and Adebayo (2018)	Reinsurance utilization and performance of non-life business in the Nigerian insurance industry: a mixed methods approach.	The study investigated the reinsurance utilization and performance of non-life business in the Nigerian insurance industry through descriptive design and interview guide used for collecting qualitative data from a census of 41 non-life insurance firms while analysis involved regression and thematic content analysis. There is a significant negative relationship between reinsurance utilization as a risk management technique and performance of non-life businesses in terms of customer's satisfaction, claims management procedures and time lag.	The finding that reinsurance has a negative significant effect on non-life insurance business is a classic clash from the findings of Soye, Adeyemo and Ayo (2017) and by Lee and Lee (2012) that found a positive relationship and in that respect the current study sought to demonstrate which finding is true in relation to hydroelectric energy projects.
Communication strategy	Mugo and Moronge (2018)	Organizational communication and implementation of housing projects in Kenya	The study assessed communication and implementation of housing projects in Kenya through descriptive survey design and questionnaire used for collecting data from a sample of 74 respondents while analysis involved descriptive and inferential techniques of correlation, regression and ANOVA. Communication framework with clear roles and well-documented communication plan enhances project implementation; information	The study was comprehensive in content and handled communication strategy effectively in the domain of construction projects while the current study contextualizes on hydroelectric energy projects which may generate a different understanding of the phenomenon.

			transparency increases level of synergy and team work; appropriate communication channel ensures team coordination; while IT use ensures timely coordinated and interpretation of information in projects.	
	Ssenyange et al. (2017)	Communication and performance of University Projects	The study assessed communication and performance of projects in public universities in Uganda through Quantitative survey design and questionnaire used for collecting data from a sample of 127 participants out of a target population of 150 project managers while analysis involved correlation and regression. Communication has a significant positive influence on performance of projects since communication provides clarity on project objectives and means of collaboratively achieving them, thus, emphasize should be put on awareness and information flow models.	The methodology of the study was correct and enabled the derivation of the relationship between the variables under study to answer to the research objectives which the current study emulate in the context of hydroelectric energy projects.
	Hermawati and Rosaira (2017)	Key Success Factors for Renewable Energy Projects in Indonesia	The study exploratory deign sought to establish factors leading to sustainability of renewable energy projects in rural areas of Indonesia and In-depth interviews used to collect data with thematic content analysis applied. Active communication between project parties ensures an informed planning, development, and adherence to maintenance standards for timely completion of the project within budget, with customer satisfaction besides reducing conflict between the project parties.	The study was comprehensive but the use of qualitative data alone is not enough and therefore the current study uses mixed method to give in-depth understanding of the variable under study through triangulation.
	Forcada et al. (2017)	Communications' Performance Indicators in Construction Project	The study investigated communications' performance indicators and effectiveness of construction projects in Spain through Quantitative survey design and questionnaire used for collecting data from a sample of 390 respondents' while analysis involved Ordinal logistic regression and Chi-square (x^2) test. Key performance communication indicators such as information quality, clear communication channels, information flow structures and communication plan have a significant positive relationship on effectiveness of construction projects as they ensure information accuracy and timeliness in delivery to achieve project objectives.	The study was correctly done and objectives addressed to provide insight into communication performance indicators in construction industry, however, this was in a construction projects' context in a developed economy unlike the current study which is domesticated to hydroelectric energy projects in a developing nation like Kenya.
	Ogutu and Muturi (2017)	Communication and success of road construction projects in Kenya	The study sough to establish influence of communication on success of road construction projects in Kisumu, Kenya through descriptive survey design and Semi-structured questionnaires used for collecting data from a sample of 73 respondents while analysis involved descriptive and inferential techniques of Pearson correlation. Communication has a significant positive relationship with success of road projects.	The study was adequate in content from the objective to methodology and findings as they were all linked. However, the study focused on road construction while the current study will duels on hydroelectric energy projects.
Contract management	Opawole and Jagboro (2017)	Contract management and performance of concessional PPP projects in Nigeria	The study assessed factors influencing performance of concession contract in Nigeria through quantitative Survey design and questionnaire used for collecting data from a sample of 81 participants with analysis involving Relative significance index (RSI). Findings show that the ability of the private party to understand the content and transaction in the public private alliance contract and the surrounding policies are significant factors	The study was correctly done aligning findings to the objectives and using the correct methodology. However the study was not specific on the project context leaving a gap that this study fills by focusing on hydroelectric energy projects.

			influencing performance in fulfilling the contract obligations.	
	Lucas and Rambo (2016)	Concessional factors and financing of BOT railway project in Kenya.	The study examined concessional factors influencing financing and performance of BOT railway project in Kenya through Causal-comparative design and Semi-structured questionnaires used for collecting data from a sample of 348 participants out of a target population of 402 while analysis involved descriptive and inferential statistics of Chi square, ANOVA and Relative Importance Index (RII). The concession contract parties' technical capacity and understanding of concession fee, concessionaire's revenue, and concession period significantly influence financing and performance of BOT to reduce cases of payment default, cost escalation and operational delays.	Though the study was comprehensive in nature with a large sample size that ensures normal distribution and results generalization, it failed to clearly articulate how qualitative data collected through a semi-structured questionnaire was used to triangulate quantitative data or how the qualitative data was converted into quantitative data. This gap is handled by the current study through proper triangulation of the quantitative data with the qualitative ones using thematic content analysis to stitch the gist of the study.
	Píchaa, Tomekb and Löwittc (2015)	Application of EPC contracts in international power projects.	The study assessed causes of EPC contracts disputes for delivery of power projects in Czech Republic, Russia and Oman through descriptive survey design and Quantitative secondary data triangulated with qualitative primary data collected using interview from a sample of 13 interviewees. Findings showed that contract disputes can result from non-standardized EPC contracts, inadequate awareness by the EPC contractor on the obligation and risk bearing responsibility, and insufficient skills in contract management leading to time and cost overruns in projects.	The study adequately addressed the research concerns by triangulating the qualitative data with quantitative data for in-depth understanding while the current study is domesticated in Kenya a developing economy specifically hydroelectric energy projects.
	Nyamwange and Nyang'au (2018)	Contract management and completion of projects at Kenya Airports Authority	The study assessed the influence of contract management on completion of construction projects at Kenya Airports Authority through descriptive survey design and questionnaire used for collecting data from a census of 122 respondents while analysis involved descriptive and inferential techniques of regression. Results indicated that contract variation has a negative significant influence on completion of construction projects.	The study failed to show the sample size while the current study addresses the shortcoming in methodology and further include other inferential techniques of ANOVA and Correlation.
	Yegon and Mbeche (2018)	Determinants of Procurement Contract Management of government parastatals in Kenya	The study assessed factors influencing procurement contract management in parastatals in Nakuru County through descriptive survey design and data collected using questionnaire from a sample of 96 respondents while analysis involved descriptive and inferential techniques of regression. The quality of contract documentation has a positive significant influence on effectiveness of contract management. This shows that if contract content is not of quality then even if you adhere to the terms and conditions then it will still be ineffective in achieving the target objective.	The research was adequate in content but focused on corporate world while the current study focused on hydroelectric energy project which has unique characteristics and this may elicit different results.
Performance of hydroelectric energy projects	Sibiya, Aigbavboa and Thwala (2015)	Construction Projects' Key Performance Indicators: A case of the South Africa Construction	The study explored the KPIs in a construction project in Gauteng province, South Africa through Quantitative survey and data collected using Likert scale questionnaire while analysis involved descriptive techniques of standard-deviation and mean. Findings showed that implementation time, profitability, effective procurement, risk management, quality assurance, client satisfaction, safety, and productivity are significant indicators of	The study was comprehensive but was not domesticated to renewable energy projects and more so some of the KPI were repetitive with redundancy effect for instance construction time and time predictability can be merged into implementation time schedule as an indicator. The current study domesticate KPI for hydroelectric energy

	Industry.	performance of a project.	projects into quality electricity supply, cost, time and operational efficiency, generation capacity, customer satisfaction, environmental safety and profitability.
Ofori-Kuragu, Baiden and Badu (2016)	Key Performance Indicators for Project Success in Ghanaian Contractors	The study sought to establish Key performance indicators for contractors in Ghana by underpinned the study on Pragmatism philosophy, Mixed method survey design and data collected using questionnaire and expert interview from a census of 139 contractors while analysis involved descriptive technique of percentage. In Ghana a set of nine KPIs are used in construction including client satisfaction, cost, time, health, safety, profitability, productivity, people and environmental sustainability which were not only precise but equally measurable.	The study was elaborate due to the use of correct methodology and linking findings to objectives of the study but failed to articulate how the quantitative data was triangulated with the qualitative data thus creating a gap that the current study fills by using inferential statistics to generate inferable data before triangulation with qualitative findings for in-depth into performance indicators of hydroelectric energy projects.
Pramangioulis *et al.,* (2019)	A Methodology for Determination and Definition of Key Performance Indicators of Grids Island Energy Systems	The study through desk review identified performance indicators for hydroelectric plant as technical performance, friendly environmental effect, economic performance, cost-effectiveness, efficient operation and electricity supply, quality of supply, social performance, user-friendly and legislative performance	The study was comprehensive in nature with but failed to measure performance in relation to financial risk management instruments use a gap which the current study potent to achieve.
Elbatran *et al.,* (2015)	Hydro Power and Turbine Systems Reviews	Through desk review of hydropower technologies and turbines the study found that performance of hydro power systems are measured in terms of generation capacity increase, efficiency of hydroelectric facilities, environmental safety, reduced cost, increased households connection, reduced failure rates and reliable low operation and maintenance cost.	The study used the correct KPI but failed to link use of financial risk management instruments and performance of hydroelectric energy projects while the current study bridges that gap.
Waweru and Rambo (2017)	Factors influencing effective hydroelectric power supply generation in Kenya; a case of Kindaruma power station project in Machakos County	The study investigated factors influencing effective hydroelectric power supply generation at Kindaruma in Machakos County, Kenya through descriptive survey design with questionnaires and interview schedule used to collect data from a census of 36 respondents while analysis involved descriptive and inferential statistics. Findings revealed that technological upgrade, human capita competency, financial support and management support significantly influence the effectiveness of hydroelectric power generation in terms of profitability, increased power supply, customer satisfaction and increased household connectivity.	Though the study achieved its objectives by showing a positive significant relationship between technology, human capital, financial availability, management support and performance of hydroelectric power projects it failed to test the relationship between financial risk management instruments and performance of hydroelectric energy projects, a gap which the current study fill.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents philosophical paradigm underpinning the study, research design, target population, sample size and sampling procedure, data collection instruments, pilot testing, validity and reliability of instruments and Data collection procedure, Data analysis techniques, Ethical issues and operationalization of variables.

3.2 Research Paradigm

The study was underpinned on pragmatism paradigm propounded by Peirce, James and Dewey in 1870 (Creswell, 2013) which allows a researcher to seek knowledge of a phenomenon under investigation through mixed method approach (Wambugu, Kyalo, Mbii, and Nyonje, 2015; Creswell, 2008). In order to develop research questions to enable simultaneous collection of quantitative and qualitative data in a study, pragmatists adopt abduction reasoning that merges both inductive and deductive reasoning (Creswell, 2008), thus, the ultimate important thing is what works in practice and promotes social justice (Kagan and Neuman, 1998). The emphasis was on a value system in which the researchers choose the appropriate methods to answer research questions rather than the methods themselves which makes it more flexible in research design approach. As such, pragmatists can select research design and methodology best suited to solve research questions. However, critics argue that adoption of methodological approach is tied to adequacy of particular methods to answer research questions instead of primarily relying on the researcher's commitment to a design and philosophy on which it is supposedly based which is difficult in socially situated research problems.

Pragmatists believe that knowledge is not only developed through careful observation and measurement of existing objective reality (quantitative approach) but also seeking an understanding of the world by developing subjective meanings from the researchers own experiences and those of his subjects on the phenomena under study (qualitative approach). Further, pragmatism paradigm has a distinct underpinning ontology, epistemology and axiology (Kagan and Neuman, 1998). The ontology of the study was that reality is out there to be discovered and is constantly changing, is both observable and have deep structures that are unobservable. Epistemologically knowledge is true, if it makes meaning to the people and is constructed from participant's frame of reference, to inform individual and group actions.

Axiological pragmatism recognizes research as a moral and political activity attached to choice and commitment to a value position during the study period. This was the philosophical underpinning that inspired this study to seek an understanding of the association between the variables under study by undertaking objective measurement and developing meaning to the opinion and experiences of the key informants on the relationships of the variables as expressed in Key informant interview.

3.2.1 Research Design

The study adopted descriptive survey research design and correlational research design since it provides the foundation upon which correlation and experimental studies can be anchored to generate and test hypotheses. The descriptive survey design allows the use of mixed method approach involving simultaneous and independent undertaking of qualitative and quantitative research and triangulation of results to deduce in-depth knowledge of the problem under study without manipulating the environment (Wambugu *et al.*, 2015), hence, neutralizes biases and limitations inherent in any single method (Teddlie and Tashakkori, 2009). The study employed mixed method approach to simultaneously collect quantitative data for establishing relationships between variables and qualitative data for triangulation and in-depth understanding of the relationships between independent variables and dependent variable. The design also enables the variables measured at interval level to be Cross tabulated to assess the existing relationship before conducting inferential analysis. The ability of the design to establish the relationship between variables through correlation facilitates the use of descriptive and inferential statistics of regression.

Further, the design involves numeric descriptions of behavior, attitudes, values and characteristics of some part of the population as exuded by the subjects under study in their current status (Mugenda and Mugenda, 2008), thus enabling evidence obtained in a study to answer the research question it sought to delineate any ambiguity. This survey of part of a population and description of values and behaviors in their current status and establishment of relationships between variables through mixed method approach were the domain of the choice of a descriptive survey and correlational research designs which involves asking questions to respondents at one point in time on the relationship between financial risk management instruments and performance of hydroelectric energy projects without manipulating the environment to enable the gathering of both qualitative and quantitative data. The design is cost effective and ensures efficiency in short time data collection making

it possible to identify attributes of a large population from a small sample that can be used for results generalization (Wambugu *et al.,* 2015).

3.3 Target Population

The target population had 94 subjects consisting of 84 respondents and 10 Key Informants as shown in Table 3.1.

Table 3.1: Target Population

Serial No.	Energy Ownership	Power Project Capacity	Power Project Name	Target Population	Population Proportion
1	KenGen	Mega-Hydro	Tana	7	63 (67%)
2	KenGen	Mega-Hydro	Masinga	7	
3	KenGen	Mega-Hydro	Kamburu	7	
4	KenGen	Mega-Hydro	Gitaru	7	
5	KenGen	Mega-Hydro	Kindaruma	7	
6	KenGen	Mega-Hydro	Kiambere	7	
7	KenGen	Mega-Hydro	Sondo	7	
8	KenGen	Mega-Hydro	Sang'oro	7	
9	KenGen	Mega-Hydro	Turkwel	7	
10	IPP	Mini-Hydro	Imenti Tea Factory (Feed-in Plant)	7	21 (22%)
11	IPP	Mini-Hydro	Gikira small hydro	7	
12	IPP	Mini-Hydro	Regen-Teremi	7	
		Total	12 Hydroelectric energy projects	84 Resp.	84 (89%)
13	Government agencies	MOE, MOF, KenGen, ERC, KPLC, KETRACO, GDC, CMA, NSE and IRA		10 Key Informants	10 (11%)
		Grand Total		**94 Resp.**	**94 (100%)**

Source: KenGen (2019)

The 84 respondents comprised of project manager, finance manager, communications manager, quality assurance manager, hydroelectric plant technician, hydroelectric operator, hydroelectric engineer drawn from the 12 hydroelectric energy projects, 9 operated by Kenya Energy Generating Company (KenGen) and 3 operated by Independent Power Producers (IPPs) and connected to grid while the 10 Key Informants (finance managers) were drawn from relevant government ministry and agencies like Ministry of Energy (MOE), Ministry of Finance (MOF), Energy Regulatory Commission (ERC), Kenya Power and Lighting Company (KPLC), Kenya Electricity Transmission Company (KETRACO), Geothermal Development Company (GDC), Capital Markets Authority (CMA), Nairobi Security Exchange (NSE) and Insurance Regulatory Authority (IRA) to provide insight of financial risk management instruments in hydroelectric energy projects. The project manager, finance manager, communication manager, quality assurance manager, hydroelectric plant technician, hydroelectric operator, and hydroelectric engineer had been purposively selected for purposes

of representativeness, diversity and knowledge on financial risk management instruments, communication strategy, and contract management to achieve project objectives.

3.4 Sample Size and Sampling Procedure

This section described the sample size and sampling procedure used in the study.

3.4.1 Sample Size

The study used census of 94 participants. The census was intended to facilitate normality of distribution for a true reflection of the population and accuracy of results generalization besides reduction of error instances due to attrition and biases. According to Mugenda and Mugenda (2008), a target population of 100 subjects and below is recommended to be censured in a social science research instead of using a sample proportion to cater for any loss that may arise due to attrition and biases. The sample size and scale of representativeness determines the degree to which it mirrors population characteristics (Kothari, 2004).

3.4.2 Sampling procedure

A census of 94 participants was distributed proportionately across all the 12 hydroelectric energy projects in the study area and the agencies concerned with the variables under study. The sample was distributed as shown in Table 3.2 based on power project capacity and sample ratio per project.

Table 3.2: Sampling Procedure

Serial No.	Energy Ownership	Power Project Capacity	Power Project Name	Sample Size	Sample Proportion
1	KenGen	Mega-Hydro	Tana	7	63 (67%)
2	KenGen	Mega-Hydro	Masinga	7	
3	KenGen	Mega-Hydro	Kamburu	7	
4	KenGen	Mega-Hydro	Gitaru	7	
5	KenGen	Mega-Hydro	Kindaruma	7	
6	KenGen	Mega-Hydro	Kiambere	7	
7	KenGen	Mega-Hydro	Sondo	7	
8	KenGen	Mega-Hydro	Sang'oro	7	
9	KenGen	Mega-Hydro	Turkwel	7	
10	IPP	Mini-Hydro	Imenti Tea Factory (Feed-in Plant)	7	21 (22%)
11	IPP	Mini-Hydro	Gikira small hydro	7	
12	IPP	Mini-Hydro	Regen-Teremi	7	
		Total	12 Hydroelectric energy projects	84 Resp.	84 (89%)
13	Government agencies	MOE, MOF, KenGen, ERC, KPLC, KETRACO, GDC, CMA, NSE and IRA		10 Key Informants	10 (11%)
		Grand Total		**94 Resp.**	**94 (100%)**

The respondents were categorized into two groups consisting of 10 Key Informants from relevant government agencies and 84 questionnaire respondents from the 12 hydroelectric energy projects. The 84 questionnaire respondents were derived from the 12 hydroelectric energy projects where each project produced 7 respondents comprising of project manager, finance manager, communications manager, quality assurance, hydroelectric plant technician, hydroelectric operator, and hydroelectric engineer.

The census selection of the 84 respondents was due to their privy to information concerning financial risk management instruments, communication strategy, contract management and performance of hydroelectric energy projects. Census technique ensures subjects with required specific characteristics are included in the study (Mugenda and Mugenda, 2008). All the hydroelectric energy projects were included in the study and stratification done based on the capacity of the hydro-power projects, that is, Mega-Hydos by KenGen and Mini-Hydros by Independent Power Producer (IPP) to ensure minority and all of the populations' key subgroups are included in the study as postulated by Kombo and Tromp (2006). In the second stage 10 Key Informants who happen to be finance managers were selected using the purposive sampling procedure as they held key information to the research area. The targeted respondents must have been involved in the operations of the project for not less than 6 months so as to be qualified to be having relevant information to the study and in the case of Key Informants only the finance manager were targeted as they are presumed to have the relevant information concerning the utilization of financial risk management instruments. The selection of hydroelectric energy projects was informed by the knowledge gap on influence of financial risk management instruments on performance of hydroelectric energy projects in a developing economy like Kenya.

3.5 Research Instruments

The study used both primary and secondary data to source for information concerning financial risk management instruments, communication strategy, contract management and performance of hydroelectric energy projects. For primary data, structured questionnaire was used to collect quantitative data from project manager, finance manager, communications manager, quality assurance manager, hydroelectric plant technician, hydroelectric operator and hydroelectric engineer while an Interview Guide was used to collect qualitative data from Key Informants drawn from power related government agencies. Secondary data was sourced through organizational records or document review, desk review of journals, policy and

research papers, published books and internet search based on the research themes. The nature of data collected as well as objectives of the study guided the selection of these tools.

The self-administered structured questionnaire was used to record opinions, perceptions and values on variables that cannot be directly observed while catering for situations of time constraint and wider geographical coverage such as this study instance as supported by Oso and Onen (2005). The questionnaire was organized into an introductory and main body sections with closed ended items that presents options from which respondents make their choices to capture direct issues. The introductory section A: captured respondent's demographic details and the nature of data were categorical. The main body section was organized into eight thematic areas constituted as section B: containing information on Alternative Risk Transfer; section C: Contingent capital; section D: Credit enhancement; section E: Hedging derivatives; section F: Insurance; section G: Communication strategy; section H: Contract management, and section I: performance of hydroelectric energy projects with each area containing 10 items that examined all the indicators that explicate the objective variables under study. The items were presented as closed-ended five point Likert scale type and allowed the respondents to express an opinion on every item as best represented by one of the five options presented as Strongly Disagree (1), ($1<SD<1.8$); Disagree (2), ($1.8<D<2.6$); Neutral (3), ($2.6<N<3.4$); Agree (4), ($3.4<A<4.2$); and Strongly Agree (5), ($4.2<SA<5.0$). A Likert scale due to equal distances between each value is qualified to be interval scale as was the case of the study.

Key Informant Interview Guide for qualitative data collection involved extraction of information from 10 Key Informant interviewees drawn from the government ministries dealing with renewable energy issues and financial risk management instruments such KenGen, GDC, KPLC, Ministry of Finance, Ministry of Energy, IRA, CMA, NSE, ERA and KETRACO. This technique was preferred because it helps capture typical and useful information only besides saving time and funds (Oso and Onen, 2005). The interview was guided by the researcher and recorded by the research assistant. The interview guide was structured into an introductory part having interviewee demographic information and main body section with open ended questions to answer to the study objectives by probing on the importance, drivers, and challenges of financial risk management instruments. It further sought to establish the communication strategies and contract management effectiveness in hydroelectric energy projects.

3.5.1 Pilot testing of the instruments

The questionnaire and the Key informant interview were pre-tested in 10 unselected participants drawn from Sondu and Sang'oro hydroelectric energy projects with similarity in character to the ones in the main study prior to the actual data collection. The number 10 was deemed adequate for pilot study as it represents the 10% of the actual study sample size of 94 respondents recommended by Kothari (2004) as adequate for a pilot study. Using a simple random sampling technique two hydroelectric energy projects were selected and from each project a deputy project manager, deputy finance manager, deputy communications manager and assistant hydroelectric engineer were selected for the pilot study and 2 Key Informants were drawn from KPLC and KenGen who did not participate in the actual study.

A table of random numbers was used to select the sample energy projects. In this procedure, energy projects from different producers were assigned a single digit number starting from zero (0) to the nth number of projects per strata. From the table of random numbers, the researcher blindly picked at any digit and moving either across, up or down selected 10% of the projects distributed proportionately whose digits ranged between 0 and n. Every number was selected once and numbers already included were omitted. In addition KPLC and KenGen were randomly selected out of the 10 bodies identified to be having relevant information concerning hydroelectric energy projects to be used in the pilot study and 2 interviewees selected. The questionnaire and Key informant interview guide were reviewed to obtain a higher validity and reliability coefficients greater than 0.70 recommended by Cohen and Swerdlik (2010) as adequate for data collection before final administration in the field. Further the review ensured that the pre-test sample was similar to the survey. The instruments adjustments was guided by analysis of the collected pilot study data until a validity coefficient of 0.775 and reliability coefficient of 0.781 was obtained and thus, the instruments were considered adequate for data since the values were above the threshold of 0.7 recommended by Cohen and Swerdlik (2010) as adequate for data collection.

3.5.2 Validity of the Instruments

Measurement of validity was done by examining the content, criterion and construct of the instrument to ensure accurate measurement, design and statistical conclusion. To establish content validity, two specialist in the area of study who were the research supervisors from the University of Nairobi were given the instruments to examine the instrument's items relevance and consistence to the objectives by rating each item on a scale of very relevant (4),

relevant (3), somewhat relevant (2), and not relevant (1). Content Validity Index (CVI) was used to determine validity. CVI= Items rated 3 or 4 by both judges divided by the total number of items in the questionnaire and symbolized by n/N. The validity was readjusted through repeated evaluation by the experts to attain a validity coefficient of 0.775 greater than the threshold of 0.70 validity coefficient suggested by Kathuri and Pals (1993).

$$CVI = \frac{\text{Sum of items rated 3 or 4}}{\text{Number of questionnaire items}}$$

The results summarized in Table 3.2 were obtained.

Table 3.3: Experts Rating of Instruments

		Supervisor I				
		1	2	3	4	**Total**
Supervisor II	1	0	0	0	0	**0**
	2	3	3	0	0	**6**
	3	2	3	12	29	**46**
	4	3	4	10	11	**28**
	Total	**8**	**10**	**22**	**40**	**80**

Table 3.3 shows that validity index: CVI= $\frac{(22+40)}{80}$ = 0.775, which is acceptable since it was more than the threshold of 0.7 recommended by Cohen and Swerdlik (2010). Hence out of any ten items used in this study, at least seven of them measured what they were intended to measure.

Construct validity evaluated the consistency in significance of the proportion of high scores in items examining independent variables correlating positively or negatively with scores in items examining dependent variable by comparing several scores from various participants. Findings showed that 66 items with high scores were positively correlated (r=0.775) with scores in items examining dependent variable. Criterion validity was tested by rating the instrument's items on their relevance to the variables indicators for correlation and prediction of relationship between independent and dependent variables, that is, construct scores correlated with conceptual constructs. Design validity ensured that the items in the instruments were able to generate adequate and relevant data for a conclusive inference and result generalization. The design validity showed that 66 items in the instruments were rated as relevant and highly relevant. Statistical conclusion validity assessment ensured that the instruments and their items were appropriately designed in a 5-Point equidistant Likert scale format for collection of Interval data and analysis through inferential statistics for correct conclusions.

3.5.3 Reliability of the Instruments

Reliability as a measure of consistency of a test result (Kombo and Tromp, 2006) was done using split half technique to generate Cronbach's alpha coefficients. The split half technique is advantageous because it only requires a single test administration (Allen and Yen, 2002). In the procedure, all items in the data collection instruments were numbered and administered to 10 participants in the pilot study. The questionnaire items were then split into two parallel halves based on even-odd number basis using SPSS before correlation was done as demonstrated by Chakrabartty (2011) and Van der Linden and Hambleton (2013) as capable of producing two parallel halves of almost equal means, variances and covariance's. This study employed Cronbach's alpha coefficients to test reliability of the rating scaled questionnaire and items deleted in order to maximize their reliability coefficient. The coefficient was then compared against a threshold of 0.70 as a coefficient test for reliability suggested by Cohen and Swerdlik (2010) and Oso and Onen (2009); the test instrument used in this study satisfied this criterion for consideration as highly reliable and appropriate for data collection with a reliability coefficient of 0.781.

A questionnaire with Statements for eight variables was used to collect data from 84 participants. The variables were Alternative risk transfer, Contingent capital, Credit enhancement, Hedging derivatives, Insurance, Communication strategy, Contract Management and performance hydroelectric energy projects. The overall instrument had a reliability coefficient of 0.781 and hence the instrument was considered reliable and internal consistency achieved. The summary of reliability results is shown in Table 3.4

Table 3.4: Summary of Reliability Statistics

Variable	Cronbach's Alpha coefficient	No. of items
Alternative risk transfer	0.814	10
Contingent capital	0.825	10
Credit enhancement	0.758	10
Hedging derivatives	0.763	10
Insurance	0.796	10
Communication strategy	0.753	10
Contract Management	0.799	10
performance hydroelectric energy projects	0.743	10
Averaged Cronbach's alpha coefficient	**0.781**	**80**

3.6 Data Collection Procedure

The researcher sought authorization to conduct research from the University of Nairobi and proceed to procure a permit from National Commission for Science, Technology and

Innovation (NACOSTI). Equipped with the permit and an introductory letter from the university, the researcher visited the project authority offices for introduction, clearance and seeking respondents consent to undertake research. The instruments were administered by the researcher and 4 research assistants with university degree and experience in conducting quantitative and qualitative research. The research staff were taken through a training on the pending research study for a better understanding of the instrument items, data collection tools, procedure for identifying respondents, data quality assurance, daily reporting procedures and ethics of research. The research team then proceeded to the actual field work which lasted for a month and sought respondent's and Key Informant's consent to voluntarily participate in the exercise before engaging them and a confirmation of consent was registered by the respondents by signing a consent declaration sheet that was provided and retained by the research assistants. A single instrument administration lasted between 30 to 40 minutes and each research assistant was required to administer 7 questionnaires in a day and collection done after 3 days for all the 84 questionnaires and 10 interview guides. The collected data was then checked for completeness and cleaned to ensure quality.

3.7 Data Analysis Techniques

Descriptive and inferential statistics were used for analyzing data to fulfill research objectives, answer research questions and test hypotheses. These were further described as follows:

3.7.1 Descriptive Statistics

Descriptive statistics described and summarized data into distribution scores like measures of central tendency, variability, measures of spread, relationship and association in frequency percentage and presentation done in tables. The data collected using questionnaires were grouped according to specific objectives and research questions. Closed ended questions were awarded numerical scores. Descriptive statistics determine whether the relationship or difference is real or by chance between sample data and population parameters was the ultimate purpose of the study.

3.7.1.1 Quantitative data analysis

Quantitative data was collected using questionnaire on the five independent variables, moderating variable, intervening variable and dependent variable which contained approximately 80 items in the main body with each of the 8 variables having 10 items structured to generate Likert response options measured on a 5-point ordinal scale ranging

from the lowest score "1" Strongly disagree (SD) to the highest score "5" Strongly agree (SA) that was combined into composite Likert scale to provide a quantitative measure of the variable in an interval scale as recommended by Frauke *et al.,* (2008) and Cooper and Schindler (2003). The data was then captured in a pre-designed entry screen using SPSS version 25 and frequencies run to correct post entry errors and show data distribution. For analysis of Likert responses, the study used a 5-point equidistance scale (Carifio and Perla, 2007) that provided the ranges between the points as follows: Strongly disagree (1<SD<1.8); Disagree (1.8<D<2.6); Neutral (2.6<N<3.4); Agree (3.4<A<4.2) and Strongly Agree (4.2<SA<5.0). Based on this scale, this study considered an item means greater than 3.4 to indicate that most respondents agree with the opinion expressed in the item. Preliminary data analysis involved descriptive techniques of mean and standard deviation for every questionnaire item, and the mean of means and mean standard deviation for the composite scores for each study variable for insightful show of the data structure.

3.7.1.2 Qualitative data analysis

The qualitative data was analyzed manually through descriptive statistics of thematic content analysis method that follows an interview question approach. The approach being inductive in nature reviewed the key informant's responses to individual questions in the interview guide and identified themes, consistencies and differences. Qualitative analysis involved thematic clustering of narrations and transcriptions by Key informants on the opportunities, drivers, and barriers of financial risk management instruments, communication strategy and contract management on performance of hydroelectric energy projects and then results used to triangulate the quantitative data. During transcription and translation, care was taken to retain the grammar as was used (verbatim) without modification to explain certain issues of interest and provide the best reflection of the original conversation. Cleaning was then done to remove any possibility of duplications and overlapping for subsequent summarization into categories. The qualitative findings were reported verbatim under every theme corresponding to a specific objective for triangulation with quantitative data for detailed understanding and interpretation. These statistics were useful for assessment of the dimensions of characteristics of variables under investigation (Mugenda and Mugenda, 2003). Each objective had variables for analysis as operationalized in Table 3.5.

3.7.2 Inferential Statistics

Inferential statistics enables generalization of sample results to the population from which it's drawn. Statistical inference in this study therefore ascertained whether the study findings were by chance, could enable replication or are false inferences drawn from the sample by testing formulated hypotheses on the relationship between variables. The study applied parametric hypotheses tests of correlation and regression analysis at a confidence level of 95% or 0.05 significance level, that is, the researcher left 5% chance of error to environmental factors and was 95% confident the study sample was not biased. The results presentation was done in table form.

3.7.2.1 Correlation Analysis

Correlation analysis measures relationship strength between two or more variables by means of the correlation coefficient r. Correlation analysis tested hypotheses 1. H_0, 2. H_0, 3. H_0, 4. H_0 and 5. H_0 using Pearson Product Moment Correlation denoted by r. A Pearson correlation analysis was conducted to investigate whether there is an association or variance between performance of hydroelectric energy projects and ART, Contingent capital, credit enhancement, hedging derivatives, insurance, communication strategy and contract management from data that is continuous in nature and interval in scale.

The value of r lies between -1 and +1 and explained as follows:

A coefficient of +1: Perfect positive correlation

-1: Perfect negative correlation

0: No/zero correlation

r^2= Sample of coefficient of determination, representing variance proportion in dependent variable explained by regression equation.

3.7.2.2 Regression Analysis

Regression model is a parametric statistical test expressed as a mathematical equation and is used in describing the relationship between two or more variables which yields continuous data and measured under interval scale. A simple regression model involves a single independent variable and a dependent variable. The test result yielded a model summary, ANOVA and Coefficient of Regression which was used to test the level of significance of each independent variable against dependent variable. In addition, the researcher used multiple regression analysis to establish the strength of the relationship between dependent and independent variables.

The regression model took the form:

$Y= \beta_0+ \beta_1X_1+\beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5+.... \beta_nX_n+\alpha$

Where; Y: dependent variable (performance of hydroelectric energy projects),

β_0: regression coefficient/constant/Y-intercept,

β_1, β_2, β_3, β_4, and β_5: slopes of the regression equation/Beta Coefficients,

X_1, X_2, X_3, X_4, X_5.....Xn: predictor variables

α: error term normally distributed around a mean of 0 and for computational reasons we assume $\alpha=0$. It captures the effect of all omitted variables or random variation in the dependent variable.

A simple regression model was used on each of the single independent variables, and the combined independent variables against dependent variable taking the form:

1. H_0: There is no significant relationship between Alternative Risk Transfer and performance of hydroelectric energy projects in Kenya

Performance=*f*(Alternative risk transfer, random variable)

$Y= \beta_0+ \beta_1X_1 +\alpha$

2. H_0: There is no significant relationship between Contingent capital and performance of hydroelectric energy projects in Kenya

Performance=*f*(Contingent capital, random variable)

$Y= \beta0+ \beta_2X_2 +\alpha$

3. H_0: There is no significant relationship between Credit enhancement and performance of hydroelectric energy projects in Kenya

Performance=*f*(Credit enhancement, random variable)

$Y= \beta_0+ \beta_3X_3 +\alpha$

4. H_0: There is no significant relationship between Hedging derivatives and performance of hydroelectric energy projects in Kenya

Performance=*f*(Hedging derivatives, random variable)

$Y= \beta_0+ \beta_4X_4 +\alpha$

5. H_0: There is no significant relationship between Insurance and performance of hydroelectric energy projects in Kenya

Performance=*f* (Insurance, random variable)

$Y= \beta_0+ \beta_5X_5+\alpha$

6. H_0: There is no significant relationship between the combined financial risk management instruments and performance of hydroelectric energy projects in Kenya

Performance=f(Financial Risk Management Instruments, random variable)

$Y= \beta_0+ (\beta_1X_1+\beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5) +\alpha$

To test hypotheses 7. H_0 and 8. H_0 which have more than one independent variable (predictor variables) against the dependent variable, a stepwise linear regression analysis and multiple linear regression analysis using Baron and Kenny (1986) approach was adopted.

The study formed groups using independent variables and dependent variable analyzed.

In step 1 the moderating effect of communication strategy was conducted on each predictor in order to test whether there was any moderating effect or not using the model

$Y= \beta_0+ \beta_1X +\alpha$

In step 2 a multiple regression analysis was conducted on the predictors (Financial Risk Management Instruments) together with the moderator (communication strategy) predicting performance of hydroelectric energy projects in Kenya. Communication strategy (moderating variable) was hypothesized to test the magnitude of the relationship and degree of association for linear regression with thematic data analysis on financial risk management instruments and performance of hydroelectric energy projects. Communication strategy acted as a special independent variable in a moderating capacity with the effect of either increasing or decreasing the cause and effect relationship between independent and dependent variables. The relationship between financial risk management instruments and communication strategy on performance of energy projects was structured into a linear regression model in the form:

$Y_j= \beta_0+ \beta_jX_j+\beta_mX_m+ \alpha$

Where: j=1, 2, 3...n: population regression coefficients for every independent variable X_i

Y_j -Dependent variable

β_j -Regression coefficient of the predictor variable

β_m -Regression coefficient of the moderator variable

X_j -Independent variables (Financial risk management instruments)

X_m -Moderator variable (performance)

β_0 -Population regression constant or intercept

α -Model error variable

7. H_0: Communication strategy does not significantly moderate the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya

Performance=f(financial risk management instruments, communication strategy, and the interaction term between Financial Risk Management Instruments and performance of hydroelectric energy projects, random variable)

$Y_j = \beta_0 + \beta_j X_j + \beta_2 X_m + \beta_3 X_m + \alpha$

The moderating influence was measured in a continuous manner, and modeled through creation of a new variable which is a product of moderated variable (X) and the moderating variable (M). The interaction term (XM) is integrated into regression equation after estimating the main linear effects, outcome (Y) of the moderating (M) and the moderated variable (X). If the effect of (XM) is not significant then the influence of X on Y is dependent upon the levels of M.

In the case of hypothesis 8. H_0: In step 1 the mediating effect of contract management was conducted on each predictor in order to test whether there was any mediating effect or not using the model

$Y = \beta_0 + \beta_1 X + \alpha$

In step 2 a multiple regression analysis was conducted on the predictors (Financial Risk Management Instruments) together with the mediator (contract management) predicting performance of hydroelectric energy projects in Kenya.

The procedure was similar to that of hypothesis 7. H_0 but measured the mediating effect of contract management on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects. An intervening variable hypothetically affect the cause-effect relationship of independent and dependent variables indirectly, for instance, contract management can either have a positive (increase) or negative (decrease) correlation on performance of hydroelectric energy projects thereby affecting indirectly the relationship between financial risk management instruments and performance of hydroelectric energy projects. When this occurs researchers hypothesize what other variables could be influencing the relationship between the two, that is, contract management intervenes to mediate the connection between financial risk management instruments and performance of hydroelectric energy projects.

8. H_0: Contract management does not significantly mediate the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya

Performance=f(financial risk management instruments, contract management, and the interaction term between Financial Risk Management Instruments and performance of

hydroelectric energy projects, random variable)

$Y_j = \beta_0 + \beta_j X_j + \beta_2 X_m + \beta_3 X_m + \beta_2 X_i + \beta_3 X_i + \alpha$

Given a case like in 1. H_0 the interpretation of the regression equation takes the form: a unit increase in ART gives rise to an increase of β_1% on the performance of hydroelectric energy projects. For regression analysis to be effective the following assumptions were considered: the errors are independent, probability distribution of the errors is normal, standard deviation of errors is constant and the mean of errors is zero. The Coefficient of multiple determination (R^2, SST) showed how good the multiple regression model was and how well the independent variables explained dependent variable. In research it's always advisable to use adjusted coefficient of multiple determination which refers to the amount of variation explained by the independent variable or variables (%). The ANOVA table provided the significance of the relationships between the independent and dependent variables ($F_{(df)}$=Calculated value; P-value=calculated value in comparison to α). Decision rule: If P-value>α then fail to reject the Null hypothesis, for instance, 1. H_0: States that there is no significant relationship between ART and performance of hydroelectric energy projects.

OR,

Reject H_0 if $F_{\text{calculated}} \geq F_{\text{critical value}}$ found in F distribution table of probabilities with degree of freedom, df_1=k-1 and df_2=N-k.

For the study the conclusion will be whether there is statistically significant evidence at α=0.05 to show that there is a difference in mean of financial risk management instruments among hydroelectric energy projects.

3.8 Ethical considerations

The study was professionally handled with relevant ethical issues considered in an effort to uphold integrity and protect the interest of the respondents. At the onset, the consent of the respondents was sought and they were made to understand their voluntary participation in the study and no influence whatsoever was used to solicit the consent. Further, the research was done with utmost confidentiality and information obtained was only accessible to the researcher and applicable to the research purpose. For purposes of anonymity respondent's identity was kept anonymous in the entire report as only a serial number was assigned to them. Items in data collection instruments were sensitive to the psychological wellbeing of respondents, that is, embarrassing or threatening items in data collection instruments or statement that could elicit negative emotions were avoided during data collection. Lastly, the research was conducted with utmost honesty within the confines of the law.

3.9 Operationalization of the variables

Table 3.5 presents the operational definition of variables with their respective indicators, data collecting instruments, measurement scales and data analysis

Table 3.4: Operationalization of Variables

Objectives	Variables	Indicators	Measurement scale	Research Approach	Data Analysis Techniques	Tools of data analysis
To establish the extent to which Alternative Risk Transfer influence performance of hydroelectric energy projects in Kenya	Independent: Alternative risk transfer	• Risk securitization • Standardization and non-indemnity trading • Funding risk transfer • Complementary source of capital • Enhances returns	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Thematic content analysis Mean, standard deviation
To examine how Contingent capital influence performance of hydroelectric energy projects in Kenya	Independent: Contingent capital	• Capital reserve maintenance • Moral hazard reduction • Financial distress cost reduction • Rate of debt amortization • Cheaper cost of capital	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Thematic content analysis Mean, standard deviation
To assess the extent to which Credit enhancement influence performance of hydroelectric energy projects in Kenya	Independent: Credit enhancement	• Access to market borrowing • Credit rating • Risk financing • Borrowing cost reduction • Debt amortization rate	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Mean, standard deviation Thematic content analysis
To determine the extent to which Hedging derivatives influence performance of hydroelectric energy projects in Kenya	Independent: Hedging derivatives	• Availability of hedging tools • Reduced market risk • Reduce counterparty risk • Liquidity flow control • Reduce cost of capital	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Mean, standard deviation Thematic content analysis
To examine how insurance influence performance of hydroelectric energy projects in Kenya	Independent: Insurance	• Risk acceptance • Premium charges • Efficiency of indemnification • Reinsurance of risks	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Mean, standard deviation Thematic content analysis

		• Underwriting capacity				
To determine the extent to which Communication strategy moderates the relationship between financial risk management instruments influences performance of hydroelectric energy projects in Kenya	Moderating: Communication strategy	• Communication flow structures • Communication management tools • Communication channels • Quality of information • Information symmetry • Communication cost • Risk awareness communication • Communication scope	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Mean, standard deviation Thematic content analysis
To assess the intervening influence of Contract management on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya	Intervening: Contract management	• Quality standards operation • Value for money achievement • Efficiency in fund allocation • Competitive procurement • Risk obligation of project parties • Schedule implementation • Pre-approved contract language adherence	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Correlation analysis Regression analysis Mean, standard deviation Thematic content analysis
	Dependent: Performance of hydroelectric energy projects	• Project cost reduction • Operational efficiency • Implementation schedule time • Production capacity • Profitability of operations • Quality electricity supply • Customer satisfaction • Affordable electricity supply • Ease of electricity access	Ordinal Interval	Quantitative Qualitative	Parametric: Descriptive Inferential	Mean, standard deviation Thematic content analysis

Table 3.6 Summary of the hypotheses tested in analysis

Objective	Hypotheses	Type of test	Interpretation
To establish the extent to which Alternative Risk Transfer influence performance of hydroelectric energy projects in Kenya	1. H_0: There is no significant relationship between Alternative Risk Transfer and performance of hydroelectric energy projects in Kenya	Correlational analysis Simple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To examine how Contingent capital influence performance of hydroelectric energy projects in Kenya	2. H_0 There is no significant relationship between Contingent capital and performance of hydroelectric energy projects in Kenya	Correlational analysis Simple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To assess the extent to which Credit enhancement influence performance of hydroelectric energy projects in Kenya	3. H_0 There is no significant relationship between Credit enhancement and performance of hydroelectric energy projects in Kenya	Correlational analysis Simple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To determine the extent to which Hedging derivatives influence performance of hydroelectric energy projects in Kenya	4. H_0 There is no significant relationship between Hedging derivatives and performance of hydroelectric energy projects in Kenya	Correlational analysis Simple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To examine how insurance influence performance of hydroelectric energy projects in Kenya	5. H_0 There is no significant relationship between Insurance and performance of hydroelectric energy projects in Kenya	Correlational analysis Simple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To assess the extent to which the combined financial risk management instruments influence performance of hydroelectric energy projects in Kenya	6. H_0: There is no significant relationship between the Combined financial risk management instruments and performance of hydroelectric energy projects in Kenya	Correlational analysis Multiple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To determine the extent to which Communication strategy moderates the relationship between financial risk management instruments influences performance of hydroelectric energy projects in Kenya	7. H_0 There is no significant Moderating influence of Communication strategy on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya	Correlational analysis Multiple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong
To assess the mediating influence of Contract management on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya	8. H_0 There is no significant mediation influence of Contract management on the relationship between combined financial risk management instruments and performance of hydroelectric energy projects in Kenya	Correlational analysis Multiple Linear Regression analysis	When $p<0.05$, Reject H_0, otherwise fail to reject Strength of Relationship: $+0.10<r<+0.29$; weak; $+0.30<r<+0.49$; moderate; $+0.50<r<1$; strong

CHAPTER FOUR

DATA ANALYSIS, PRESENTATION, INTERPRETATION AND DISCUSSION

4.1. Introduction

This chapter presents findings of the study discussed based on themes and sub-themes in line with the objectives. The themes include: Questionnaires return rate, Participant's demographic characteristics, Basic tests of statistical assumptions, alternative risk transfer and performance of hydroelectric energy projects, contingent capital and performance of hydroelectric energy projects, credit enhancement and performance of hydroelectric energy projects, hedging derivatives and performance of hydroelectric energy projects, insurance and performance of hydroelectric energy projects, communication strategy moderating financial risk management instruments and performance of hydroelectric energy projects, and finally contract management mediating financial risk management instruments and performance of hydroelectric energy projects.

4.2 Questionnaire Return Rate

The study administered 84 questionnaires to the participants from the twelve hydroelectric energy projects which were all dully filled representing a 100% return rate. The 100% high return rate ensured sufficient data collection for generalization to determine the influence of financial risk management instruments, communication strategy and contract management on performance of hydroelectric energy projects in Kenya. This was in line with Orodho (2009) that a return rate above 50% enables sufficient data gathering for generalization to represent participant's opinions about the study problem in the target population.

4.3 Demographic Characteristics of Respondents

The background information of the participants in the study was necessary to understand their characteristics. The study sought information from the participants on distribution by; project category, age, gender, years of professional experience, educational background, and designation type. The participants were asked to provide the demographic information and results presented in Table 4.1.

Table 4.1: Demographic Characteristics of Respondents

Characteristics	n(f) frequency	(%) percent
Project category		
KenGen	63	75.0
Independent power producer	21	25.0
Total	**84**	**100**
Gender		
Male	59	70.2
Female	25	29.8
Total	**84**	**100**
Age(years)		
Below 30	5	6.0
30-39	19	22.6
40-49	31	36.9
50 and above	25	34.5
Total	**84**	**100**
Years of professional experience		
Below 2	3	3.6
2-4	7	8.3
5-10	24	28.6
11 and above	50	59.5
Total	**84**	**100**
Educational level		
Diploma holder	6	7.1
Bachelor degree	48	57.2
Post-graduate	30	35.7
Total	**84**	**100.0**
Designation type		
Project manager	12	14.3
Finance manager	12	14.3
Hydroelectric plant technician	12	14.3
Hydroelectric plant operator	12	14.3
Hydroelectric engineer	12	14.3
Communications manager	12	14.3
Quality assurance manager	12	14.3
Total	**84**	**100**

The study results on Table 4.1 shows that out of 84 respondents who participated in the study, 63(75%) were from KenGen (Mega-Hydros) whereas 21(25%) were from independent power producers (Mini-Hydros). The research findings on the participants age distribution indicated that 5(6.0%) were below 30 years, 19 (22.6%) were between 30-39 years, 31(36.9%) were between 40-49 years and 29(34.5%) were 50 years and above. This results shows that all the study subjects were all adults above 18 years with a capability for adequate response to the question items under study as recommended by Wambugu *et al.*, (2015). The research results on participants distribution by gender shows that majority 59(70.2%) were males and 25(29.8%), were females. This result implies that male participants were predominant than

female counterparts gender wise in this study; however it satisfied the gender parity requirement of 2/3rd as provided by the labor laws and this implies that the gender parity could have never had a great implications on the results of this study. The study results indicated that 5(6.0%) had a professional experience of below 2 years, 7(8.3%) had a professional experience of between 3-4 years, 24(28.6%) had a professional experience of 5-10 years and 50(59.5%) had a professional experience of 11 years and above; implying that 74% of the participants had worked for at least 5 years in the hydroelectric energy projects giving them an impetus on the understanding of financial risk management instruments, communication strategy and contract management influence on performance of hydroelectric energy projects.

It was important to establish participants' education level to ascertain their knowledge and skill relevance on responding to financial risk management instruments, communication strategy and contract management influencing performance of hydroelectric energy projects in Kenya. The study findings indicated that 48(57.1%) had bachelor degree, 30(35.7%) had post-graduate degree and 6(7.1%) had diploma. The findings implied that most of the respondents were well educated to understand the nature of the study problem and thus provided the study with reliable information on financial risk management instruments, communication strategy and contract management influencing performance of hydroelectric energy projects. The study findings indicated further that 12(14.3%) each were project managers, finance managers, hydroelectric plant technician, hydroelectric plant operators, hydroelectric engineers, communications managers and quality assurance managers respectively which gave an equal distribution of respondents and a fair chance of response throughout the study area.

4.4. Basic Tests for Statistical Assumptions

It was necessary in this research study to check for assumptions of multiple linear regressions to eliminate any bias on estimated coefficients and standard errors (for example getting a significant effect when in fact there is none, or vice versa). In particular, the following assumptions were tested:

4.4.1 Assumptions of Normality

The normality test of data distribution was conducted on all the predictor variables, and on dependent variable using Kolmogorov-Smirnov test statistics and Shapiro-Wilk test. The two test statistics compares the sample scores to a set of normally distributed scores with equal

means and standard deviations (Pedace, 2013; Baguley, 2012). If P-value>0.05 then the test is non-significant; indicating that sample distribution is not significantly different from a normal distribution (normal). Otherwise, the data distribution is non-normal if the test is significant (P-Value <0.05), that is, the sample distribution is significantly different from a normal distribution. The study results indicated that all the independent variables under investigation (alternative risk transfer, contingent capital, credit enhancement, hedging derivatives, insurance as well as communication strategy as the moderator variable and contract management as intervening variable) had P-values above 0.05 leading to the conclusion that the samples pick was from a normal population. The statistical results of Kolmogorov-Smirnov and Shapiro- Wilk tests are shown in Table 4.2.

Table 4.2: Tests for Normality

Variables	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Alternative risk transfer	0.151	84	0.200	0.960	84	0.776
Contingent capital	0.141	84	0.200	0.979	84	0.928
Credit enhancement	0.178	84	0.200	0.981	84	0.940
Hedging derivatives	0.204	84	0.200	0.993	84	0.843
Insurance	0.185	84	0.200	0.980	84	0.727
Communication strategy	0.170	84	0.200	0.969	84	0.893
Contract management	0.248	84	0.200	0.920	84	0.532

a. Lilliefors Significance Correction

4.4.2 Test for independent errors in the model

A Durbin-Watson test was done to detect if there is autocorrelation between variables. According to Gujarati and porter (2009), Durbin-Watson test ranges from 0 to 4 with a value closer to 2 indicating non-autocorrelation; a value closer to 0 indicating positive correlation and a value near 4 indicating negative correlation. The research found out values near 2 for the three Multiple linear regression models 1(Combined independent variables regression model), model 2(regression model with communication strategy as moderator on the relationship between financial risk management instruments and performance of hydroelectric energy projects) and model 3 (with contract management as an intervening variable on the relationship between financial risk management instruments and performance of hydroelectric energy project) implying that the error term was independent. The findings are presented on Table 4.3

Table 4. 3: Test statistics for Independence of Errors

Model	Durbin-Watson Statistic (D)	Conclusion
Model 1	1.489	Error terms are independent
Model 2	1.552	Error terms are independent
Model 3	1.477	Error terms are independent

4.4.3 Homogeneity of Variance (Homoscedasticity) Assumption

Multiple regression analysis assumes that variances of dependent variable remain homogeneous on manipulation of the independent variables (Tabachnick and Fidell, 2013; Alin, 2010). Levene's test was adopted to examine uniformity of variability in the scores of dependent variables upon manipulation of independent variables. Levene's test tests the null hypothesis that the variances in different groups are equal (zero difference between variances). The test examined whether variance of performance of hydroelectric energy projects was the same across the predictor variables. The results are represented in Table 4.4

Table 4.4: Test of Homogeneity of Variances

Financial risk management instruments		Levene Statistic	df1	df2	Sig.
Alternative risk transfer	Based on Mean	1.595	13	69	0.109
Contingent capital	Based on Mean	0.989	13	69	0.471
Credit enhancement	Based on Mean	1.408	13	69	0.215
Hedging derivatives	Based on Mean	1.996	13	69	0.067
Insurance	Based on Mean	1.579	13	69	0.155
Communication strategy	Based on Mean	1.372	13	69	0.212
Contract management	Based on mean	1.841	13	69	0.072

For homogeneity of variances, none of the Levene statistic should be significant at a significance level of 5%. The null hypothesis is not correct if Levene's test is significant (P-Value $\leq$0.05); meaning variances are significantly different, thus, homogeneity of variance assumption has been violated. Otherwise, the variances are near equal and assumption is tenable if Levene's test is none significant (P-Value >0.05). The findings revealed that none of the Levene statistics was significant (alternative risk transfer: df(13,69), P-Value=0.109>0.05; contingent capital: df(13,69), P-Value=0.471>0.05; credit enhancement: df(13,69), P-Value=0.215>0.05; Hedging derivatives: df(13,69), P-Value=0.067>0.05; insurance: df(13,69), P-Value=0.155>0.05; moderating communication strategy: df(13,69), P-Value=0.212>0.05; and intervening contract management: df (13,69), P-Value=0.072>0.05; hence homogeneity of variances was not violated.

4.4.4 Testing for the Presence of MultiCollinearity

A collinearity diagnosis of the independent variable was performed and the results indicated that all the tolerances are above 0.2; all the Variance Inflation Factors (VIF) are also below 5. Since MultiCollinearity is associated with VIF above 5 and tolerances below 0.2 (Pedace, 2013; Baguley, 2012; Alin, 2010), all the variables under the study were therefore deemed not to exhibit MultiCollinearity and considered fit for analysis. The collinearity findings are presented in Table 4.5

Table 4.5: Collinearity Statistics

Variable	Tolerance	VIF
Alternative Risk Transfer	0.724	1.408
Contingent capital	0.710	1.672
Credit enhancement	0.747	1.338
Hedging derivatives	0.891	1.122
Insurance	0.961	1.041
Communication Strategy	0.920	1.087
Contract Management	0.929	1.076

4.5 Performance of Hydroelectric Energy Projects

Performance of Hydroelectric Energy projects in this study was the dependent variable. Both theoretical and empirical review in this study showed that project implementation within time, reduced project cost of capital, attainment of quality standards in supply of electricity measures performance of hydroelectric energy projects. Data was collected to measure ten indicators of Performance of Hydroelectric Energy Projects. To measure Performance of Hydroelectric Energy Projects ten statements were developed in the self-administered questionnaires. The views of the 84 research participants on Performance of Hydroelectric Energy Projects are presented in statements in the subsequent section. The respondents were asked to state their level of agreements or disagreements to the Items in the Likert scale of 1-5 where Strongly Agree(SA)=5, Agree(A)=4, Neutral(N)=3, Disagree(D)=2 and Strongly Disagree (SD)=1. The results are shown in Table 4.6

Table 4.6: Performance of Hydroelectric Energy Projects

STATEMENTS	SA	A	N	D	SD	Mean	Std. dev
1. The Project implementation is within scheduled time	4(4.8%)	52(61.9%)	23(27.3%)	5(6.0%)	0(0.0%)	3.65	0.668
2. The Project cost of capital is reduced	14(16.7%)	50(59.5%)	19(22.6%)	1(1.2%)	0(0.0%)	3.92	0.662
3. The Project meets required quality standards in supply of electricity	64(76.2%)	19(22.6%)	1(1.2%)	0(0.0%)	0(0.0%)	4.75	0.462
4. The Project clients are satisfied with the project outcomes	26(31%)	58(69%)	0(0.0%)	0(0.0%)	0(0.0%)	4.31	0.465
5. The Project operates efficiently as required	42(50%)	39(46.4%)	3(3.6%)	0(0.0%)	0(0.0%)	4.46	0.569
6. The access to power supply is easy	5(6%)	31(36.9%)	48(57.1%)	0(0.0%)	0(0.0%)	3.49	0.611
7. The project has positive environmental impact	77(91.7%)	7(8.3%)	0(0.0%)	0(0.0%)	0(0.0%)	4.92	0.278
8. The energy production capacity has increased	27(32.1%)	57(67.9%)	0(0.0%)	0(0.0%)	0(0.0%)	4.32	0.470
9. The produced electricity is affordable	8(9.5%)	40(47.6%)	35(41.7%)	1(1.2%)	0(0.0%)	3.65	0.668
10. The project generates adequate revenue	69(82.1%)	13(15.5%)	2(2.4%)	0(0.0%)	0(0.0%)	4.80	0.460
Composite mean and Composite standard deviation						**4.23**	**0.281**

Ten statements were developed to measure the extent of performance of hydroelectric energy projects. Statement (1) that 'the project implementation was within time schedule' had a mean of 3.65 and 0.668 standard deviation. This result indicate that from 84 respondents, 52(61.9%) agreed that project implementation was within time schedule, 4(4.8%) strongly agreed that project implementation was within time schedule, 23(27.3%) were neutral that project implementation was within time schedule, and 5(6%) disagreed that project implementation was within time schedule. This result indicate that the line statement mean score of 3.65 was below composite mean score of 4.23; this result implies that project implementation was not within time schedule and hence may negatively affect the performance of hydroelectric energy projects. The higher line item standard deviation of 0.668 than composite standard deviation of 0.281 indicates divergence of opinions. The study results supports findings by Pramangioulis *et al.,* (2019) who observed that delays in the implementation and operations and maintenance of power projects has a negative influence on their performance.

Statement (2) that 'the project cost of capital is reduced' had a mean of 3.92 and 0.662 standard deviation. This finding indicate that from 84 respondents, 50(59.5%) agreed that

project cost of capital was reduced, 14(16.7%) strongly agreed that project cost of capital was reduced, 19(22.6%) were neutral that project cost of capital was reduced, and 1(1.2%) disagreed that project cost of capital is reduced. This result indicates that the line statement mean score of 3.92 was below composite mean score of 4.23; this result implies that the project cost of capital was not reduced and hence may negatively affect the performance of hydroelectric energy projects. The higher line item standard deviation of 0.662 than composite standard deviation of 0.281 indicates divergence of opinions. The study results supports findings by Ofori-Kuragu, Baiden and Badu (2016) who observed that cost-overruns in the implementation and operations of power projects have a negative influence on their performance.

Statement (3) that 'the project meets required quality standards in supply of electricity' had a mean of 4.75 and 0.462 standard deviation. This finding indicate that from 84 respondents, 64(76.2%) strongly agreed that projects' electricity supply met quality standards, 19(22.6%) agreed that projects' electricity supply met quality standards and 1(1.2%) were neutral that the projects' electricity supply met quality standards. This result indicate that the line item mean score of 4.75 was above composite mean score of 4.23; this results implies that the projects met required quality standards in supply of electricity which would positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.462 than composite standard deviation of 0.281 indicates divergence of opinions. The study results supports findings by Waweru and Rambo (2017) who observed that quality achievement in the implementation of power projects has a positive effect on their performance.

Statement (4) that 'project outcomes satisfied clients' had a mean of 4.31 and 0.465 standard deviation. This results indicate that from 84 respondents 58(69%) agreed that project clients were satisfied with the project outcome, 26(31%) strongly agreed that project clients are satisfied with the project outcome. This result indicates that the line statement mean score of 4.31 was above composite mean score of 4.23; this result implies that the project outcomes satisfied clients and hence positively affect the performance of hydroelectric energy projects. However, higher line item standard deviation of 0.465 than composite standard deviation of 0.281 indicates divergence of opinions. The study results supports findings by Sibiya, Aigbavboa and Thwala (2015) who observed that client satisfaction is positively correlated to the performance of power projects.

Statement (5) that 'the project operates efficiently as required' had a mean of 4.46 and 0.569 standard deviation. This result show that from 84 respondents, 42(50%) strongly agreed that project operates efficiently as required, 39(46.4%) agreed that project operates efficiently as required and 3(3.6%) were neutral that project operates efficiently as required. This result indicate that the line statement mean score of 4.46 was above composite mean score of 4.23; this results implies that the projects operated efficiently as required and hence positively influence the performance of hydroelectric energy projects. The higher line item standard deviation of 0.569 than composite standard deviation of 0.281 indicates divergence of opinions. The study finding supports findings by Elbatran *et al.,* (2015) who observed that efficiency in power plants operation positively influences the performance of the power projects.

Statement (6) that 'the access to power supply is easy' had a mean of 3.49 and 0.611 standard deviation. This finding indicate that from 84 respondents, 48(57.1%) were neutral that the access to power supply was easy, 31(36.9%) agreed that the access to power supply was easy and 5(6%) strongly agreed that the access to power supply was easy. This results shows that the line item mean score of 3.49 was below composite mean score of 4.23; this results implies that the access to power supply is not easy and hence may negatively influence the performance of hydroelectric energy projects. The higher line item standard deviation of 0.611 than composite standard deviation of 0.281 indicates that there is a strong divergence of opinion by the respondents. The study finding supports findings by Hansen, Pedersen, and Nygaard (2015) who observed that difficulty in access to power supply by intended customers negatively influence performance of power projects.

Statement (7) that 'the project has a positive environmental impact' had a mean of 4.92 and a 0.278 standard deviation. This finding shows that from 84 respondents, 77(91.7%) strongly agreed that the project has a positive environmental impact, 7(8.3%) agreed that the project has a positive environmental impact. This result indicates that the line statement mean score of 4.92 was above composite mean score of 4.23; this result implies that the projects had a positive environmental impact and hence positively influencing performance of hydroelectric energy projects. The lower line item standard deviation of 0.278 than composite standard deviation of 0.281 indicates that there is convergence in opinion among the respondents. The study finding supports findings by Rezec and Scholtens (2017) who observed that renewable energy projects have a positive environmental effect hence better performance.

Statement (8) that 'the project energy production capacity has increased' had a mean of 4.32 and 0.470 standard deviation. This finding shows that from 84 respondents, 57(67.9%) agreed that project energy production capacity has increased, 27(32.1%) strongly agreed that the project energy production capacity has increased. This result indicates that the line item mean score of 4.32 was above composite mean score of 4.23; this result implies that the project energy production capacity has increased and hence positively influences performance of hydroelectric energy projects. The higher line item standard deviation of 0.470 than composite standard deviation of 0.281 indicates that there is a divergence of opinion by the respondents. The study finding supports findings by Gitone (2014) who observed that an increase in renewable energy capacity production significantly improves performance of power projects.

Statement (9) that 'the produced electricity is affordable' had a mean of 3.65 and 0.668 standard deviation. This finding show that from 84 respondents, 40(47.6%) agreed that the produced electricity was affordable, 35(41.7%) were neutral that the produced electricity was affordable, 8(9.5%) strongly agreed that the produced electricity is affordable and 1(1.2%) disagreed that the produced electricity was affordable. This results show that the line statement mean score of 3.65 was below composite means score of 4.23; this result implies that the produced electricity is not affordable and hence may negatively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.668 than composite standard deviation of 0.281 indicates that there is a strong divergence opinion among respondents. The study finding supports findings by Gitone (2014) who observed that the cost of electricity is still high for the customers and thus affects performance of renewable power projects.

Statement (10) that 'the project generates adequate revenue had a mean of 4.80 and 0.460 standard deviation. This finding indicate that from 84 respondents, 69(82.1%) strongly agreed that the project generates adequate revenue, 13(15.5%) agreed that the project generates adequate revenue and 2(2.4%) were neutral that the project generates adequate revenue. This results shows that the line item mean score of 4.80 was above composite mean score of 4.23; this results implies that the project generates adequate revenue and hence positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.460 than composite standard deviation of 0.281 indicates that there is a divergence opinion among respondents. The study finding supports findings by Frisari and Micale (2015) who

observed that renewable energy projects have the ability to generate adequate revenue for their operations and profit hence positively affecting their performance. The overall composite score of all indicators of Performance of Hydroelectric Energy Projects had a mean of 4.23 and 0.281 standard deviation. This finding shows that out of 84 participants, 71(84.5%) of participants at least agreed that there is performance of hydroelectric energy projects; this findings are similar to findings by Pragmangiouis *et al.*, (2019) who observed that steady revenue inflows from electricity sales ensures performance of Hydroelectric Energy Projects.

These findings were further supported by qualitative data derived from Key informant interview regarding performance of Hydroelectric Energy Projects. This observation was explicitly captured by KenGen participant who, upon being asked about the performance of hydroelectric energy projects, responded:

> *"...our good performance can be shown by the confidence the public and investors have in us when we successfully issued the Largest Public Infrastructure Bond in Kenya of over Kshs.26 billion in 2016 through the NSE to fund mega energy projects. The good performance is attributed to a committed skilled workforce for delivery of cost effective operation and maintenance of existing and new power projects."* As an intervention, *"...the 10 year Good-to-Great (G2G) transformative strategic plan launched in 2007 for capacity expansion and sustainable power supply has met 83% delivery success out of 721MW targeted by 2020 in conformity with Least Cost Power Development Plan (LCPDP) and Vision 2030 for access to affordable, quality, reliable, adequate, safe, and competitive electricity."* (KII No. 1, KenGen).

This was supported by Ministry of Energy (MoE) respondent who asserted that:

> *"...implementation of institutional reforms such as legal, regulatory and institutional framework in the energy sector on Least Cost Power Development Plan (LCPDP) for electricity generation, transmission and distribution to drive entire economic growth and Vision 2030 flagship projects is facilitated effectively by offering quality, cost effective, competitive and affordable energy services. In spite of these reforms, the energy sector still faces challenges including huge capital input and long leads times from feasibility to infrastructure implementation, constraint in mobilization of funds for mega-power development, high energy cost, low income per capita and under-industrialization."* However as an intervention, *"...the 2004 Energy Policy Session*

Paper Number 4, the 2006 Energy Act, Number 12 and FiT Policy 2008 for renewable energy sub-sector seek to increase private sector investment and address these challenges to ensure affordable and reliable supply of energy." (KII No. 2, MoE).

Further, the KenGen participant said that:

"…the earning of Certified Emission Reduction (CERs) or carbon asset funds under Clean Development Mechanism (CDM) portfolio projects like the 24 MW Kiambere Project from United Nations Framework Convention on Climate Change (UNFCCC) was a boost to renewable energy projects. The current portfolio of registered CDM projects by KenGen can contribute up to 1,500,000 tons of Carbon Dioxide (CO2) emission reduction every year. Equally, *"…to deliver on climate change and sustainability, KenGen is establishing a full-fledge CDM and finance center."* (KII No. 1, KenGen).

Certified Emission Reductions are carbon credits from developing nations to enable developed nations limit their emission targets in accordance with Kyoto Protocol for reduced global warming.

Concerning the efficiency of power production, the KenGen interviewee stated that:

"…there is enhanced generation capacity through increased power production, plant availability and reduced machine down time which has led to increased revenue generation and subsequent increase in shareholders' value." Specifically, *"…in 2019 performance monitoring and measurement of hydro's stations achieved high plant availability of 98% against a target of 82% due to proactive breakdown simulation maintenance philosophy which led to good financial returns."* Further, *"…to improve the availability of our power plants, we are upgrading the control and protection systems of the old power plants through implementation of SCADA Phase II to increase efficiency and reduce operational costs by enabling remote control and visibility of power plants at a central dispatch centre."* (KII No. 1, KenGen).

Though the production efficiency of the existing power projects was good, the capacity expansion of potential hydropower stations is wanting and this was supported by the Ministry of Energy Official who stated that:

"…in spite Kenya having an estimated hydropower potential of about 6,000MW for large hydros (above 10MW) and over 3,000MW for small hydros, only 823.8 MW of large hydros and less than 25MW of small hydros has been exploited as at 2019." (KII No. 2, MoE).

To protect hydropower investments, the Ministry of Energy official said that:

> *"…to cushion generators, transmitters, distributors and consumers against the vulnerability of hydropower to variations in hydrology and climate, the National Government through Renewable Energy Resources Advisory Committee (RERAC) has developed strategies on Criteria for allocation and licensing of energy resource areas to investors, Management of water towers and catchment areas and development of multi-purpose dams for power generation."* Further, *"…the National Government has integrated hydroelectric energy resources exploration under Rural Electrification and Renewable Energy Corporation."* Equally, *"…the Government explores local and international viable financing options, Public Private Partnerships and set up of Consolidated Energy Fund for infrastructure development."* (KII No. 2, MoE).

A General observation by the Ministry of Energy respondent was that:

> *"…the vulnerability of hydropower projects due to variations in hydrology and climate change results into high economic risk, specifically, small hydros subsector experience challenges including viability threat due to destruction of catchment areas, inadequate financial resources, insufficient hydrological data and inadequate technical personnel, lack of awareness on FiT among potential investors and unclear guidelines on PPA negotiations."* (KII No. 2, MoE).

As an intervention and to attract investor, FiT tariffs have been reviewed downwards for the introduction of renewable energy auctions for competitive price bidding of power projects. This was reflected through a remark from the Ministry of Energy respondent that:

> *"...since the introduction of FiT policy a good number of investors have expressed interest in developing power projects including 104 small hydro's with a 579.71MW capacity."* (KII No. 2, MoE).

To improve power transmission efficiency the respondent from KenGen said that:

> *"…we collaborate with KETRACO and other key stakeholders on the review of the National Land Act to provide a subsidiary legislation for partial and permanent way leave acquisition to facilitate the construction of transmission lines to ensure cost effective integration of new plants comprising of about 5,000km in the short term and 16,000km by 2031."* (KII No. 1, KenGen).

Similarly, an interviewee from KETRACO observed that:

> *"…the Government has decommissioned the expensive Garissa and Lamu thermal power plants following successful completion of Kindaruma to Garissa and Mombasa*

to Lamu transmission lines which have reduced the cost of electricity production though challenges of unjustified land compensation for way leave delayed the project's completion schedule." (KII No. 3, KETRACO).

On profitability an interviewee from KenGen observed that:

"…due to improved revenues and optimization of expenses, the operating profit grew by 43% from Kshs.11.342 billion to Kshs.16.271 billion in the year 2018/2019." (KII No. 1, KenGen).

On risk management KenGen Interviewee said that:

"…risk management practices are robust with a designated Audit and Risk Management Committee of the Board that develops a comprehensive Enterprise Risk Management (ERM) policy including a Strategic Corporate Risk Matrix to monitor effectiveness of internal control systems in assessing and mitigating risk exposures in line with ISO 31000 for effective internal financial management." (KII No. 1, KenGen).

For environmental safety and quality electricity supply KenGen respondent observed that:

"…there is a close collaboration between the company, neighboring communities and other stakeholders to achieve environmental sustainability consistent with National and International Standards in the generation of safe, quality and competitively priced electric energy and this has been demonstrated through operational certification to both ISO 9001:2008 for Quality Management and ISO 9001:14001 for Environment Management besides ISO 18001 for Occupational Health Safety Management System (OHSAS) from which policies and rules such as Quality Policy Statement; Occupational Safety and Health Policy Statement; Fire Safety and Emergency Policy Statement; General Safety Rules are derived." Further, *"…setting, monitoring and evaluation and capacity building on environmental objectives and targets is continuously done as per the environmental policy, laws, regulations and permit conditions for pollution prevention and environmental impacts mitigation."* (KII No. 1, KenGen).

The adherence to environmental safety was supported by observations from Energy Regulatory Commission (ERC) interviewee response that:

"…Environment, Health and Safety (EHS) follow up audits of Sondu and Sang'oro hydroelectric power plants were done in 2017 and Corrective Action Plans (CAPs) for

the non-conformities prepared and submitted by KenGen." (KII No. 4, ERC).

On customer satisfaction, KenGen respondent observed that:

> *"…a certificate of customer service was awarded in 2019 after an independent consultancy report by Commission on Administrative Justice (CAJ) which demonstrated that KenGen power projects offer high quality customer service and satisfaction. This is achieved through conducting regular comprehensive Internal Customer Satisfaction Survey to improve the quality of service delivery and ensure prompt resolution of public complaints referred directly or channeled through Commission on Administrative Justice (CAJ)."* (KII No. 1, KenGen).

However, a contrast picture was portrayed by KPLC respondent that:

> *"…in 2018-2019 expressions of dissatisfied customers due to challenges in service delivery and subsequent negative media coverage eroded the gains made in maintaining high stakeholder confidence besides facing an unprecedented event when the entire top management was arraigned in court and consequently suspended."* However, as a mitigate, *"…the Board of Directors promptly appointed on an interim basis a competent senior management team to maintain our market presence, strong brand and heritage as an energy solution provider of choice to fulfill the Government's Big Four Agenda."* (KII No. 5, KPLC).

Concerning the accessibility of electricity, KPLC respondent said that:

> *"…based on 2018 report 73.5% of the population had access to electricity while in 2019 a total of 578, 808 new customers were connected to the grid, growing the overall customer base by 9.4% to 6,761,090 million through the subsidized government funded Last Mile Connectivity Project to enable customers access electricity cheaply on Feeder Based Business Units (FBBUs)."* However, *"…the cost of extending the power supply network remains a major challenge especially in rural areas owing to land tenure system."* (KII No. 5, KPLC).

These resentments show an institution under depression to provide safe, secure and reliable electricity for economic development. The responses provided insight on how the different indicators under consideration contributed to performance of hydroelectric energy projects. The study findings on the measurement of performance were in tandem with findings of Pramangioulis *et al.,* (2019); Waweru and Rambo, (2017); Ofori-Kuragu, Baiden and Badu

(2016), Sibiya, Aigbavboa and Thwala (2015), and Elbatran *et al.,* (2015) who held a convergence view that measurement of performance in hydroelectric power projects should be attached to quality electricity supply, project cost reduction, increased generation capacity, implementation within time, operational efficiency, customer satisfaction, environmental safety, increased profitability, competitive procurement and risk management.

The findings on performance of hydroelectric energy projects conquers with the principles of goal setting theory that the indicators of performance were clear and measurable, decently difficult to motivate project parties towards their achievement while the project parties committed to achieving the set goals. Through strategic communication, goal commitment was achieved as project parties were inspired to rally around and prioritize their work-units for fulfillment of the project objectives.

4.6 Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

This was the first objective that the study sought to achieve. Therefore participants were requested to give their opinions on their level of agreement or disagreement with the statements on a Likert scale of 1-5 where Strongly agree(SA)=5, Agree(A)=4 Neutral(N)=3, Disagree(D)=2 and Strongly disagree. (SD)=1. The findings are shown in Table 4.7

Table 4.7: Alternative Risk Transfer and Performance of Hydroelectric Energy Projects.

Statements	SA	A	N	D	SD	Mean	Std. dev
1. Alternative risk transfer ensures risk securitization for enhanced project credit rating	34(40.5%)	49(58.3%)	1(1.2%)	0(0.0%)	0(0.0%)	4.39	0.515
2. Alternative risk transfer enables standardization of projects to determine market value of loans	16(19.0%)	26(31.0%)	36(42.9%)	6(7.1%)	0(0.0%)	3.62	0.877
3. Alternative risk transfer enables funding risk transfer for streamlined revenue flow	15(17.9%)	49(58.3%)	18(21.4%)	2(2.4%)	0(0.0%)	3.92	0.698
4. Alternative risk transfer provides complementary source of lower cost of capital	10(11.9%)	40(47.6%)	33(39.3%)	1(1.2%)	0(0.0%)	3.70	0.690
5. Alternative risk transfer allows insurers to increase their capacity by opening capital markets	23(27.4%)	48(57.1%)	13(15.5%)	0(0.0%)	0(0.0%)	4.12	0.648
6. Alternative risk transfer complements traditional insurance products for enhanced liquidity ratios	21(25.0%)	50(59.5%)	13(15.5%)	0(0.0%)	0(0.0%)	4.10	0.633
7. Alternative risk transfer constitutes a different asset class that enhances returns for competitive advantage	9(10.7%)	23(27.4%)	39(46.4%)	13(15.5%)	0(0.0%)	3.33	0.869
8. Alternative risk transfer provides diversification over portfolio to the investors	20(23.8%)	51(60.7%)	13(15.5%)	0(0.0%)	0(0.0%)	4.08	0.625
9. Alternative risk transfer reduces over insurance through participation in an own loss development	28(33.3%)	51(60.7%)	5(6.0%)	0(0.0%)	0(0.0%)	4.27	0.567
10. Alternative risk transfer reduces cost of borrowing through tax deductibility advantages	13(15.5%)	65(77.4%)	6(7.1%)	0(0.0%)	0(0.0%)	4.08	0.471
Composite mean and Composite standard deviation						**3.96**	**0.445**

NB. ART1-10 (Alternative Risk Transfer statements)

Ten Items measured the extent to which alternative risk transfer influence performance of hydroelectric energy projects. Statement (1) that 'alternative risk transfer ensures risk securitization for enhanced project credit rating' had a mean of 4.39 and 0.515 standard deviation. This result indicate that from 84 respondents, 49(58.5%) agreed that alternative risk transfer ensures risk securitization for enhanced project credit rating, 34(40.5%) strongly agreed that alternative risk transfer ensures risk securitization for enhanced project credit rating, 1(1.2%) were neutral that alternative risk transfer ensures risk securitization for enhanced project credit rating. This result indicate that the line item mean score of 4.39 was above composite mean score of 3.96; This results implies that alternative risk transfer ensures risk securitization for enhanced project credit rating and hence positively influence performance of hydroelectric energy projects. However, this line item standard deviation of 0.515 was higher than the composite standard deviation of 0.445; implying that there is

divergence opinion. The findings were in tandem with those of Bouriaux and MacMinn (2009) and Cummins (2008) who postulated Alternative Risk Transfer to be capable of offering risk securitization thus enhancing the credit rating of a project in capital market for access to cheaper capital.

Statement (2) that 'alternative risk transfer enables standardization of projects to determine market value of loans' had a mean of 3.62 and 0.877 standard deviation. This results indicate that from 84 respondents, 36(58.5%) were neutral that alternative risk transfer enables standardization of projects to determine market value of loans, 26(31%) agreed that alternative risk transfer enables standardization of projects to determine market value of loans, 16(19%) strongly agreed that alternative risk transfer enables standardization of projects to determine market value of loans. This results show that the line statement mean score of 3.62 was below composite mean score of 3.96; implying that alternative risk transfer does not enable standardization of projects to determine market value of loans and hence moderately influence performance of hydroelectric energy projects. A higher line item standard deviation of 0.877 than the composite standard deviation of 0.445 implies that there is divergence opinion. The findings were in contrary to that of Cummins (2008) who postulated ART to be capable of offering risk standardization and non-indemnity trading for determining market value of loans or pricing certainty for better performance of projects. Thus, for the realization of alternative risk transfers ability to facilitate risk standardization for loan pricing a hybrid triggers and index have to be applied as argued by Bouriaux and MacMinn (2009).

Statement (3) that 'alternative risk transfer enables funding risk transfer for streamlined revenue flow' had a mean of 3.92 and 0.698 standard deviation. This results show that from 84 respondents, 49(58.3%) agreed that alternative risk transfer enables funding risk transfer for streamlined revenue flow, 18(21.4%) were neutral that alternative risk transfer enables funding risk transfer for streamlined revenue flow, 15(17.9%) strongly agreed that alternative risk transfer enables funding risk transfer for streamlined revenue flow and 2(2.4%) disagreed that alternative risk transfer enables funding risk transfer for streamlined revenue flow. This results show that the line statement mean score of 3.92 was with a small margin below composite mean score of 3.96; this results imply that alternative risk transfer moderately enables funding risk transfer for streamlined revenue flow and hence would moderately influence performance of hydroelectric energy projects. The higher line item standard

deviation of 0.698 than the composite standard deviation of 0.445 implies that there is divergence in opinion. The findings were in tandem with those of Cummins (2008) who postulated that for project lenders and investors ART enables direct transfer of parts of their risk exposure to the capital markets thereby absorbing the resulting losses in cases of mega catastrophe for streamlined revenue flow.

Statement (4) that 'alternative risk transfer provides complementary source of lower cost of capital' had a mean of 3.70 and a 0.690 standard deviation. This finding indicate that from 84 respondents, 40(47.6%) agreed that alternative risk transfer provides complementary source of lower cost of capital, 33(39.3%) were neutral that alternative risk transfer provides complementary source of lower cost of capital, 10(11.9%) strongly agreed that alternative risk transfer provides complementary source of lower cost of capital and 1(1.2%) disagreed that alternative risk transfer provides complementary source of lower cost of capital. This results show that the line statement mean score of 3.70 was with a small margin below composite mean score of 3.96; implying that alternative risk transfer moderately provides complementary source of lower cost of capital and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.690 than the composite standard deviation of 0.445 implies that there is divergence in opinion. The findings were in tandem with those of Sibindi (2015) and Chieh (2010) observation that ART products facilitate access to additional cheaper capitals due to tax deductibility benefits in the capital markets.

Statement (5) that 'alternative risk transfer allows insurers to increase their capacity by opening capital markets' had a mean of 4.12 and 0.648 standard deviation. This finding indicate that from 84 respondents, 48(47.6%) agreed that alternative risk transfer allows insurers to increase their capacity by opening capital markets, 23(27.4%) strongly agreed that alternative risk transfer allows insurers to increase their capacity by opening capital markets, 13(15.5%) were neutral that alternative risk transfer allows insurers to increase their capacity by opening capital markets. This results show that the line statement mean score of 4.12 was above composite mean score of 3.96; This results implies that alternative risk transfer allows insurers to transfer risk portions to capital markets thereby increasing capacities by opening financial markets and hence positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.648 than the composite standard deviation of 0.445 implies that there is divergence in opinion. The findings were in tandem

with that of Sibindi (2015) who observed that ART products enables investors to directly transfer parts of their risk exposure to the capital markets thereby absorbing the resulting losses in cases of mega catastrophe.

Statement (6) that 'alternative risk transfer complements traditional insurance products for enhanced liquidity ratios' had a mean of 4.10 and a 0.633 standard deviation. This finding indicate that from 84 respondents, 50(59.5%) agreed that alternative risk transfer complements traditional insurance products for enhanced liquidity ratios, 21(25%) strongly agreed that alternative risk transfer complements traditional insurance products for enhanced liquidity ratios, 13(15.5%) were neutral that alternative risk transfer complements traditional insurance products for enhanced liquidity ratios. This results show that the line statement mean score of 4.10 was above composite mean score of 3.96; This results implies that alternative risk transfer absorbs losses from catastrophic events through increased insurance capacity thus complementing traditional insurance products and enhances liquidity ratios' and hence positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.633 than the composite standard deviation of 0.445 implies that there is divergence in opinion. The findings were in tandem with Forent (2004) and Schanz (1999) arguments that ART products such as risk-linked securities enables the selling of insurance risk to the capital market to raise funds for insurers and reinsurance for claims settlement in case of mega catastrophes.

Statement (7) that 'alternative risk transfer constitutes a different asset class that enhances returns for competitive advantage' had a mean of 3.33 and a 0.869 standard deviation. This results indicate that from 84 respondents, 39(46.4%) were neutral that alternative risk transfer constitutes a different asset class that enhances returns for competitive advantage, 23(27.4%) agreed that alternative risk transfer constitutes a different asset class that enhances returns for competitive advantage, 13(15.5%) disagreed that alternative risk transfer constitutes a different asset class that enhances returns for competitive advantage and 9(10.7%) strongly agreed alternative risk transfer constitutes a different asset class that enhances returns for competitive advantage. This results show that the line statement mean score of 3.33 was below composite mean score of 3.96; This results implies that alternative risk transfer does not constitute a different asset class that can enhance returns and provide competitive advantage and hence negatively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.869 than the composite standard

deviation of 0.445 implies that there is divergence in opinion. The findings contradicts those of Cummins (2008) who observed that for the investors ART forms a different asset class for enhancing returns while controlling the portfolio variance.

Statement (8) that 'alternative risk transfer provides diversification over portfolio to the investors' had a mean of 4.08 and 0.625 standard deviation. This finding indicate that from 84 respondents, 51(60.7%) agreed that alternative risk transfer provides diversification over portfolio to the investors, 20(23.8%) strongly agreed that alternative risk transfer provides diversification over portfolio to the investors, 13(15.5%) were neutral that alternative risk transfer provides diversification over portfolio to the investors. This results shows that the line statement mean score of 4.08 was above composite mean score of 3.96; This results implies that alternative risk transfer provides expanded spectrum and capacity of insurable risk and diversification over portfolio and time to the investors and hence positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.625 than the composite standard deviation of 0.445 implies that there is divergence in opinion. The findings supports those of Bouriaux and MacMinn (2009) who posit that alternative risk transfer increases the capacity of insuring entity to absorb more loss in case of a mega catastrophe in a project and can generate better returns to investors as it's a form of investment diversification.

Statement (9) that 'alternative risk transfer reduces over insurance through participation in an own loss development' had a mean of 4.27 and 0.567 standard deviation. This finding indicate that from 84 respondents, 51(60.7%) agreed that alternative risk transfer reduces over insurance through participation in an own loss development, 28(33.3%) strongly agreed that alternative risk transfer reduces over insurance through participation in an own loss development, 5(6%) were neutral that alternative risk transfer reduces over insurance through participation in an own loss development. This results shows that the line statement mean score of 4.27 and 0.567 standard deviation are above the composite mean score of 3.96 and 0.455 standard deviation; This results implies that alternative risk transfer improves efficiency through participation in an own loss development hence reduces over insurance as it is flexible and can be tailored to suit client needs thereby positively influence performance of hydroelectric energy projects and this has been supported by Bouriaux and MacMinn (2009). However, the higher line item standard deviation of 0.567 than the composite standard deviation of 0.445 implies that there is divergence in opinion.

Statement (10) that 'alternative risk transfer reduces cost of borrowing through tax deductibility advantages' had a mean of 4.08 and 0.471 standard deviation. This finding indicate that from 84 respondents, 65(77.4%) agreed that alternative risk transfer reduces cost of borrowing through tax deductibility advantages, 13(15.5%) strongly agreed that alternative risk transfer reduces cost of borrowing through tax deductibility advantages, 6(7.1%) were neutral that alternative risk transfer reduces cost of borrowing through tax deductibility advantages. This results show that the line statement mean score of 4.08 was above the composite mean score of 3.96; This results implies that alternative risk transfer reduces cost of borrowing through tax deductibility advantages and reduced credit risk thereby positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.471 than the composite standard deviation of 0.445 implies that there is a slight divergence in opinion among respondents. The findings supports those of Chieh (2010) who posit that alternative risk transfer reduces cost of capital when traded in the capital markets due to tax deductibility advantages thus improving performance of projects.

The overall composite score of all indicators of Alternative risk transfer had a mean of 3.962 and 0.445 standard deviation which further reveals that a majority 64(76.2%) of participants at least agreed that Alternative risk transfer influence performance of hydroelectric energy projects.

These findings were further supported by qualitative data and this is what the respondent had to say on Alternative risk transfer and performance of hydroelectric energy projects. On risk management KenGen participant said that:

> *"…captives in the projects "self-insurance" are a larger framework of the enterprise risk management applied instead of engaging a third entity that would require payment of premiums and additional costs."* (KII No. 1, KenGen).

This aspect was further captured by a CMA respondent when asked the effect of ART use in the project, remarked:

> *"...Alternative risk transfer in projects complements insurance companies of compensation since the project itself has a cash reserve for settling financial distress. However, the capital market, for instance NSE currently does not provide the ART products leaving any project with the only option to self-insure "use captives" for securitization."* (KII No. 6, CMA).

This was similar to Chieh (2010) findings that ART use in projects facilitates project securitization and reduced cost of capital. However, unavailability of most ART products in the local capital market was seen to frustrate the adoption of ART in the project. This was evident from remarks of an interviewee from KenGEN who said:

> *"...though the institution may want to utilize alternative risk transfer products they are not readily available in the domestic market and we only apply internal mechanisms to manage risks which would otherwise be better mitigated through advanced ART products"*. (KII No. 1, KenGen).

Thus, ART offers risk securitization, funding risk transfer, facilitates access to additional capitals and for project lenders and investors to directly transfer parts of their risk exposure to the capital markets thereby absorbing the resulting losses in cases of mega catastrophe while for the investors ART forms a different asset class for enhancing returns while controlling the portfolio variance for improved performance of projects. Therefore, targeted policy enactment for inclusion of Alternative Risk Transfer in hydroelectric energy projects and trading of ART products like Catastrophic (CAT) bonds, options, futures, and Industry Loss Warranties (ILW) in bourses of Nairobi Security Exchange for easier access by investors and energy developers are necessary.

4.6.1 Correlation analysis of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

The study sought to assess the relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects. Pearson correlation coefficient was used to test the relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects at a significance level of 0.05. The correlations results obtained are represented in Table 4.8.

Table 4.8: Correlations of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects (n=84)

Alternative Risk Transfer Indicators		Performance of Hydroelectric Energy Projects
1. Alternative Risk Transfer ensures risk securitization which enhances the projects credit rating	Pearson Correlation	-0.404*
	Sig. (2-tailed)	0.304
	n	84
2. Alternative Risk Transfer enables standardization of projects to determine market value of loans	Pearson Correlation	0.775*
	Sig. (2-tailed)	0.000
	n	84
3. Alternative Risk Transfer enable funding risk transfer thereby smoothening the revenue flow due to low loss ratios	Pearson Correlation	0.469*
	Sig. (2-tailed)	0.000
	n	84
4. Alternative Risk Transfer provides complementary source of lower cost of capital	Pearson Correlation	-0.781*
	Sig. (2-tailed)	0.414
	n	84
5. Alternative Risk Transfer allows insurers to increase their capacity by opening capital markets	Pearson Correlation	0.616*
	Sig. (2-tailed)	0.000
	n	84
6. Alternative Risk Transfer complements traditional insurance products for enhanced liquidity ratios	Pearson Correlation	0.483*
	Sig. (2-tailed)	0.000
	n	84
7. Alternative Risk Transfer forms an asset class that enhances returns for competitive advantage	Pearson Correlation	-0.587*
	Sig. (2-tailed)	0.200
	n	84
8. Alternative Risk Transfer provides diversification over portfolio to the investors	Pearson Correlation	0.591*
	Sig. (2-tailed)	0.000
	n	84
9. Alternative Risk Transfer reduces over insurance through participation in an own loss development	Pearson Correlation	0.651*
	Sig. (2-tailed)	0.000
	n	84
10. Alternative Risk Transfer reduces cost of borrowing through tax deductibility advantages	Pearson Correlation	0 640*
	Sig. (2-tailed)	0.000
	n	84
OVERRAL CORRELATION FOR ALTERNATIVE RISK TRANSFER	**Pearson Correlation**	**0.803**
	Sig. (2-tailed)	**0.000**
	n	**84**

NB * correlation significant at 0.05 level (2-tailed)

To test the strength of the relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects; all indicators of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects were analyzed based on the hypothesis that: 1. H_0: There is no significant relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects. The corresponding mathematical model for the hypothesis took the form: Performance of Hydroelectric Energy Projects $= f$(Alternative Risk Transfer).

The research study found that out of the ten statements of Alternative Risk Transfer, three statements namely; Statement (1) (Alternative Risk Transfer ensures risk securitization which enhances the projects credit rating; r=-0.404, P-value=0.304>0.05), Statement (4)

(Alternative Risk Transfer provides complementary source of lower cost of capital; r=-0.781, P-value=0.414>0.05), and Statement (7) (Alternative Risk Transfer forms an asset class that enhances returns for competitive advantage; r=-0.587, P-value=0.200<0.05) were not statistically significant whereas seven statements namely; Statement (2) (Alternative Risk Transfer enables standardization of projects to determine market value of loans or pricing certainty; r=0.775, P-value=0.000<0.05), statement (3) (Alternative Risk Transfer enable funding risk transfer thereby smoothening the revenue flow due to low loss ratios; r=0.469, P-value=0.000<0.05), Statement (5) (Alternative Risk Transfer allows insurers to increase their capacity by opening capital markets; r=0.616, P-value=0.000<0.05), Statement (6) (Alternative Risk Transfer complements traditional insurance products for enhanced liquidity ratios; r=0.483, P-value=0.000<0.05), Statement (8) (Alternative Risk Transfer provides diversification over portfolio to the investors; r=0.591, P-value=0.000<0.05), Statement (9) (Alternative Risk Transfer reduces over insurance through participation in an own loss development; r=0.651, P-value=0.000<0.05), Statement (10) (Alternative Risk Transfer reduces cost of borrowing through tax deductibility advantages; r=0.640, P-value=0.000<0.05) had significant correlation.

Similarly the overall correlation coefficient for Alternative Risk Transfer and Performance of Hydroelectric Energy projects was found to be r= 0.803, p-value=0.000<0.05, implying that there is a significant relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy projects; thus rejecting the null hypothesis (1. H_0: There is no significant relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects) and accepting alternative hypothesis, hence the study findings conclude that there is significant relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy projects. The correlation results are in tandem with the descriptive overall composite mean scores of 3.96 and 0.455 standard deviation which indicated that participants agreed that Alternative Risk Transfer influence Performance of Hydroelectric Energy Projects. This study finding was in agreement with studies done by Wing and Jin (2015) and Sibindi (2015) in South Africa who postulate that there is significant relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects.

4.6.2. Regression Analysis of Alternative Risk Transfer on Performance of Hydroelectric Energy Projects

Simple linear regression was adopted to investigate how Alternative Risk Transfer influences Performance of Hydroelectric Energy Projects. The rational of using the simple linear

regression model was to establish how Alternative Risk Transfer as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy Projects.

4.6.2.1 Model Summary of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

The model sought to establish how Alternative Risk Transfer as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy Projects. The regression model summary results are shown in Table 4.9.

Table 4.9: Regression Model Summary of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.803[a]	0.644	0.640	0.426

a. Predictors: (Constant), aggregated scores of art indicators

The model summary results suggest the existence of a positive correlation (R=0.803) between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects and those predicted by the regression model. In addition, 64.4% (R^2=0.644) of the variance in the Performance of Hydroelectric Energy Projects is explained by Alternative Risk Transfer. The results are similar to observations by Wing and Jin (2015) that Alternative Risk Transfer and Performance of Hydroelectric Energy Projects are significantly related.

4.6.2.2 ANOVA of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

The study sought to establish if the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of Alternative Risk Transfer. The results of regression ANOVA statistics are represented in Table 4.10.

Table 4.10: An ANOVA of the Regression of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	26.899	1	26.899	148.520	0.000[b]
	Residual	14.851	82	0.181		
	Total	41.750	83			

a. Dependent variable: Aggregated Performance of Hydroelectric Energy Projects.
b. Predictors: (Constant), aggregated score of art indicators

The ANOVA results, F(1,82)=148.520 is significant at P-value =0.000<0.05 implying that the regression model results is significantly better prediction of Performance of Hydroelectric Energy Projects.

4.6.2.3 Coefficients for Regression of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

The study sought to establish the influence of Alternative Risk Transfer on Performance of Hydroelectric Energy Projects. The regression coefficients results are in Table 4.11.

Table 4.11: Coefficients for the Regression of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.181	0.256		4.614	0.000
	Alternative risk transfer	0.774	0.064	0.803	12.187	0.000

a. Dependent Variable: Performance Hydroelectric Energy Projects

The simple linear regression coefficients results indicated the existence of a significant influence of Alternative Risk Transfer on Performance of Hydroelectric Energy Projects given P-Value =0.000<0.05. The regression model for Alternative Risk Transfer was $Y=1.181 + 0.774X_1$; implying that for each unit of Alternative Risk Transfer use, Performance of Hydroelectric Energy projects marginally changed by 0.774 units. The results are consistent with findings by Wing and Jin (2015); Chieh (2010); Bouriaux and MacMinn (2009) and; Cummins (2008) who found that ART enables operational risk transfer to bond investors for developers to secure low cost capital for renewable energy development.

4.7 Contingent Capital and Performance of Hydroelectric Energy Projects

This was the second objective that the study sought to achieve. Therefore, participants were requested to give their opinions on the level of agreement or disagreement with the statements of contingent capital on a Likert scale of 1-5 where Strongly agree(SA)=5, Agree(A)=4, Neutral(N)=3, Disagree(D)=2 and Strongly disagree (SD)=1. The results are presented in Table 4.12

Table 4.12: Contingent Capital and Performance of Hydroelectric Energy Projects

Statements	SA	A	N	D	SD	Mean	Std. dev
1. Contingent capital provides leverage in good times through timely conversion	33(39.3%)	50(59.5%)	1(1.2%)	0(0.00%)	0(0.00%)	4.38	0.513
2. Contingent capital provide buffer to absorb losses during financial distress	52(61.9%)	32(38.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.62	0.489
3. Contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt	73(86.9%)	10(11.9%)	1(1.2%)	0(0.00%)	0(0.00%)	4.86	0.385
4. Contingent capital provides strong incentives for the prompt recapitalization in the event of increased risk	38(45.2%)	41(48.8%)	5(6.0%)	0(0.00%)	0(0.00%)	4.39	0.602
5. Contingent capital reduces moral hazard of market manipulation through credible signal of default risk	1(1.2%)	16(19%)	53(63.1%)	14(16.7%)	0(0.00%)	3.05	0.638
6. Contingent capital ensures reduced cost of capital relative to risk due to accounting tax advantage	57(67.9%)	27(32.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.68	0.470
7. Contingent capital provides a strong incentive to raise equity before facing insolvency risk	27(32.1%)	26(31%)	28(33.3%)	3(3.6%)	0(0.00%)	3.92	0.895
8. Contingent capital eliminates problems of enforcing book capital requirements	1(1.2%)	9(10.7%)	25(29.8%)	48(57.1%)	1(1.2%)	2.54	0.752
9. Contingent capital decreases incentive for raising fresh equity in a financial crisis to help maintain shareholders value	17(20.2%)	45(53.6%)	21(25%)	1(1.2%)	0(0.00%)	3.93	0.708
10. Contingent capital supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level	4(4.8%)	22(26.2%)	43(51.1%)	15(17.9%)	0(0.00%)	3.18	0.779
Composite mean and Composite standard deviation						**3.95**	**0.344**

NB. CC1-10 is the statements of Contingent Capital

Ten statements measured the extent to which contingent capital influence performance of hydroelectric energy projects. Statement (1) that 'contingent capital provides leverage in good times through timely conversion' had a mean of 4.38 and a 0.513 standard deviation. This finding indicate that from 84 participants, 50(59.5%) agreed that contingent capital provides leverage in good times through timely conversion, 33(39.3%) strongly agreed that contingent capital provides leverage in good times through timely conversion, 1(1.2%) were neutral that contingent capital provides leverage in good times through timely conversion. This result indicate that the line statement mean score of 4.38 was above composite mean score of 3.95; This results implies that contingent capital provides leverage in good times through timely conversion, proper pricing and evaluation models to avoid multi equilibrium thereby positively influencing performance of hydroelectric energy projects. The higher line item standard deviation of 0.513 than the composite standard deviation of 0.344 implies that

there was divergence of opinion among respondents. The study results supports finding by Calomiris and Herring (2013) who found that Contingent capital provides projects with strong and efficient recapitalization incentives when they experience significant equity loss or upon reaching a trigger threshold.

Statement (2) that 'contingent capital provide buffer to absorb losses during financial distress' had a mean of 4.62 and a 0.489 standard deviation. This finding indicate that from 84 participants, 52(61.9%) strongly agreed that contingent capital provide buffer to absorb losses during financial distress, 32(38.1%) agreed that contingent capital provide buffer to absorb losses during financial distress. This results show that the line statements mean score of 4.62 was above composite mean score of 3.95; implying that contingent capital provide buffer to absorb losses during financial distress thereby positively influencing performance of hydroelectric energy projects. The higher line item standard deviation of 0.489 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The study results support finding by Vall´ee (2016) who indicated that contingent capital can reduce financial distress by injecting liquidity to the project thereby robustly controlling seasonal equity offering and government bail-outs.

Statement (3) that 'contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt' had a mean of 4.86 and a 0.385 standard deviation. This results indicate that from 84 respondents, 73(86.9%) strongly agreed that contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt, 10(11.9%) agreed that contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt and 1(1.2%) was neutral that contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt. This results indicate that the line statement mean score of 4.86 was above composite mean score of 3.95; This results implies that contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt and expected bankruptcy costs; thereby positively influencing performance of hydroelectric energy projects. The higher line item standard deviation of 0.385 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The study results support finding by McDonald (2011) who showed that contingent capital reduces default probability during financial distress due to tax deductibility

advantage and reduction in expected bankruptcy cost thus lowering cost of capital relative to risk compared to contemporary equity requirement and pure debt instrument.

Statement (4) that 'contingent capital provides strong incentives for the prompt recapitalization in the event of increased risk' had a mean of 4.39 and 0.602 standard deviation. This results indicate that from 84 respondents, 41(48.8%) agreed that contingent capital provides prompt recapitalization incentive in the event of increased risk, 38(45.2%) strongly agreed that contingent capital provides prompt recapitalization incentive in the event of increased risk, and 5(6%) were neutral that contingent capital provides prompt recapitalization incentive in the event of increased risk. This results shows that the line statements mean score of 4.39 was above composite mean score of 3.95; implying that contingent capital provides prompt recapitalization incentive in the event of increased risk," bail-in" objective and hence positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.602 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The findings concur to Sundaresan and Wang (2013) observation that contingent capital ensures timely offering of equity into the market and facilitation of bail-ins.

Statement (5) that 'contingent capital reduces moral hazard of market manipulation through credible signal of default risk' had a mean of 3.05 and a 0.638 standard deviation. This finding indicate that from 84 respondents, 53(63.1%) were neutral that contingent capital contain moral hazard of market manipulation through credible signal of default risk, 16(19%) agreed that contingent capital contain moral hazard of market manipulation through credible signal of default risk, 14(16.7%) disagreed that contingent capital contain moral hazard of market manipulation through credible signal of default risk and 1(1.2%) strongly agreed that objective contingent capital contain moral hazard of market manipulation through credible signal of default risk. This results indicate that the line statement mean score of 3.05 was below composite mean score of 3.95; This results implies that contingent capital does not contain moral hazard of market manipulation through credible signal of default risk and provision of incentives for projects to avoid use of conversion facility 'signaling objective' and hence negatively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.638 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The findings contradicts observations Calomiris and Herring (2013) and McDonald (2011) that contingent capital can reduce

systemic risks and default probability by reducing multiple equilibrium. Lack of equilibrium creates multiplicity with a potential of uncertainty in price, manipulation of the market, inefficiency in capital allocation besides frequent conversion errors (Sundaresan and Wang, 2013).

Statement (6) that 'contingent capital ensures reduced cost of capital relative to risk due to accounting tax advantage' had a mean of 4.68 and 0.470 standard deviation. This finding indicate that from 84 respondents, 57(67.9%) strongly agreed that contingent capital ensure reduced cost of capital relative to risk due to accounting tax advantage and 27(32.1%) agreed that contingent capital ensure reduced cost of capital relative to risk due to accounting tax advantage. This finding indicates that the line statement mean score of 4.68 was above composite mean score of 3.95; implying that contingent capital ensure reduced cost of capital relative to risk than a simple equity requirement due to accounting tax advantage and hence positively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.470 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The finding supports Shang (2013) argument that contingent capital improves financial industry's risk tolerance and cheaper capital compared to subordinated debt instrument and equity respectively.

Statement (7) that 'contingent capital provides a strong incentive to raise equity before facing insolvency risk' had a mean of 3.92 and a 0.895 standard deviation. This finding indicate that from 84 respondents, 28(33.3%) were neutral that contingent capital provide a strong incentive to raise equity before facing insolvency risk, 27(32.1%) strongly agreed that contingent capital provide a strong incentive to raise equity before facing insolvency risk, 26(31%) agreed that contingent capital provide a strong incentive to raise equity before facing insolvency risk and 3(3.6%) disagreed that contingent capital provide a strong incentive to raise equity before facing insolvency risk. This results shows that the line statement mean score of 3.92 was marginally below composite mean score of 3.95; implying that contingent capital provide a moderate incentive for strengthening risk management before raising fresh equity to curtail insolvency risk and hence moderately influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.895 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The finding supports Vall´ee (2016) and Christoph (2015) observation that contingent capital can be used as risk governance tool for limiting regulatory

forbearance and supervisors' reluctance to recognize losses and as such can be turned into equity before the project becomes insolvent.

Statement (8) that ‘contingent capital eliminates problems of enforcing book capital requirements’ had a mean of 2.54 and 0.752 standard deviation. This finding indicate that from 84 respondents, 48(57.1%) disagreed that contingent capital eliminates problems of enforcing book capital requirements, 25(29.8%) were neutral that contingent capital eliminates problems of enforcing book capital requirements, 9(10.7%) of the respondent agreed that contingent capital eliminates problems of enforcing book capital requirements, 1(1.2%) strongly agreed that contingent capital eliminates problems of enforcing book capital requirements and 1(1.2%) strongly disagreed that contingent capital eliminates problems of enforcing book capital requirements. This result indicate that the line statement mean score of 2.54 was below composite mean score of 3.95; implying that contingent capital does not eliminates constraints of measurement and enforcement of book capital requirements and hence negatively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.752 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The finding contradicts Calomiris and Herring (2013) observation that contingent capital eliminates constraints of measurement and enforcement of book capital requirements.

Statement (9) that ‘contingent capital decreases incentive for raising fresh equity in a financial crisis to help maintain shareholders value’ had a mean of 3.93 and a 0.708 standard deviation. This results indicate that out of 84 participants, 45(53.6%) agreed that contingent capital decrease incentive for raising fresh equity in a financial crisis to help maintain shareholders value, 21(25%) were neutral that contingent capital decreases incentive for raising fresh equity in a financial crisis to help maintain shareholders value, 17(20.2%) strongly agreed that contingent capital decrease incentive for raising fresh equity in a financial crisis to help maintain shareholders value and 1(1.2%) disagreed that contingent capital decreases incentive for raising fresh equity in a financial crisis to help maintain shareholders value. This results shows that the line statement mean score of 3.93 was slightly below the composite mean score of 3.95; implying that contingent capital moderately decreases incentive for raising fresh equity in a financial crisis so as to lower chances of diluting shareholders value and hence moderately influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.708 than the composite standard

deviation of 0.344 implies that there was divergence of opinion among respondents. The finding supports Tobias and Christoph (2015) observation that contingent capital can reduce financial distress by injecting liquidity to the project thereby robustly controlling seasonal equity offering and government bail-outs.

Statement (10) that 'contingent capital supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level' had a mean of 3.18 and 0.779 standard deviation. This finding indicate that from 84 respondents, 43(51.1%) were neutral that contingent capital supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level, 22(26.2%) agreed that contingent capital supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level, 15(17.9%) disagreed that contingent capital supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level and 4(4.8%) strongly agreed that contingent capital supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level. This results indicate that the line statement mean score of 3.18 was below the composite mean score of 3.95; implying that contingent capital does not supplement supervisory oversight with market discipline by reducing management intent of taking excessive risk above tolerance level and hence negatively influence performance of hydroelectric energy projects. The higher line item standard deviation of 0.779 than the composite standard deviation of 0.344 implies that there was divergence of opinion among respondents. The finding contradicts Vall´ee (2016) observation that contingent capital can be used as risk governance tool for limiting regulatory forbearance and supervisors' reluctance to recognize losses.

The overall composite score of all indicators of Contingent capital had a mean of 3.95 and 0.344 standard deviation and further indicated that majority 58(69%) of participants at least agreed that Contingent capital influence performance of hydroelectric energy projects. The study results corroborate with similar findings by Calomiris and Herring (2013), Vall´ee (2016) and Tobias and Christoph (2015) who found that Contingent capital influence performance of projects.

These findings were further supported by qualitative data and this is what the participant had to say on influence of Contingent capital on performance of hydroelectric energy projects. An

interviewee from KenGEN said that:

> *‘‘…due to the need to expand and initiate new energy infrastructure projects in 2016 demanding huge capital which was way above the institutions debt to equity threshold, the government had to convert its debt of Kshs 20.2 billion into equity before raising additional equity of Kshs 6.4 billion through Rights Issue to facilitate the infrastructural expansion.’’* (KII No. 1, KenGen).

Further, contingent capital ensures prompt recapitalization and efficient liquidity flow which is key to systemic risk management of the projects. This was evident from the remark of NSE interviewee who stated:

> *"…in general prompt recapitalization by contingent capital enables investors to cheaply and easily acquire the much needed capital to facilitate the implementation of projects."* (KII No. 7, NSE).

Generally, contingent capital can reduce financial distress by injecting liquidity into the project thus offering cheaper capital compared to subordinated debt instrument and contemporary equity respectively besides reducing government bail-outs, reduces default probability and improving projects’ risk tolerance. However, without certainty of equilibrium, contingent capital faces the challenge of equilibrium multiplicity with a potential of uncertainty in price, manipulation of the market, and inefficiency in capital allocation. To contain the equilibrium problem, market triggered contingent capital should be handled cautiously as a regulatory tool.

4.7.1 Correlation analysis of Contingent Capital and Performance of Hydroelectric Energy Projects

The study sought to assess the relationship between Contingent capital and Performance of Hydroelectric Energy projects. The relationship between Contingent Capital and Performance of Hydroelectric Energy Projects was tested using Pearson correlation coefficient at a significant level of 0.05. The correlations results obtained are shown in Table 4.13.

Table 4.13: Correlations of Contingent Capital and Performance of Hydroelectric Energy Projects (n=84); NB * Correlation significant at 0.05 level (2-tailed)

Contingent Capital indicators		Performance of Hydroelectric Energy Projects
1. Contingent capital provides leverage in good times through timely conversion	Pearson Correlation	0.538*
	Sig. (2-tailed)	0.000
	n	84
2. Contingent capital provides buffer to absorb losses during financial distress	Pearson Correlation	0.412
	Sig. (2-tailed)	0.003
	n	84
3. Contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt	Pearson Correlation	0.453**
	Sig. (2-tailed)	0.001
	n	84
4. Contingent capital provide strong incentives for prompt recapitalization in the event of increased risk	Pearson Correlation	0.476
	Sig. (2-tailed)	0.000
	n	84
5. Contingent capital contain moral hazard of market manipulation through credible signal of default risk	Pearson Correlation	-0.423*
	Sig. (2-tailed)	0.102
	n	84
6. Contingent capital ensure reduced cost of capital relative to risk due to accounting tax advantages	Pearson Correlation	0.588
	Sig. (2-tailed)	0.000
	n	84
7. Contingent capital provide a strong incentive to raise equity before facing insolvency risk	Pearson Correlation	0.504
	Sig. (2-tailed)	0.000
	n	84
8. Contingent capital eliminates problems of enforcing book capital requirements	Pearson Correlation	-0.419
	Sig. (2-tailed)	0.403
	n	84
9. Contingent capital decreases incentive for raising fresh equity in a financial crisis which helps maintain shareholders value	Pearson Correlation	0.080
	Sig. (2-tailed)	0.000
	n	84
10. Contingent capital supplement supervisory oversight with market discipline by reducing management's intent of taking excessive risk above tolerance level	Pearson Correlation	-0.504
	Sig. (2-tailed)	0.120
	n	84
Overall correlation for contingent capital	**Pearson Correlation**	**0.895**
	Sig. (2-tailed)	**0.000**
	n	**84**

To test the extent of the relationship between Contingent capital and Performance of Hydroelectric Energy projects; all indicators of Contingent capital and Performance of Hydroelectric Energy projects were analyzed based on the hypothesis 2. H_0: There is no significant relationship between Contingent Capital and Performance of Hydroelectric Energy Projects. The corresponding mathematical model for the hypothesis took the form: Performance Hydroelectric Energy projects = f(Contingent capital).

The research study revealed that out of the ten statements of contingent capital; three statements namely Statement 5(Contingent capital contain moral hazard of market manipulation through credible signal of default risk r=-0.423, P-value=0.102>0.05), Statement 8(Contingent capital eliminates problems of enforcing book capital requirements; r=-0.419, P-value=0.08<0.05) and Statement 10(Contingent capital supplement supervisory oversight with market discipline by reducing management's intent of taking excessive risk above tolerance level; r=-0.480, P-value=0.120<0.05) did not have significant correlation whereas seven statements namely: Statement 1(Contingent capital provides leverage in good times through timely conversion; r=0.538, P-value=0.000<0.05), statement 2(Contingent capital provides buffer to absorb losses during financial distress; r=0.412, P-value=0.003<0.05), Statement 3(Contingent capital provides relief for debt servicing obligation in bad times due to reduction of coupon of straight debt; r=0.453, P-value=0.001<0.05), statement 4(Contingent capital provide strong incentives for prompt recapitalization in the event of increased risk; r=0.476, P-value=0.000<0.05), Statement 6(Contingent capital ensure reduced cost of capital relative to risk due to accounting tax advantages; r=0.588, P-value=0.000<0.05), Statement7 (Contingent capital provide a strong incentive to raise equity before facing insolvency risk; r=0.504, P-value=0.000<0.05), Statement 9(Contingent capital decreases incentive for raising fresh equity in a financial crisis which helps maintain shareholders value; r=0.504, P-value=0.000<0.05), had significant correlation.

Similarly the overall correlation coefficient for Contingent capital and Performance of Hydroelectric Energy projects was found to be r= 0.895 and p-value =0.000<0.05, implying that Contingent capital and Performance of Hydroelectric Energy projects are significantly related, thus, rejecting the null hypothesis (2. H_0: There is no significant relationship between Contingent capital and Performance of Hydroelectric Energy projects) and accepting alternative hypothesis, hence concluding that there is significant relationship between Contingent capital and Performance of Hydroelectric Energy projects. The correlation results are in tandem with the descriptive overall composite mean scores of 3.95 and 0.344 standard deviation which indicated that the participants agreed that Contingent capital influence Performance of Hydroelectric Energy projects. This findings is in agreement with studies done by Vall´ee (2016), Tobias and Christoph (2015), Calomiris and Herring (2013), Sundaresan and Wang (2013) and McDonald (2011), who found a significant relationship between Contingent capital and Performance of projects.

4.7.2. Regression Analysis of Contingent Capital on Performance of Hydroelectric Energy Projects

Simple linear regression was adopted to investigate how Contingent capital influence Performance of Hydroelectric Energy projects. The rationale of using the simple linear regression model was to establish how Contingent capital as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy projects.

4.7.2.1 Model Summary of Contingent Capital and Performance of Hydroelectric Energy Projects

The model sought to establish how Contingent capital as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy Projects. The regression model summary is presented in Table 4.14.

Table 4.14: Regression Model Summary of Contingent capital and Performance of Hydroelectric Energy Projects

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.895[a]	0.802	0.799	0.318

a. Predictors: (Constant), aggregated score of Contingent capital Indicators

The model summary suggest the existence of a positive correlation(R=0.895) between Contingent capital and Performance of Hydroelectric Energy Projects and those predicted by the regression model. In addition, 80.2% (R^2=0.802) of the variance in the Performance of Hydroelectric Energy projects is explained by Contingent capital. The results are consistent with the findings by Vall´ee (2016), Tobias and Christoph (2015), Calomiris and Herring (2013), Sundaresan and Wang (2013) and McDonald (2011); that suggest significant relationship between Contingent capital and Performance of projects.

4.7.2.2 ANOVA of Contingent Capital and Performance of Hydroelectric Energy Projects

The study sought to establish if the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of contingent capital. The regression ANOVA output statistics are represented in Table 4.15.

Table 4.15: An ANOVA of the Regression of Contingent Capital and Performance of Hydroelectric Energy Projects

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	33.477	1	33.477	331.805	0.000[b]
	Residual	8.273	82	0.101		
	Total	41.750	83			

a. Dependent Variable: aggregated Performance of Hydroelectric Energy Projects.

b. Predictors: (Constant), aggregated score of contingent capital

The ANOVA statistic (F(1,82) =331.805) is significant at P-value =0.000<0.05; implying that the regression model result is significantly better prediction of Performance of Hydroelectric Energy Projects.

4.7.2.3 Coefficients for Regression of Contingent Capital and Performance of Hydroelectric Energy Projects

The study sought to establish the influence of contingent capital on Performance of Hydroelectric Energy projects. The regression coefficients results are in Table 4.16.

Table 4.16: Coefficients for the Regression of contingent capital and Performance of Hydroelectric Energy projects

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.773	0.140		12.631	0.000
	Contingent capital	0.629	0.035	0.895	18.216	0.000

a. Dependent Variable: Performance of Hydroelectric Energy Projects

The simple linear regression coefficients results indicated that contingent capital significantly influences Performance of Hydroelectric Energy projects given P-Value =0.000<0.05. The regression model for contingent capital was $Y= 1.773 + 0.629X_2$; implying that for each unit of contingent capital use, Performance of Hydroelectric Energy projects marginally changed by 0.629 units. The results are consistent with the findings by Vall´ee (2016), Tobias and Christoph (2015), Calomiris and Herring (2013), Sundaresan and Wang (2013) and McDonald (2011) that contingent capital on Performance of Hydroelectric Energy Projects are significantly related.

4.8 Credit Enhancement and Performance of Hydroelectric Energy Projects

This was the third objective that the study sought to achieve. Therefore, participants were requested to give their opinions on their level of agreement or disagreement with the statements of Credit Enhancement on a Likert scale of 1-5 where Strongly agree(SA)=5, Agree(A)=4, Neutral(N)=3, Disagree(D)=2 and Strongly disagree (SD)=1. The findings are shown in Table 4.17

Table 4.17: Credit Enhancement and Performance of Hydroelectric Energy Projects

Statements	SA	A	N	D	SD	Mean	Std. dev
1. Credit enhancement improves project's credit worthiness	77(91.7%)	7(8.3%)	0(0.00%)	0(0.00%)	0(0.00%)	4.92	0.278
2. Credit enhancement enable expanded access to market borrowings	18(21.4%)	66(78.6%)	0(0.00%)	0(0.00%)	0(0.00%)	4.21	0.413
3. Credit enhancement attracts new sources of financing	18(21.4%)	66(78.6%)	0(0.00%)	0(0.00%)	0(0.00%)	4.21	0.413
4. Credit enhancement mitigates credit risk	73(86.9%)	11(13.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.87	0.339
5. Credit enhancement create more confidence among investors	40(47.6%)	44(52.4%)	0(0.00%)	0(0.00%)	0(0.00%)	4.48	0.502
6. Credit enhancement acts as a security instrument by cushioning of underlying loans against default	10(11.9%)	72(85.7%)	2(2.40%)	0(0.00%)	0(0.00%)	4.10	0.368
7. Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants	24(28.6%)	59(70.2%)	1(1.20%)	0(0.00%)	0(0.00%)	4.27	0.475
8. Credit enhancement reduces cost of capital through lower interest rate charges	6(7.1%)	71(84.6%)	7(8.3%)	0(0.00%)	0(0.00%)	3.99	0.396
9. Credit enhancement enables favorable debt amortization through extended debt maturity	20(23.8%)	49(58.3%)	15(17.9%)	0(0.00%)	0(0.00%)	4.06	0.647
10. Credit enhancement enables introduction of new borrowers to the market for large scale transaction	3(3.6%)	30(35.7%)	51(60.7%)	0(0.00%)	0(0.00%)	3.43	0.566
Composite mean and Composite standard deviation						**4.25**	**0.210**

NB. CE1-10 is the statements of Credit Enhancement

Ten statements measured the extent to which Credit Enhancement influence performance of hydroelectric energy projects. Statement (1) that 'credit enhancement improves project's credit worthiness' had a mean of 4.92 and 0.278 standard deviation. This finding indicate that from 84 respondents, 77(91.7%) strongly agreed that 'credit enhancement improves project's credit worthiness', and 7(8.3%) agreed that 'credit enhancement improves project's credit worthiness'. This results show that the line statement mean score of 4.92 was above composite mean score of 4.25; implying that credit enhancement improves credit worthiness

of the project and hence positively influencing the performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.278 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The study results support finding by Dhruba (2018) and Chowdhury, Chen and Tiong (2015) who observed that Credit enhancement improves a project's creditworthiness for project bankability in cost effective resource mobilization and fulfillment of financial obligations like access to loans, green bonds, risk sharing facilities and credit guarantees at a cheaper cost.

Statement (2) that 'Credit enhancement enable expanded access to market borrowings' had a mean of 4.21 and 0.413 standard deviation. This finding indicate that from 84 respondents, 18(21.4%) strongly agreed that Credit enhancement enable expanded access to market borrowings, 66(78.6%) agreed that Credit enhancement enable expanded access to market borrowings. This finding indicates that the line statement mean score of 4.21 was slightly below the composite mean score of 4.25; implying that Credit enhancement moderately enables expanded access to market borrowings thereby moderately influencing the performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.413 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The study results support finding by Atal, Shrimali and Singh (2018) and Chowdhury, Chen and Tiong (2015) that credit enhancement increases project parties' creditworthiness to access additional cheaper capital in the capital markets.

Statement (3) that 'Credit enhancement attracts new sources of financing' had a mean of 4.21 and 0.413 standard deviation. This finding indicate that from 84 respondents, 18(21.4%) strongly agreed that Credit enhancement attract new sources of financing, 66(78.6%) agreed that Credit enhancement attract new sources of financing. This finding indicate that the line statement mean score of 4.21 was slightly below composite mean score of 4.25; implying that Credit enhancement moderately attract new sources of financing and hence moderately influencing the performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.413 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The study results support finding by Atal, Shrimali and Singh (2018) who observed that improvement in investment grading of projects due to the use of credit enhancement facilities can attract both foreign and domestic investors who traditionally shy away owing to their low risk tolerance.

Statement (4) that ‘Credit enhancement mitigates credit risk’ had a mean of 4.87 and 0.339 standard deviation. This results indicate that out of 84 participants, 73(86.9%) strongly agreed that Credit enhancement mitigate credit risk, 11(13.1%) agreed that Credit enhancement mitigate credit risk. This finding indicate that the line statement mean score of 4.87 was above composite mean score of 4.25; implying that Credit enhancement mitigate credit risk and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.339 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The findings are similar to Yoshino and Taghizadeh-Hesary (2015) and Chassot, Hampl, and Wüstenhagen (2014) observations that credit enhancement can reduce credit risk thus giving confidence to institutional investors and commercial banks to inject finances into renewable energy projects hence correcting the credit market failure for the projects.

Statement (5) that ‘Credit enhancement create more confidence among investors’ had a mean of 4.48 and 0.502 standard deviation. This finding indicate that from 84 respondents, 40(47.6%) strongly agreed that Credit enhancement create more confidence among investors, 44(52.4%) agreed that Credit enhancement create more confidence among investors. This finding indicate that the line statement mean score of 4.48 was above composite mean score of 4.25; implying that Credit enhancement create more confidence among investors and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.502 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The study finding supports findings by Chassot, Hampl, and Wüstenhagen (2014) that credit enhancement gives confidence to institutional investors and commercial banks to inject finances into renewable energy projects because of the securitization of risk and improvement of projects creditworthiness thereby correcting the credit market failure for projects.

Statement (6) that ‘Credit enhancement acts as a security instrument by cushioning of underlying loans against default’ had a mean of 4.10 and 0.368 standard deviation. This finding indicate that from 84 respondents, 10(11.9%) strongly agreed that Credit enhancement acts as a security instrument by cushioning of underlying loans against default, 72(85.7%) agreed that Credit enhancement acts as a security instrument by cushioning of underlying loans against default and 2(2.4%) were neutral that Credit enhancement acts as a security instrument by cushioning of underlying loans against default. This results show that

the line statement mean score of 4.10 was slightly below composite mean score of 4.25; implying that Credit enhancement moderately acts as a security instrument by cushioning of underlying loans against default and hence moderately influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.368 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The study finding supports observation by Frisari and Micale (2015) who found that credit enhancement provides guarantee for debt repayment there by reducing the cost of borrowings in the capital markets.

Statement (7) that 'Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants' had a mean of 4.27 and 0.475 standard deviation. This finding indicate that from 84 respondents, 24(28.6%) strongly agreed that Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants, 59(70.2%) agreed that Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants 1(1.2%) was neutral that Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants and. This finding indicate that the line statement mean score of 4.27 was above composite mean score of 4.25; implying that Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.475 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The findings supports observations by Dhruba (2018) that Credit enhancement in a project provides stakeholders with comprehensive risk mitigation in areas such as political risk coverage for project bankability in cost effective resource mobilization.

Statement (8) that 'Credit enhancement reduces cost of capital through lower interest rate charges' had a mean of 3.99 and 0.396 standard deviation. This finding indicate that from 84 respondents, 6(7.1%) strongly agreed that Credit enhancement reduces cost of capital through lower interest rate charges, 71(84.4%) agreed that Credit enhancement reduces cost of capital through lower interest rate charges and 7(8.3%) were neutral that Credit enhancement reduces cost of capital through lower interest rate charges. This results show that the line statement means score of 3.99 was marginally below composite mean score of 4.25; implying that Credit enhancement moderately reduce cost of capital through lower interest rate charges and hence moderately influence performance of Hydroelectric Energy

projects. The higher line item standard deviation of 0.396 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The finding supports observation by Yoshino and Taghizadeh-Hesary (2015) that credit enhancement lowers the interest rates charged on borrowings for the projects due to the security guarantee attached to them.

Statement (9) that 'Credit enhancement enables favorable debt amortization through extended debt maturity' had a mean of 4.06 and 0.647 standard deviation. This finding indicate that from 84 respondents, 20(23.8%) strongly agreed that Credit enhancement enables favorable debt amortization through extended debt maturity, 49(58.3%) agreed that Credit enhancement enables favorable debt amortization through extended debt maturity and 15(17.9%) were neutral that Credit enhancement enables favorable debt amortization through extended debt maturity. This result shows that the line statement means score of 4.06 was slightly below composite mean score of 4.25; implying that Credit enhancement moderately enables favorable debt amortization through extended debt maturity and hence moderately influences performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.647 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The study results support findings by Clean Bonds Initiative (2017) and IRENE (2016) that credit enhancement products softens debt amortization rate because of the reduced chances of default risk in the project.

Statement (10) that 'Credit enhancement enables introduction of new borrowers to the market for large scale transaction' had a mean of 3.43 and 0.566 standard deviation. This finding indicate that from 84 respondent, 3(3.6%) strongly agreed that Credit enhancement enables introduction of new borrowers to the market for large scale transaction, 30(35.7%) agreed that Credit enhancement enables introduction of new borrowers to the market for large scale transaction and 51(60.7%) were neutral that Credit enhancement enables introduction of new borrowers to the market for large scale transaction. This finding indicate that the line statement mean score of 3.43 was below composite mean score of 4.25; implying that Credit enhancement does not enable introduction of new borrowers to the market for large scale transaction' and hence might negatively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.566 than the composite standard deviation of 0.210 implies that there was divergence of opinion among respondents. The findings contradict Dhruba (2018) and IRENE (2016) argument that credit enhancement

products when rated makes them tradable in capital markets hence creating new networks of project financiers.

The overall composite score of all indicators of Credit enhancement had a mean of 4.25 with a 0.210 standard deviation; indicating that a majority 77(91.7%) of participants at least agreed that Credit enhancement influence performance of Hydroelectric Energy projects. The study results corroborates with similar findings by Dhruba (2018); Clean Bonds Initiative (2017); IRENE (2016) and; Chowdhury, Chen and Tiong (2015) that Credit enhancement influence performance of Hydroelectric Energy projects.

These findings were further supported by qualitative data and this is what the participant had to say concerning Credit enhancement and performance of Hydroelectric Energy project. The interviewee from CMA said that:

> *"…in order to finance green infrastructure projects through accelerated private sector uptake of green bonds, the Capital Markets Authority has developed Guideline for Approval and Registration of Credit Rating Agencies to facilitate debt securities rating issuers while NSE has developed green bond guidelines under the Green Bonds Programme. This programme is expected to enhance accessibility of complementary longer-term capital besides conventional, short-term bank lending, to achieve "green" investments financing, thus reinforcing the role of Kenya as the leading financial service provider within the region as contained in Vision 2030 Green Economy Strategy."* Further, *"…as a commitment to stimulate private investors on renewable energy projects, the government has developed Green Bond Issuance Policy Guidance Note and NSE Green Bond Trading Rules of 2019 and as a result in August 2019, Acorn Project Limited Liability Partnership issued unlisted Green Bond for investors in East Africa backed by a 50% guarantee from Guarant Co Ltd.* Equally, "…*the amendment of the Income Tax Act (ITA) through the Finance Act 2019, to exempt from withholding tax, interest income payable to investors in Green bonds is a positive gesture."* As such, *"…the initiatives facilitate financing of climate change for greenhouse gas emissions reduction to below 2 ^{0}C through the capital market."* (KII No. 6, CMA).

Thus the Capital Markets Master Plan (CMMP) fosters to deepen local capital markets to bridge the national funding gap with KenGen being an active player.

Equally, CMA interviewee said that:

"…the Government projected to issue its first Sovereign Green Bond in March 2020 with a Guarantee from CMA" and *"...as a requirement by CMA, Kenya's banking sector is aligning its functions to ESG factors with a likelihood of redirecting significant financing to green energy in line with the 2019 Principles of Responsible Investing (PRI) 16."* (KII No. 6, CMA).

These statements by CMA participant were supported by NSE participant who said that:

"…NSE offers issuers and investors a secure and transparent platform where they can come together and fulfill their green objectives through Green Bonds Programme Kenya which is an innovative tool for promoting economic and climate resilience for our country." (KII No. 6, CMA).

Green bond facilitates investments in climate friendly assets by investors, which facilitating climate aligned investments into their portfolios. The supportive regulatory instruments for Green Bond issuances facilitates institutionalization of green capital markets in Kenya with both private and public sector participants in line with Marrakech Pledge 2016. A green bond provides easy access to a large-diverse low cost financial pool and risk adjusted returns to finance hydroelectric projects. Shifting to capital markets relieves cash trapped banks during early-stage project financing to facilitate carbon emissions reduction, raising resource efficiency and environmental benefits.

For purposes of Green bond standardization a CMA participant said that:

"…regulatory oversight through Green bond standards and guidelines sets high governance levels and better transparency in the green bond issues hence raising investor confidence in the market besides lowering the cost of raising capital using such instruments." (KII No. 6, CMA).

However, the growth of global green bond market faces a myriad of challenges including volume of bankable projects, maturity of bond markets, bond financing preparedness, acceptable green standards, and capacity to analyze green investments by risk-averse investors. As an intervention adoption of Green Bond Principles and Climate Bonds Standard frameworks enables attraction of more environmentally responsible investors. As an intervention in the international capital market the CMA interviewee posited that:

"…the development of Green Bond Principles (GBPs) by International Capital Market Association (ICMA) for promoting sound management processes on the use of proceeds and engagement of independent reviewers for environmental credentials

and reporting practices has enabled the completion of green bond certification for solar, wind, and geothermal energy while a hydropower certification criterion is still under development." (KII No. 6, CMA)

The responses provided insight on how credit enhancement products under consideration contributed to performance of hydroelectric energy projects. Generally, Credit enhancement in a project provides stakeholders with comprehensive risk mitigation in areas such as political risk coverage besides improving project's creditworthiness for project bankability in cost effective resource mobilization and fulfillment of financial obligations like access to loans, green bonds, risk sharing facilities and credit guarantees at a cheaper cost thereby reducing the demand pressure on the banking system. Credit rating of the credit enhancement products is the surest way of making them tradable in the capital markets as it provides market signal for placement, bond pricing and access to bank financing.

4.8.1 Correlation Analysis of Credit enhancement and Performance of Hydroelectric Energy Projects

The study sought to examine the relationship between Credit enhancement and Performance of Hydroelectric Energy projects. Pearson correlation coefficient was adopted to test the relationship between Credit enhancement and Performance of Hydroelectric Energy projects; at a significant level of 0.05. The correlations findings obtained are represented in Table 4.18.

Table 4.18: Correlations of Credit Enhancement and Performance of Hydroelectric Energy Projects (n=84);*correlation significant at 0.05 level (2-tailed)

Credit enhancement indicators		Performance of Hydroelectric Energy Projects
1. Credit enhancement enhance credit worthiness of the project	Pearson Correlation	0.403*
	Sig. (2-tailed)	0.000
	n	84
2. Credit enhancement enable expanded access to market borrowings	Pearson Correlation	0.315*
	Sig. (2-tailed)	0.003
	n	84
3. Credit enhancement attract new sources of financing	Pearson Correlation	0.474*
	Sig. (2-tailed)	0.000
	n	84
4. Credit enhancement mitigate credit risk	Pearson Correlation	0.332*
	Sig. (2-tailed)	0.002
	n	84
5. Credit enhancement create more confidence among investors	Pearson Correlation	0.238*
	Sig. (2-tailed)	0.029
	n	84
6. Credit enhancement acts as a security instrument by cushioning of underlying loans against default	Pearson Correlation	0.260*
	Sig. (2-tailed)	0.017
	n	84
7. Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants	Pearson Correlation	0.229*
	Sig. (2-tailed)	0.036
	n	84
8. Credit enhancement reduces cost of capital through lower interest rate charges	Pearson Correlation	-0.339*
	Sig. (2-tailed)	0.110
	n	84
9. Credit enhancement enables favorable debt amortization through extended debt maturity	Pearson Correlation	0.358*
	Sig. (2-tailed)	0.001
	n	84
10. Credit enhancement enables introduction of new borrowers to the market for large scale transaction	Pearson Correlation	-0.256*
	Sig. (2-tailed)	0.06
	n	84
Overall correlation for Credit enhancement	**Pearson Correlation**	**0.858***
	Sig. (2-tailed)	**0.000**
	n	**84**

To test the extent of the relationship between Credit enhancement and Performance of Hydroelectric Energy projects; all indicators of Credit enhancement and Performance of Hydroelectric Energy projects were analyzed based on the hypothesis 3. H_0: There is no significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects. The corresponding mathematical model for the hypothesis took the form: Performance of Hydroelectric Energy projects = f(Credit enhancement). The research study found that out of the ten statements of credit enhancement, two statements namely: Statement

8(Credit enhancement reduces cost of capital through lower interest rate charges; r=-0.339, P-value=0.110>0.05) and Statement 10(Credit enhancement enables introduction of new borrowers to the market for large scale transaction; r=-0.256 P-value=0.06>0.05) were not statistically significant whereas eight statements namely: Statement 1(credit enhancement enhance credit worthiness of the project; r=0.403, P-value=0.000<0.05), statement 2(Credit enhancement enable expanded access to market borrowings; r=0.315, P-value=0.003<0.05), Statement 3(Credit enhancement attract new sources of financing; r=0.474, P-value=0.000<0.05), statement 4(Credit enhancement mitigate credit risk; r=0.332, P-value=0.002<0.05), Statement 5(Credit enhancement create more confidence among investors; r=0.238, P-value=0.029<0.05), Statement 6(Credit enhancement acts as a security instrument by cushioning of underlying loans against default; r=0.260, P-value=0.017<0.05), Statement 7(Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants; r=0.229, P-value=0.036<0.05), and Statement 9(Credit enhancement enables favorable debt amortization through extended debt maturity; r=0.358, P-value=0.001<0.05) were significantly correlated.

Similarly the overall correlation coefficient for Credit enhancement and Performance of Hydroelectric Energy projects was found to be r= 0.858; p-value= 0.000<0.05, implying that there is a significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (3. H_0: There is no significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects) and accepting alternative hypothesis, hence concluding that Credit enhancement and Performance of Hydroelectric Energy projects are significantly related. The correlation results are in tandem with the descriptive composite mean scores of 4.25 and 0.210 standard deviation which indicated that the participants agreed that Credit enhancement influence Performance of Hydroelectric Energy projects. This finding is in agreement with studies done by Dhruba (2018) and Chowdhury, Chen and Tiong (2015) that Credit enhancement and Performance of Hydroelectric Energy projects are significantly related.

4.8.2. Regression Analysis of Credit Enhancement on Performance of Hydroelectric Energy Projects

Simple linear regression was adopted to investigate how Credit enhancement influences Performance of Hydroelectric Energy projects. The rational of using the simple regression model was to establish how Credit enhancement as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy projects.

4.8.2.1 Model Summary of Credit Enhancement and Performance of Hydroelectric Energy Projects

The model sought to establish how Credit Enhancement as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy Projects. The regression model summary is presented in Table 4.19.

Table 4.19: Regression Model Summary of Credit Enhancement and Performance of Hydroelectric Energy Projects.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.858[a]	0.737	0.734	0.366

a. Predictors: (Constant), aggregated score on Contingent capital Indicators

The model summary suggest the existence of a positive correlation (R=0.858) between Credit enhancement and Performance of Hydroelectric Energy projects and those predicted by the regression model. In addition, 73.7% (R^2=0.737) of the variance in the Performance of Hydroelectric Energy projects is explained by Credit enhancement. The results are consistent with findings by Dhruba (2018); Chowdhury, Chen and Tiong (2015) and Chassot, Hampl, and Wüstenhagen (2014); that suggest significant relationships between Credit enhancement and Performance of Hydroelectric Energy projects.

4.8.2.2 ANOVA of Credit Enhancement and Performance of Hydroelectric Energy Projects

The study sought to establish if the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of Credit enhancement. The regression ANOVA statistics is represented in Table 4.20.

Table 4.20: An ANOVA of the Regression of Credit enhancement and Performance of Hydroelectric Energy Projects.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	30.764	1	30.764	229.629	0.000[b]
	Residual	10.986	82	0.134		
	Total	41.750	83			

a. Dependent Variable: aggregated Performance of Hydroelectric Energy Projects.

b. Predictors: (Constant), aggregated score of Credit enhancement

The ANOVA statistics show that (F(1,82)=229.629) is significant at P-value =0.000< 0.05, implying that the regression model result is significantly better prediction of Performance of Hydroelectric Energy projects.

4.8.2.3 Coefficients for Regression of Credit Enhancement and Performance of Hydroelectric Energy Projects

The study sought to establish the influence of Credit enhancement on Performance of Hydroelectric Energy projects. The regression coefficients findings are in table 4.21

Table 4.21: Coefficients for the Regression of Credit Enhancement and Performance of Hydroelectric Energy Projects.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.049	0.286		-0.170	0.865
	Credit enhancement	1.009	0.067	0.858	15.154	0.000

a. Dependent Variable: Performance Hydroelectric Energy Projects

The simple linear regression coefficients results indicated that Credit enhancement significantly influenced Performance of Hydroelectric Energy projects given P-Value =0.000<0.05. The regression model for contingent capital was $Y= -0.049 + 1.009X_3$; implying that for each unit of Credit enhancement use, Performance of Hydroelectric Energy projects marginally changed by 1.009 units. The results are consistent with the findings by Dhruba (2018); Atal, Shrimali, and Singh (2018); Chowdhury, Chen and Tiong (2015); Frisari and Micale (2015); Yoshino and Taghizadeh-Hesary (2015) and; Chassot, Hampl, and Wüstenhagen (2014) that there is significant influence of Credit enhancement on Performance of Hydroelectric Energy projects.

4.9 Hedging Derivatives and Performance of Hydroelectric Energy Projects

This was the fourth objective that the study sought to achieve. Therefore, participants were requested to give their opinions on their level of agreement or disagreement with the statements of contingent capital on a Likert scale of 1-5 where Strongly agree(SA)=5, Agree(A)=4, Neutral(N)=3, Disagree(D)=2 and Strongly disagree (SD)=1. The results are presented in Table 4.22

Table 4.22: Hedging Derivatives and Performance of Hydroelectric Energy Projects.

Statements	SA	A	N	D	SD	Mean	Std. dev
1. Hedging Derivatives enhances profitability of the project	13(15.5%)	71(84.5%)	0(0.00%)	0(0.00%)	0(0.00%)	4.15	0.364
2. Hedging Derivatives maintains liquidity flow within the project	78(92.9%)	6(7.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.93	0.259
3. Hedging Derivatives reduces market risks for the project	78(92.9%)	6(7.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.93	0.259
4. Hedging Derivatives reduces counterparty risk in the project	0(0.00%)	5(6.0%)	46(54.7%)	33(39.3%)	0(0.00%)	2.67	0.588
5. Hedging Derivatives ensures price stabilization by managing transaction costs and volatility	1(1.2%)	75(89.3%)	8(9.5%)	0(0.00%)	0(0.00%)	3.92	0.318
6. Hedging Derivatives saves time by reducing transaction bookwork	0(0.00%)	14(16.7%)	62(73.8%)	8(9.5%)	0(0.00%)	3.07	0.510
7. Hedging Derivatives facilitates efficiency in trading through market capitalization	33(39.3%)	50(59.5%)	1(1.20%)	0(0.00%)	0(0.00%)	4.38	0.513
8. Hedging Derivatives reduces cost of capital through systematic risk coverage	47(56%)	35(41.6%)	1(1.2%)	1(1.2%)	0(0.00%)	4.52	0.591
9. Hedging Derivatives facilitates steady revenue flow thus improving liquidity control	3(3.5%)	78(92.9%)	2(2.4%)	1(1.2%)	0(0.00%)	3.99	0.329
10. Hedging Derivatives improves project reputation among lenders and investors	58(69%)	25(29.8%)	1(1.2%)	0(0.00%)	0(0.00%)	4.67	0.545
Composite mean and Composite standard deviation						**4.12**	**0.197**

NB. HD1-10 is the statements of Hedging Derivatives

Ten statements measured the extent to which Hedging Derivatives influence performance of Hydroelectric Energy projects. Statement (1) that 'Hedging Derivatives enhances profitability of the project' had a mean of 4.15 and 0.364 standard deviation. This finding indicate that from 84 respondents, 13(15.5%) strongly agreed that Hedging Derivatives enhances profitability of the project, and 71(84.5%) agreed that Hedging Derivatives enhances profitability of the project. This result indicate that the line statement mean score of 4.15 was above composite mean score of 4.12; implying that Hedging Derivatives enhances profitability of the project and hence positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.364 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The study results support finding by Giraldo-Prieto *et al.*, (2017) and Basha (2013) that hedging derivatives are important financial risk management instrument that can be used in a project to prevent losses and maintain high profitability returns.

Statement (2) that 'Hedging Derivatives maintains liquidity flow within the project' had a mean of 4.93 and 0.259 standard deviation. This finding indicate that from 84 respondent,

78(92.9%) strongly agreed that Hedging Derivatives maintains liquidity flow within the project, and 6(7.1%) agreed that Hedging Derivatives maintains liquidity flow within the project. This result indicate that the line statement mean score of 4.93 was above composite mean score of 4.12; implying that Hedging Derivatives maintains liquidity flow within the project and hence positively influencing the performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.259 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The study results support finding by Giraldo-Prieto *et al.,* (2017) and Sharpe *et al.,* (2012) that Derivative instruments enhance financial market efficiency through increased liquidity depth thus preventing losses that would result from systemic risks.

Statement (3) that 'Hedging Derivatives reduces market risks for the project' had a mean of 4.93 and 0.259 standard deviation. This finding indicate that from 84 respondents, 78(92.9%) strongly agreed that Hedging Derivatives reduces market risks for the project, and 6(7.1%) agreed that Hedging Derivatives reduces market risks for the project. This result indicate that the line statement mean score of 4.93 was above composite mean score of 4.12; implying that Hedging Derivatives reduces market risks for the project and hence positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.259 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The finding supports Waswa and Wepukhulu (2018) observation that Derivative instruments hedges market risks such as interest rate risk, currency exchange risk, and inflation risk besides commodity risk for smooth project operations.

Statement (4) that 'Hedging Derivatives reduces counterparty risk in the project' had a mean of 2.67 and 0.588 standard deviation. This finding indicate that from 84 respondents, 5(6%) agreed that Hedging Derivatives reduces counterparty risk in the project, 46(54.7%) were neutral that Hedging Derivatives reduces counterparty risk in the project, 33(39.3%) disagreed that Hedging Derivatives reduces counterparty risk in the project. This result indicate that the line statement mean score of 2.67 was below composite mean score of 4.12; implying that Hedging Derivatives does not reduce counterparty risk in the project and hence negatively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.588 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The findings are similar Giraldo-Prieto *et al.,* (2017) and Basha (2013) observation that hedging derivatives themselves carry with them

counterparty risk and legal risk which may make the contract enforceable when it's required to perform and thus adequate understanding and supervision of derivatives transaction should be done with maximum accuracy.

Statement (5) that 'Hedging Derivatives ensures price stabilization by managing transaction costs and volatility' had a mean of 3.92 and 0.318 standard deviation. This finding indicate that from 84 respondents, 1(1.2%) strongly agreed that Hedging Derivatives ensures price stabilization by managing transaction costs and volatility, 75(89.3%) agreed that Hedging Derivatives ensures price stabilization by managing transaction costs and volatility, 8(9.5%) were neutral that Hedging Derivatives ensures price stabilization by managing transaction costs and volatility. This results show that the line statement mean score of 3.92 was marginally below composite mean score of 4.12; implying that Hedging Derivatives moderately ensures price stabilization by managing transaction costs and volatility and hence moderately influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.318 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The finding supports Sharpe *et al.,* (2012) observation that Derivative instruments enhance market price stability by reducing transaction cost and neutralizing volatilities.

Statement (6) that 'Hedging Derivatives saves time by reducing transaction bookwork' had a mean of 3.07 and 0.510 standard deviation. This finding indicate that from 84 respondents, 14(16.7%) agreed that Hedging Derivatives saves time by reducing transaction bookwork, 62(73.8%) were neutral that Hedging Derivatives saves time by reducing transaction bookwork, and 8(9.5%) disagreed that Hedging Derivatives saves time by reducing transaction bookwork. This result indicate that the line statement mean score of 3.07 was below composite mean score of 4.12; implying that Hedging Derivatives does not save time by reducing transaction bookwork and hence negatively influence the performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.510 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The study results contradicts finding by Fernando *et al.,* (2017) that hedging derivatives saves time by reducing transaction bookwork.

Statement (7) that 'Hedging Derivatives facilitates efficiency in trading through market capitalization' had a mean of 4.38 and 0.513 standard deviation. This finding indicate that from 84 respondents, 33(39.3%) strongly agreed that Hedging derivatives facilitates

efficiency in trading through market capitalization, 50(59.5%) agreed that Hedging derivatives facilitates efficiency in trading through market capitalization, and 1(1.2%) was neutral that Hedging Derivatives facilitates efficiency in trading through market capitalization. This result indicate that the line statement mean score of 4.38 was above composite mean score of 4.12; implying that Hedging Derivatives facilitates efficiency in trading through market capitalization and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.513 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The findings are similar to observations by Giraldo-Prieto *et al.,* (2017) that derivatives use enables market recapitalization and leverage.

Statement (8) that 'Hedging Derivatives reduces cost of capital through systematic risk coverage' had a mean of 4.52 and 0.591 standard deviation. This finding indicate that from 84 respondents, 47(56%) strongly agreed that Hedging derivatives reduces cost of capital through systematic risk coverage, 35(41.6%) agreed that Hedging reduces cost of capital through systematic risk coverage, 1(1.2%) was neutral that Hedging Derivatives reduces cost of capital through systematic risk coverage and 1(1.2%) disagreed that Hedging Derivatives reduces cost of capital through systematic risk coverage. This result indicate that the line statement mean score of 4.52 was above composite mean score of 4.12; implying that Hedging Derivatives reduces cost of capital through systematic risk coverage and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.591 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The finding support Sharpe *et al.,* (2012) argument that hedging derivatives in projects provides an umbrella for cost variance in case of market price volatility hence reduces the overall cost of capital.

Statement (9) that 'Hedging Derivatives facilitates steady revenue flow thus improving liquidity control' had a mean of 3.99 and 0.329 standard deviation. This finding indicate that from 84 respondents, 3(3.5%) strongly agreed that Hedging Derivatives facilitates steady revenue flow thus improving liquidity control, 78(92.9%) agreed that Hedging Derivatives facilitates steady revenue flow thus improving liquidity control, 2(2.4%) were neutral that Hedging Derivatives facilitates steady revenue flow thus improving liquidity control and 1(1.2%) disagreed that Hedging Derivatives facilitates steady revenue flow thus improving liquidity control. This results shows that the line statement mean score of 3.99 was

marginally below composite mean score of 4.12; implying that Hedging Derivatives moderately facilitate steady revenue flow thus moderately improve liquidity control and hence moderately influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.329 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The finding supports observation by Sharpe *et al.,* (2012) that Hedging derivatives used by firms to hedge systemic risks facilitates steady revenue flow which results into nourished liquidity depth.

Statement (10) that 'Hedging Derivatives improves projects' reputation among lenders and investors' had a mean of 4.67 and 0.545 standard deviation. This finding indicate that from 84 respondents, 58(69%) strongly agreed that Hedging derivatives improves project reputation among lenders and investors, 25(29.8%) agreed that Hedging derivatives improves project reputation among lenders and investors and 1(1.2%) was neutral that Hedging Derivatives improves project reputation among lenders and investors. This result indicate that the line statement mean score of 4.67 was above composite mean score of 4.12; implying that Hedging Derivatives improves project reputation among lenders and investors and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.545 than the composite standard deviation of 0.197 implies that there was divergence of opinion among respondents. The finding is similar to Waswa and Wepukhulu (2018) and Giraldo-Prieto *et al.,* (2017) observation that hedging derivatives in a project reduces market risk and improve financial image and reputation of the project amongst lenders and peers.

The overall composite score of all indicators of Hedging Derivatives had a mean of 4.12 and a 0.197 standard deviation and further indicate that a majority 68(80.9%) of participants at least agreed that Hedging Derivatives influence performance of Hydroelectric Energy projects. The study results corroborates with similar findings by Bhattacharya *et al.,* (2015) that Hedging Derivatives influence performance of Hydroelectric Energy projects.

These findings were further supported by qualitative data and this is what the participant had to say on Hedging Derivatives and Performance of Hydroelectric Energy Project. The interviewee from NSE said that:

> *"…NSE derivatives market enables trading of futures contracts as regulated by Capital Markets Authority protecting investors' portfolios from potential price declines "a form of insurance,"* for example, *"KenGen subscribed hedging*

derivatives during Public Infrastructure Bond offer in 2019 for efficiency in offsetting in future, making NSE the second exchange to offer traded derivatives in Africa, after Johannesburg Stock Exchange." (KII No. 7, NSE).

Similarly, CMA participant attributed that:

"…CMA Strategic Plan 2018-2023 envisages the positioning of Kenya's domestic capital markets as the premier choice for investors and issuers of derivatives through robust regulation, supportive innovation and enhanced investor protection besides trading only in secure bourse of Nairobi Securities Exchange (NSE) and working with licensed credit rating agencies." Further, *"…to minimize the potential adverse effects of credit, liquidity and market risks, the Authority's risk management policies subscribe to transacting with institutions with good credit ratings."* Equally, *"…the Authority partners with several stakeholders such as Chartered Institute for Securities and Investment, Certified Financial Analyst East Africa (CFA East Africa), Association of Chartered Certified Accountants (ACCA), Financial Sector Deepening Africa (FSD Africa) in awareness activities for hedging derivatives."* (KII No. 6, CMA).

In support, KenGen's participant said that:

"…the Company's Finance Division identifies, evaluates and hedges financial risks such as credit risk, liquidity risk, foreign exchange risk, interest rate risk and price risk through derivatives placed in NSE to minimize potential adverse effects on its financial performance." (KII No. 1, KenGen)

Generally, hedging derivatives enhance financial market efficiency through increased liquidity depth besides maintaining high investment returns and preventing losses that would result from risks such as systemic risks or market risks.

4.9.1 Correlation Analysis of Hedging Derivatives and Performance of Hydroelectric Energy Projects

The study sought to examine the relationship between Hedging Derivatives and Performance of Hydroelectric Energy projects. Pearson correlation coefficient was adopted to test the relationship between Hedging Derivatives and Performance of Hydroelectric Energy projects at a significance level of 0.05. The correlations results obtained are represented in Table 4.23.

Table 4.23: Correlations of Hedging Derivatives and Performance of Hydroelectric Energy Projects (n=84)

Hedging derivatives indicators		Performance of Hydroelectric Energy Projects
1. Hedging Derivatives enhances profitability of the project	Pearson Correlation	0.365*
	Sig. (2-tailed)	0.001
	n	84
2. Hedging Derivatives maintains liquidity flow within the project	Pearson Correlation	0.237*
	Sig. (2-tailed)	0.03
	n	84
3. Hedging Derivatives reduces market risks for the project	Pearson Correlation	0.247*
	Sig. (2-tailed)	0.023
	n	84
4. Hedging Derivatives does not reduce counterparty risk in the project	Pearson Correlation	-0.527*
	Sig. (2-tailed)	0.302
	n	84
5. Hedging Derivatives ensures price stabilization by managing transaction costs and volatility	Pearson Correlation	0.256*
	Sig. (2-tailed)	0.019
	n	84
6. Hedging Derivatives saves time by reducing transaction bookwork	Pearson Correlation	-0.353*
	Sig. (2-tailed)	0.125
	n	84
7. Hedging derivatives facilitates efficiency in trading through market capitalization	Pearson Correlation	0.307*
	Sig. (2-tailed)	0.004
	n	84
8. Hedging reduces cost of capital through systematic risk coverage	Pearson Correlation	0.448*
	Sig. (2-tailed)	0.000
	n	84
9. Hedging Derivatives facilitates steady revenue flow thus improving liquidity control	Pearson Correlation	0.247*
	Sig. (2-tailed)	0.023
	n	84
10. Hedging derivatives improves project reputation among lenders and investors	Pearson Correlation	0.235*
	Sig. (2-tailed)	0.031
	n	84
Overall correlation for Hedging derivatives	**Pearson Correlation**	**0.923***
	Sig. (2-tailed)	**0.000**
	n	**84**

To test the extent to which Hedging Derivatives relates with Performance of Hydroelectric Energy projects; all indicators of Hedging Derivatives and Performance of Hydroelectric Energy projects were analyzed based on the hypothesis 4. H_0: There is no significant relationship between Hedging Derivatives and Performance of Hydroelectric Energy projects. The corresponding mathematical model for the hypothesis took the form: Performance Hydroelectric Energy projects = f(Hedging Derivatives). The research study found that out of the ten statements of Hedging derivatives two statements namely; statement 4(Hedging Derivatives reduce counterparty risk in the project; r=-0.527, P-value=0.302<0.05) and Statement 6(Hedging Derivatives saves time by reducing transaction bookwork; r=-0.353, P-value=0.125<0.05) didn't have significant correlation whereas eight statements namely;

Statement 1(Hedging Derivatives enhances profitability of the project; r=0.365, P-value=0.001<0.05), statement 2(Hedging Derivatives maintains liquidity flow within the project; r=0.237, P-value=0.03<0.05), Statement 3(Hedging Derivatives reduces market risks for the project; r=0.247, P-value=0.023<0.05), Statement 5(Hedging Derivatives ensures price stabilization by managing transaction costs and volatility; r=0.256, P-value=0.019<0.05), Statement 7(Hedging derivatives facilitates efficiency in trading through market capitalization; r=0.307, P-value=0.004<0.05), Statement 8(Hedging reduces cost of capital through systematic risk coverage; r=0.448, P-value=0.000<0.05), Statement 9(Hedging Derivatives facilitates steady revenue flow thus improving liquidity control; r=0.247, P-value=0.023<0.05), and Statement 10(Hedging derivatives improves project reputation among lenders and investors; r=0.235 P-value=0.031<0.05) were significantly correlated.

Similarly the overall correlation coefficient for Hedging derivatives and Performance of Hydroelectric Energy projects was found to be r=0.923; p-value= of 0.000<0.05, implying that Hedging derivatives and Performance of Hydroelectric Energy projects are significantly related, thus, rejecting the null hypothesis (4. H_0: There is no significant relationship between Hedging derivatives and Performance of Hydroelectric Energy projects) and accepting alternative hypothesis, hence concluding that Hedging derivatives and Performance of Hydroelectric Energy projects are significantly statistically related. The correlation results are in tandem with the descriptive composite mean scores of 4.12 and 0.197 standard deviation which indicated that the participants agreed that Hedging derivatives influence Performance of Hydroelectric Energy projects. This finding is in agreement with studies done by Waswa and Wepukhulu (2018) and Giraldo-Prieto *et al.,* (2017) that Hedging derivatives and Performance of Hydroelectric Energy projects are a significant relationship.

4.9.2. Regression Analysis of Hedging Derivatives on Performance Hydroelectric Energy Projects

Simple linear regression was adopted to investigate how Hedging derivatives influence Performance of Hydroelectric Energy projects. The rational of using the simple linear regression model was to establish how hedging derivatives as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy projects.

4.9.2.1 Model Summary of Hedging Derivatives and Performance of Hydroelectric Energy Projects

The summary model sought to establish how Hedging derivatives as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy projects. The regression model summary is presented in Table 4.24.

Table 4.24: Regression Model Summary of Hedging derivatives and Performance of Hydroelectric Energy projects.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.923[a]	0.852	0.850	0.274

a. Predictors: (Constant), aggregated scores of Hedging derivatives Indicators

The model summary suggest the existence of a positive correlation (R=0.923) between Hedging derivatives and Performance of Hydroelectric Energy projects and those predicted by the regression model. In addition, 85.2% (R^2=0.852) of the variance in the Performance of Hydroelectric Energy projects is explained by Hedging derivatives. The results are consistent with the findings by Waswa and Wepukhulu (2018); Giraldo-Prieto *et al.*, (2017); Fernando *et al.*, (2017) and Basha (2013); that suggest significant relationship between Hedging derivatives and Performance of Hydroelectric Energy projects.

4.9.2.2 ANOVA of Hedging Derivatives and Performance of Hydroelectric Energy Projects

The study sought to establish if the regression model is best fit for predicting Performance Hydroelectric Energy projects after use of Hedging derivatives instrument. The regression ANOVA output statistics is shown in Table 4.25.

Table 4.25: An ANOVA of the Regression of Hedging derivatives and Performance of Hydroelectric Energy Projects.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	35.573	1	35.573	472.230	0.000[b]
	Residual	6.177	82	0.075		
	Total	41.750	83			

a. Dependent Variable: aggregated Performance of Hydroelectric Energy projects.
b. Predictors: (Constant), aggregated scores of Hedging derivatives

The ANOVA results (F(1,82)=472.230) is significant at P-value =0.000<0.05, implying that the regression model results is significantly better prediction of Performance of Hydroelectric Energy projects.

4.9.2.3 Coefficients for Regression of Hedging Derivatives and Performance of Hydroelectric Energy Projects

The study sought to establish the influence of Hedging derivatives on Performance of Hydroelectric Energy projects. The regression coefficients results are presented in Table 4.26.

Table 4.26: Coefficients for the Regression of Hedging derivatives and Performance of Hydroelectric Energy projects.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.002	0.152		6.577	0.000
Hedging derivatives	0.786	0.036	0.923	21.731	0.000

a. Dependent Variable: Performance of Hydroelectric Energy projects

The simple linear regression coefficients results indicated that Hedging derivatives significantly influence Performance of Hydroelectric Energy projects given P-Value =0.000<0.05. The regression model for contingent capital was $Y= 1.002 + 0.786X_4$; implying that for each unit of Hedging derivatives use, Performance Hydroelectric Energy projects marginally changed by 0.786 units. The results are consistent with the findings by Waswa and Wepukhulu (2018); Giraldo-Prieto *et al.,* (2017); Fernando *et al.,* (2017) and Basha (2013) that hedging derivatives significantly influence Performance of Hydroelectric Energy projects.

4.10 Insurance and Performance of Hydroelectric Energy Projects

This was the fifth objective that the study sought to achieve. Therefore, participants were requested to give their opinions on their level of agreement or disagreement with the statements of contingent capital on a Likert scale of 1-5 where Strongly agree(SA) =5, Agree (A)=4, Neutral(N)=3, Disagree(D)=2 and Strongly disagree (SD)=1. The findings are shown in Table 4.27

Table 4.27: Insurance and Performance of Hydroelectric Energy projects

Statements	SA	A	N	D	SD	Mean	Std. dev
1. Insurance increases debt equity ratio without increasing level of risk	18(21.4%)	63(75%)	3(3.6%)	0(0.00%)	0(0.00%)	4.18	0.470
2. Insurance reduces debt service coverage ratio	8(9.6%)	70(83.3%)	6(7.1%)	0(0.00%)	0(0.00%)	4.02	0.410
3. Insurance reduces cost of capital due to the risk coverage	78(92.9%)	6(7.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.93	0.259
4. Insurance facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event	1(1.2%)	81(96.4%)	2(2.4%)	0(0.00%)	0(0.00%)	3.99	0.190
5. Insurance reduces financial distress through efficient claim duration	39(47%)	42(49.4%)	3(3.6%)	0(0.00%)	0(0.00%)	4.43	0.567
6. Insurance provides risk securitization through acceptance	76(90.5%)	8(9.5%)	0(0.00%)	0(0.00%)	0(0.00%)	4.90	0.295
7. Insurance improves project reputation	1(1.2%)	78(92.8%)	5(6.0%)	0(0.00%)	0(0.00%)	3.95	0.265
8. Reinsurance of risk increases insurance underwriting capacity	0(0.00%)	58(69%)	25(29.8%)	1(1.2%)	0(0.00%)	3.32	0.624
9. Insurance cushions projects from political risks	1(1.2%)	31(36.9%)	46(54.8%)	6(7.1%)	0(0.00%)	3.68	0.495
10. Insurance reduces the duration to project's positive cash flow	0(0.00%)	22(26.2%)	53(63.1%)	9(10.7%)	0(0.00%)	3.15	0.591
Composite mean and Composite standard deviation						**3.92**	**0.223**

NB. INS1-10 is the statements of Insurance

Ten statements measured the extent to which Insurance influence performance of Hydroelectric Energy projects. Statement (1) that 'Insurance increases debt equity ratio without increasing level of risk' had a mean of 4.18 and 0.470 standard deviation. This finding indicate that from 84 respondents, 18(21.4%) strongly agreed that Insurance increases debt equity ratio without increasing level of risk, 63(75%) agreed that Insurance increases debt equity ratio without increasing level of risk, 3(3.6%) were neutral that Insurance increases debt equity ratio without increasing level of risk. This result indicate that the line statement mean score of 4.18 was above composite mean score of 3.92; implying that insurance increases debt equity ratio without increasing level of risk and hence positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.470 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The finding supports Lee and Lee (2012) observation that insurance acts as a specialized form of risk finance with the capability to substitute the regulatory constraint on the insurance's capital ratio of debt to equity requirements.

Statement (2) that 'Insurance reduces debt service coverage ratio' had a mean of 4.02 and 0.410 standard deviation. This finding indicate that from 84 respondents, 8(9.6%) strongly

agreed that Insurance reduces debt service coverage ratio, 70(83.3%) agreed that Insurance reduces debt service coverage ratio, 6(7.2%) were neutral that Insurance reduces debt service coverage ratio. This result indicate that the line statement mean score of 4.02 was above composite mean score of 3.92; implying that insurance reduces debt service coverage ratio and hence positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.410 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The findings support Soye, Adeyemo and Ayo (2017) observation that insuring a project reduces the intensity of the period required to repay borrowings as the project remains securitized.

Statement (3) that 'Insurance reduces cost of capital due to the risk coverage' had a mean of 4.93 and 0.259 standard deviation. This finding indicate that from 84 respondents, 78(92.9%) strongly agreed that Insurance reduces cost of capital due to the risk coverage and 6(7.2%) agreed that Insurance reduces cost of capital due to the risk coverage. This result indicate that the line statement mean score of 4.93 was above composite mean score of 3.92; implying that insurance reduces cost of capital due to the risk coverage and hence positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.259 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The finding is similar to Macharia and Caleb (2018) observation that risk coverage by insurance company reduces the quantity of premium charges imposed on principle capital hence reducing the cost of capital for project implementation.

Statement (4) that 'Insurance facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event' had a mean of 3.99 and 0.190 standard deviation. This finding indicate that from 84 respondents, 1(1.2%) strongly agreed that Insurance facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event, 81(96.4%) agreed that Insurance facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event, and 2(2.4%) were neutral that Insurance facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event. This result indicate that the line statement mean score of 3.99 was above composite mean score of 3.92; implying that insurance facilitates timely indemnification and restoration of a project to its normal operation in the occurrence of a risk event and hence positively influencing performance of Hydroelectric Energy projects. The lower line item standard deviation of 0.190 than the composite standard deviation of 0.223

implies that there was convergence of opinion among respondents. The finding support Gatzert and Kosub (2015) argument that insured projects experience faster recovery due to timely indemnification in instances of risk occurrence.

Statement (5) that 'Insurance reduces financial distress through efficient claim duration' had a mean of 4.43 and 0.567 standard deviation. This finding indicate that from 84 respondents, 39(47%) strongly agreed that Insurance reduces financial distress through efficient claim duration, 42(49.4%) agreed that Insurance reduces financial distress through efficient claim duration, and 3(3.6%) were neutral that Insurance reduces financial distress through efficient claim duration. This result indicate that the line statement mean score of 4.43 was above composite mean score of 3.92; implying that insurance reduces financial distress and loss through efficient claim duration which improves liquidity flow and hence positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.567 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The finding is similar to Soye, Adeyemo and Ayo (2017) observation that Insurance acts as a financial security tool and economic protection for projects by underwriting risks and enabling continuous liquidity flow during financial distress.

Statement (6) that 'Insurance provides risk securitization through acceptance' had a mean of 4.90 and 0.295 standard deviation. This finding indicate that from 84 respondents, 76(90.5%) strongly agreed that Insurance provides risk securitization through acceptance and 8(9.5%) agreed that Insurance provides risk securitization through acceptance. This results indicate that the line statement mean score of 4.90 was above composite mean score of 3.92; implying that insurance provides risk securitization through acceptance and retention and hence positively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.295 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The study results support finding by Gatzert and Kosub (2015) and Swenja (2013) that Insurance schemes in renewable energy projects aid in incentivizing risk reduction efforts, transfer investment risks and compensate victims and this has the ability to stimulate private funding for climate change.

Statement (7) that 'Insurance improves project reputation' had a mean of 3.95 and 0.265 standard deviation. This finding indicate that from 84 respondents, 1(1.2%) strongly agreed that Insurance improves project reputation, 78(92.8%) agreed that Insurance improves project

reputation, and 5(6.0%) were neutral that Insurance improves project reputation. This results indicate that the line statement mean score of 3.95 was above the composite mean score of 3.92; implying that insurance improves project reputation and credit profile thus positively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.265 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The study results support finding by Outreville (2002) that insuring a project ensures that they are always financially sound and stable thus providing confidence for private sector investors.

Statement (8) that 'reinsurance of risk increases insurance underwriting capacity' had a mean of 3.32 and 0.624 standard deviation. This finding indicate that from 84 respondents, 58(69%) agreed that reinsurance of risk increases insurance underwriting capacity, 25(29.8%) were neutral that reinsurance of risk increases insurance underwriting capacity and 1(1.2%) disagreed that reinsurance of risk increases insurance underwriting capacity. This results indicate that the line statement mean score of 3.32 was below composite mean score of 3.92; implying that reinsurance of risk does not increase insurance underwriting capacity and hence negatively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.624 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The study results support finding by Choi and Elyasiani (2011) that reinsurance has a negative effect on ceding companies revenue flow since they will be sharing the would be sole profits of the cedant, thus driving down their operational cost which cascades into higher charges of insurance premiums to undertake underwriting function for renewable energy projects but contradicts finding by Garven and Tennant (2003) and Outreville (2002) that reinsurance decision is a specialized form of risk finance that improves underwriting capacity, reduces expected bankruptcy costs, and improves capital management decision.

Statement (9) that 'Insurance cushions projects from political risks' had a mean of 3.68 and 0.495 standard deviation. This finding indicate that from 84 respondents, 1(1.2%) strongly agreed that Insurance cushions projects from political risks, 31(36.9%) agreed that Insurance cushions projects from political risks, 46(54.8%) were neutral that Insurance cushions projects from political risks and 6(7.2%) disagreed that Insurance cushions projects from political risks. This result indicate that the line statement mean score of 3.68 was below composite mean score of 3.92; implying that Insurance does not cushions projects from

political risks and hence negatively influence performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.495 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The study results contradicts finding by Swenja (2013) that existing insurance products have managed political risks relating to environmental protection and mitigation investments.

Statement (10) that 'Insurance reduces the duration to project's positive cash flow' had a mean of 3.15 and 0.591 standard deviation. This finding indicate that from 84 respondents, 22(26.2%) agreed that Insurance reduces the duration to project's positive cash flow, 53(63.1%) were neutral that Insurance reduces the duration to project's positive cash flow and 9(10.7%) disagreed that Insurance reduces the duration to project's positive cash flow. This result indicate that the line statement mean score of 3.15 was below composite mean score of 3.92; implying that Insurance does not reduce the duration to project's positive cash flow and hence negatively influencing performance of Hydroelectric Energy projects. The higher line item standard deviation of 0.591 than the composite standard deviation of 0.223 implies that there was divergence of opinion among respondents. The finding contradicts Mayers and Smith (1981) observation that insurance reduces the duration of positive cash flow in a project.

The overall composite score of all indicators of insurance had a mean of 3.92 and a 0.223 standard deviation and further, majority 62(73.8%) of participants at least agreed that insurance influence performance of Hydroelectric Energy projects. The study results corroborates with similar findings by Macharia and Caleb (2018); Soye, Adeyemo and Ayo (2017); Halwatura (2015) and; Gatzert and Kosub (2015) who found that insurance influence performance of Hydroelectric Energy projects.

These findings were further supported by qualitative data and this is what the participant had to say on insurance and performance of Hydroelectric Energy project. The participant from KenGen said that:

> *"…insuring the hydroelectric energy projects has made investors to have increased confidence in the investments and this has also enabled access to borrowings from Multilateral financial institutions and local commercial market to be cheaper since the debt liquidity ratio threshold requirement is lowered due to the security item provided by the insurance."* (KII No. 1, KenGen)

The Insurance Regulatory Authority has equally managed to bring order in the insurance market to avoid transactions by insolvent entities through implementation of its mandate as captures by IRA participant who said that:

> "*…the Authority regulates, supervise and develop the insurance industry in Kenya by promoting consumer education and protection, promoting an inclusive, competitive and stable insurance industry; and Offer quality customer service. The insurance industry contributes to the economy by providing financial security, mobilizing savings, creating liquidity, releasing pressure on public sector finance and promoting direct and indirect investments at a lower cost."* (KII No. 8, IRA).

To strengthen the capacity of insurance companies in undertaking bigger risks IRA respondent said that:

> *"…so far we have licensed five reinsurance businesses in Kenya including Kenya Reinsurance Corporation Limited, East Africa Reinsurance Company Limited, Continental Reinsurance Company Limited, Ghana Reinsurance Company Kenya Limited and Waica Reinsurance Kenya Limited that aids in the provision of reinsurance or guarantees against political, commercial and non-commercial risks." (KII No. 8, IRA).*

Generally, insurance act as a financial security tool and economic protection by underwriting risks. Insurance increases debt equity ratio without increasing level of risk, reduces debt service coverage ratio, reduces cost of capital due to the risk coverage, facilitates timely indemnification and liquidity of a project to its normal operation in the occurrence of a risk event, provides risk securitization through acceptance and retention, and improves project reputation for enhanced credit profile. However, Insurance leaves projects with certain risks such as political risk and revenue risk.

4.10.1 Correlation Analysis of Insurance and Performance of Hydroelectric Energy Projects

The study sought to examine the relationship between Insurance and Performance of Hydroelectric Energy projects. Pearson correlation coefficient was adopted to test the relationship between Insurance and Performance of Hydroelectric Energy projects; at a significant level of 0.05. The correlations results obtained are presented in Table 4.28.

Table 4.28: Correlations of Insurance and Performance of Hydroelectric Energy Projects (n=84)

Insurance indicators		Performance of Hydroelectric Energy Projects
1. Insurance increases debt equity ratio without increasing level of risk	Pearson Correlation	0.478*
	Sig. (2-tailed)	0.000
	n	84
2. Insurance reduces debt service coverage ratio	Pearson Correlation	0.356*
	Sig. (2-tailed)	0.001
	n	84
3. Insurance reduces cost of capital due to the risk coverage	Pearson Correlation	0.313*
	Sig. (2-tailed)	0.004
	n	84
4. Insurance facilitates timely indemnification to its normal operation in the occurrence of a risk event	Pearson Correlation	0.540*
	Sig. (2-tailed)	0.000
	n	84
5. Insurance reduces financial distress through efficient claim duration	Pearson Correlation	0.274*
	Sig. (2-tailed)	0.012
	n	84
6. Insurance provides risk securitization through acceptance	Pearson Correlation	0.324*
	Sig. (2-tailed)	0.003
	n	84
7. Insurance improves project reputation	Pearson Correlation	0.276*
	Sig. (2-tailed)	0.011
	n	84
8. Reinsurance of risk increases insurance underwriting capacity	Pearson Correlation	-0.417*
	Sig. (2-tailed)	0.211
	n	84
9. Insurance cushions projects from political risks	Pearson Correlation	-0.419*
	Sig. (2-tailed)	0.107
	n	84
10. Insurance reduces the number of years to positive cash flow in the project	Pearson Correlation	-0.648*
	Sig. (2-tailed)	0.08
	n	84
Overall correlation for Insurance	**Pearson Correlation**	**0.819***
	Sig. (2-tailed)	**0.000**
	n	**84**

NB * Correlation significant at 0.05 level (2-tail)

To test the extent to which Insurance relates with Performance of Hydroelectric Energy projects; all indicators of Insurance and Performance of Hydroelectric Energy projects were analyzed based on the hypothesis 5. H_0: There is no significant relationship between Insurance and Performance of Hydroelectric Energy projects. The corresponding mathematical model for the hypothesis took the form: Performance of Hydroelectric Energy projects = f(Insurance). The research study found that out of the ten statements of Insurance three statements namely; Statement 8(Reinsurance of risk increases insurance underwriting capacity; r= -0.417, P-value=0.211>0.05), Statement 9(Insurance cushions projects from

political risks; r= -0.419, P-value=0.107>0.05) and Statement 10(Insurance reduces the duration to project's positive cash flow, r= -0.648 P-value=0.08<0.05) did not have significant correlation whereas seven statements namely; Statement 1(Insurance increases debt equity ratio without increasing level of risk; r=0.478, P-value=0.000<0.05), statement 2(Insurance reduces debt service coverage ratio; r=0.356, P-value=0.001<0.05), Statement 3(Insurance reduces cost of capital due to the risk coverage; r=0.313, P-value=0.004<0.05), statement 4(Insurance facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event; r=0.540, P-value=0.000<0.05), Statement 5(Insurance reduces financial distress and loss through efficient claim duration which improves liquidity flow; r=0.274, P-value=0.012<0.05), Statement 6(Insurance provides risk securitization through acceptance and retention; r=0.324, P-value=0.003<0.05), Statement7(Insurance improves project reputation and as such enhances its credit profile; r=0.276, P-value=0.011<0.05) had significant correlation.

Similarly the overall correlation coefficient for Insurance and Performance of Hydroelectric Energy projects was found to be r=0.819 with a p-value of 0.000<0.05, implying that Insurance and Performance of Hydroelectric Energy projects are significantly related, thus, rejecting the null hypothesis (5. H_0: There is no significant relationship between Insurance and Performance of Hydroelectric Energy projects) and accepting alternative hypothesis, hence concluding that Insurance and Performance of Hydroelectric Energy projects are significantly related statistically.

The correlation results are in tandem with the descriptive composite mean scores of 3.92 and 0.223 standard deviation which indicated that the participants agreed that Insurance influence Performance of Hydroelectric Energy projects. This finding is in agreement with studies done by Macharia and Caleb (2018); Soye, Adeyemo and Ayo (2017); Halwatura (2015); Gatzert and Kosub (2015) and; Swenja (2013) that Insurance is significantly related to Performance of Hydroelectric Energy projects.

4.10.2. Regression Analysis of Insurance on Performance of Hydroelectric Energy Projects

Simple linear regression was adopted to investigate how Insurance influence Performance of Hydroelectric Energy projects. The rational of using the simple regression model was to establish how Insurance as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy projects.

4.10.2.1 Model Summary of Insurance and Performance of Hydroelectric Energy Projects

The summary model sought to establish how Insurance as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy projects. The regression model summary is presented in Table 4.29.

Table 4.29: Regression Model Summary table of Insurance and Performance of Hydroelectric Energy Projects.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.819[a]	0.671	0.667	0.409

a. Predictors: (Constant), aggregated score of Insurance Indicators

The model summary suggests a positive correlation (R=0.819) between Insurance and Performance of Hydroelectric Energy projects and those predicted by the regression model. In addition, 67.1% (R^2=0.671) of the variance in the Performance of Hydroelectric Energy projects is explained by Insurance. The results are consistent with the findings by Macharia and Caleb (2018); Soye, Adeyemo and Ayo (2017) and; Halwatura (2015) that suggest significant relationships between the Insurance and Performance of Hydroelectric Energy projects.

4.10.2.2 ANOVA of Insurance and Performance of Hydroelectric Energy Projects

The study sought to establish if the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of Insurance. The regression ANOVA statistics results are shown in Table 4.30.

Table 4.30: An ANOVA of the Regression of Insurance and Performance of Hydroelectric Energy Projects.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	28.007	1	28.007	167.109	0.000[b]
	Residual	13.743	82	0.168		
	Total	41.750	83			

a. Dependent Variable: aggregated Performance of Hydroelectric Energy Projects.
b. Predictors: (Constant), aggregated score of Insurance

The ANOVA results (F(1,82)=167.109) is significant at P-value =0.000<0.05; implying that the regression model results is significantly better prediction of Performance of Hydroelectric Energy projects.

4.10.2.3 Coefficients for Regression of Insurance and Performance of Hydroelectric Energy Projects

The study sought to establish whether the influence of Insurance on Performance of Hydroelectric Energy projects. The regression coefficients results are shown in table 4.31

Table 4.31: Coefficients for the Regression of Insurance and Performance of Hydroelectric Energy Projects.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.490	0.218		6.834	0.000
	Insurance	0.705	0.055	0.819	12.927	0.000

a. Dependent Variable: Performance of Hydroelectric Energy Projects

The simple linear regression coefficients results indicated that Insurance significantly influence Performance of Hydroelectric Energy projects given P-Value =0.000<0.05. The regression model for contingent capital was $Y= 1.490 + 0.705X_5$; implying that for each unit of Insurance use, Performance of Hydroelectric Energy projects marginally changed by 0.705 units. The finding is similar to Macharia and Caleb (2018) and Soye, Adeyemo and Ayo (2017) observations that Insurance significantly influence Performance of Hydroelectric Energy projects.

4.11 Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought the perspectives of participants on Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. Combined Financial Risk Management Instruments used in this study was; Alternative risk transfer, Contingent Capital, Credit Enhancement, Hedging derivatives, and Insurance. It was important to get the views of the participants when all the Financial risk management Instruments were combined together. This was the sixth objective of the study. The results are shown in Table 4.32.

Table 4.32: Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

Combined Financial Risk Management Instruments	n	Mean	Standard deviation
Alternative risk transfer	84	3.96	0.445
Contingent Capital	84	3.95	0.344
Credit Enhancement	84	4.25	0.210
Hedging derivatives	84	4.12	0.197
Insurance	84	3.92	0.223
Composite mean & standard deviation	**84**	**4.04**	**0.166**

Table 4.32 shows descriptive statistics on participants views on Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects. The mean and standard deviations for: Alternative risk transfer was 3.96 and 0.445, Contingent capital was 3.95 and 0.344, Credit enhancements was 4.25 and 0.210, Hedging derivatives was 4.12 and 0.197 and finally Insurance was 3.92 and 0.223 respectively. The result shows that when the Combined Financial risk management Instruments is done, Credit enhancement (Mean=4.25) and Hedging derivatives (Mean=4.12) positively influence Performance of Hydroelectric Energy projects since their means are above the composite means score of 4.04 whereas Alternative risk transfer (Mean=3.96), Contingent capital (Mean=3.95) and Insurance (Mean=3.92) moderately influence Performance of Hydroelectric Energy projects since their means are slightly below the composite means score of 4.04. The composite mean and composite standard deviation was 4.04 and 0.166 respectively imply that the participants were agreeing that Combined Financial Risk Management Instruments influence Performance of Hydroelectric Energy projects. The results support the findings by Macharia and Caleb (2018); Soye, Adeyemo and Ayo (2017) and; Halwatura (2015), that suggest that use of Combined Financial Risk Management Instruments influence Performance Hydroelectric Energy projects.

These findings were further supported by qualitative data and this is what the participant had to say on Insurance and performance of Hydroelectric Energy project. The interviewee from KenGEN said that:

> *"...if investors use financial risk management instruments in their projects and the financiers are rest assured that their loan will be repaid then they won't place the loan as high risk which reduces the requirements of quick amortization and higher charges. In the long run the project's cost of capital will be obviously reduced and the project will achieve high success probability."* (KII No. 1, KenGen).

In support of the findings a respondent by KPLC attributed that:

> *"…relevant steps have been taken to identify, analyze, evaluate and mitigate risks arising from day to day operations in consistent with legal and regulatory obligations besides embedding the company's Enterprise Risk Management (ERM) practice. Credit risk is managed through engagement with counter parties with high credit ratings and through Alternative risk transfer techniques such as captives "internal deposits" or a bank guarantee; while liquidity risk is managed through maintaining debt liquidity ration and market risks through hedging derivatives such as future and forward contracts and interest rate risk through long term fixed interest rates contracts."* (KII No. 5, KPLC).

Contracts should be well documented with clear understandable language and defined roles for all the project parties' to achieve value for money, stakeholder satisfaction, quality products delivery, cost reduction, and competitive procurement besides risks and liabilities management.

4.11.1 Correlation Analysis of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Inferential statistics was conducted on participants Perspectives on the relationship between Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. Pearson correlation coefficient was adopted to test the relationship between Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects, at a significant level of 0.05. The results obtained are indicated in Table 4.33.

Table 4.33: Correlation Analysis of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

Combined Financial Risk Management Instruments		**Performance Hydroelectric Energy Projects**
Combined Financial risk management Instruments	*Pearson Correlation*	*0.931**
	Sig. (2-tailed)	*0.000*
	n	*84*

Correlation significant at 0.05 level (2-tailed)

To test the extent of the relationship between Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects; Alternative Risk Transfer, Contingent Capital, Credit Enhancement, Hedging Derivatives, Insurance and Performance of Hydroelectric Energy projects were analyzed based on the following hypothesis; 6. H_0: There

is no significant relationship between Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. The corresponding mathematical model for the hypothesis took the form: Performance of Hydroelectric Energy projects = f(Combined Financial Risk Management Instruments). The overall correlation coefficient for Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects was found to be r=0.931; p-value= 0.000<0.05, implying that there is a statistically significant relationship between Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects; thus, rejecting the null hypothesis (6. H_0: There is no significant relationship between Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy projects) and accepting alternative hypothesis, hence concluding that the Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy projects are significantly related. This finding are in tandem with Suprapto *et al.,* (2016); Frisari and Micale (2015) and; Gómez-Baggethun and Muradian (2015) observations that Financial risk management Instruments are significantly related to Performance of Hydroelectric Energy projects.

4.11.2 Regression Analysis of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Multiple linear regressions were adopted to investigate how the Combined Financial risk management Instruments influence Performance of Hydroelectric Energy projects. It was necessary to get the views of the participants on the influence of Combined Financial risk management Instruments on Performance of Hydroelectric Energy projects. The rational of using the multiple regression models was to establish how Combined Financial risk management Instruments significantly or insignificantly predicted Performance of Hydroelectric Energy projects.

4.11.2.1 Model Summary of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The model summary sought to establish how Combined Financial risk management Instruments significantly or insignificantly predicted Performance of Hydroelectric Energy projects. Table 4.34 presents the regression model summary on the Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects.

Table 4.34: Regression Model Summary of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.931[a]	0.867	0.858	0.267

a. Predictors: (Constant), Combined Financial risk management Instruments

The model summary suggest that there is a positive multiple correlation (R=0.931) between Combined Financial risk management Instruments and Performance of Hydroelectric Energy projects and those predicted by the regression model. In addition, 86.7% (R^2=0.867) of the variance in Performance of Hydroelectric Energy projects is explained by the Combined Financial risk management Instruments. The results are similar with Suprapto *et al.,* (2016) and Frisari and Micale (2015) findings that Financial risk management Instruments are significantly related with Performance of Hydroelectric Energy projects.

4.11.2.2 ANOVA of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought to find out whether the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of Combined Financial risk management Instruments. The regression ANOVA output statistics result is shown in Table 4.35.

Table 4.35: An ANOVA of the Regression of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.185	5	7.237	101.436	0.000[b]
	Residual	5.565	78	0.071		
	Total	41.750	83			

a. Dependent Variable: Performance of Hydroelectric Energy Projects

b. Predictors: (Constant), Combined Financial Risk Management Instruments

The ANOVA results (F(5,78)= 101.436) is significant at P-value=0.000<0.05; implying that regression model results is significantly better prediction of Performance of Hydroelectric Energy projects. From the views of the participants, Combined Financial risk management Instruments have a significant positive influence on Performance of Hydroelectric Energy projects. The findings are similar to observations by Suprapto *et al.,* (2016) and Frisari and

Micale (2015) that Financial risk management Instruments and Performance of Hydroelectric Energy projects are significantly related.

4.11.2.3 Coefficients for Regression of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought to establish the influence of Combined Financial risk management Instruments on Performance of Hydroelectric Energy projects. The regression coefficients results are shown in Table 4.36.

Table 4.36: Coefficients for the Regression of Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.919	0.285		3.230	0.002
	Alternative Risk Transfer	0.397	0.117	0.376	3.381	0.001
	Contingent Capital	0.690	0.172	0.412	3.999	0.000
	Credit Enhancement	1.276	0.252	0.534	5.060	0.000
	Hedging Derivatives	0.826	0.184	0.472	4.493	0.000
	Insurance	0.192	0.092	0.273	2.075	0.041

The multiple linear regression coefficients results indicated that the Combined Financial risk management Instruments is significantly related with Performance of Hydroelectric Energy projects given P-Value=0.00<0.05. The model was $Y=0.919+0.397X_1+0.690 X_2+1.276X_3+0.826X_4+0.192X_5$. The model shows that Alternative risk transfer, Contingent capital, Credit enhancement, Hedging derivatives and Insurance had statistical significance (P-values= 0.000<0.05). In terms of the best predictor for Performance of Hydroelectric Energy projects; the best predictor was credit enhancement (beta=0.534) followed by Hedging derivative (beta=0.472), followed by Contingent capital (beta=0.412), followed by Alternative risk transfer (beta=0.376) and then Insurance (beta=0.273). The finding is similar to observations by Suprapto *et al.*, (2016); Frisari and Micale (2015); Gómez-Baggethun and Muradian (2015) and; Mutua, Waiganjo and Oteyo (2014) that Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects are significantly related.

Generally, financial risk management instruments such as Alternative risk transfer (ART), hedging derivatives, contingent capital, credit enhancement and insurance, if used appropriately, could reduce hydroelectric energy projects' cost as risks will be transferred away from investors and lenders. Thus more needs to be done in framing and

commoditization of environmental resources which requires the input of institutional investors to assess from a portfolio perspective (tradable assets) the renewable energy projects in relation to financial risk management.

4.12 Analysis of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought the views of participants on moderating influence of Communication strategy on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The subsequent results using descriptive statistics is given in table 4.37

Table 4.37: Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

Communication Strategies, Financial Risk Management Instruments	n	Mean	Std. Deviation
Alternative Risk Transfer	84	4.17	0.269
Contingent Capital	84	4.16	0.225
Credit Enhancement	84	4.31	0.200
Hedging Derivatives	84	4.24	0.184
Insurance	84	4.15	0.196
Communication Strategy	84	4.38	0.300
Composite mean& standard deviation	**84**	**4.23**	**0.194**

Table 4.37 presents the descriptive statistics on participants' perspectives on moderating influence of Communication strategy on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The study results indicates that following the moderating effect of communication strategy (Mean=4.38, SD=0.300), the means for each financial risk management Instruments increased. This can be shown by comparing mean scores results from Table 4.32 before communication strategy was introduced; (Alternative risk transfer (Mean=3.96), Contingent capital (Mean=3.95), Credit enhancements (Mean=4.25), Hedging derivatives (Mean=4.12) and Insurance (Mean=3.92)) with Table 4.37 mean score results after the moderating influence of communication strategy (Alternative risk transfer (Mean=4.17), Contingent capital (Mean=4.16), Credit enhancements (Mean=4.31), Hedging derivatives (Mean=4.24) and Insurance (Mean=4.15)). The mean for Credit enhancement was the highest (Mean=4.31, SD=0.200), followed by Hedging derivatives (Mean=4.24, SD=0.184), Alternative risk transfer (Mean=4.17,

SD=0.267), Contingent capital (Mean=4.16, SD=0.225) and Insurance (Mean=4.15, SD=0.196). The study results further revealed that composite mean of mean was 4.23 and standard deviation of 0.194; meaning that communication strategy moderated the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. Though Chihuri and Pretorius (2010) and Serpell *et al.*, (2015) only revealed that communication strategy influences Performance of Hydroelectric Energy projects, the current study has gone further to find that communication strategy has an increasing moderating influence between financial risk management instruments and performance of hydroelectric energy projects.

These findings on moderating influence of communication strategy on the relationship between financial risk management instruments and performance of Hydroelectric Energy project were further supported by KenGen interviewee. The interviewee from KenGen said that:

> *"…to ensure achievement of the overall sector mandate we engage stakeholders and regulators such as Kenya Power "off-taker", Energy Regulatory Commission and NEMA through appropriate communication channels such as local daily newspapers and company's website that offers timely and quality information for appropriate action. Internal Communication for employees has also been enhanced through an intranet platform."* Further, *"…environmental scanning of any inherent reputational risk is frequently being undertaken so that potential adverse communication is addressed with relevant stakeholders through a sound communication engagement strategy to reduce chances of a decline in the market share price and failure to attract investors."* On contracts, *"…modernization of communication platforms has been adopted in e-procurement providing investors and shareholders with full disclosure of information and adherence to all set standards, laws and regulations which has resulted into 90% of tenders being procured through IFMIS system."* (KII No. 1, KenGen).

Also,

> *"…a PPA awareness drive for the staff has been universally initiated in KenGen operation sites for improved plant availability and enhanced cost savings."* (KII No. 1, KenGen).

On risk awareness the KenGen participant said that:

"…the Company continues to engage with relevant stakeholders for the establishment of hydro-risk mitigation fund to cushion the projects during periods of poor hydrological conditions besides diversifying from hydro-dependent generation to other modes such as geothermal and wind." (KII No. 1, KenGen).

Concerning environmental safety the KenGEN participant argued that:

"…KenGen has developed and communicated an Occupational health and safety policy (OSH policy) that undertakes to observe Health & Safety standards that exceed the minimum legal requirements through continuous training on environmentally friendly practices and maintain open communications regarding OSH practices." (KII No. 1, KenGen).

Initiatives towards implementation of capacity building to demystify the cost of investment in environmentally friendly and healthy workforce should be stepped up.

On risk mitigation the KenGEN participant stated that:

"…sensitizing market stakeholders through creating awareness using the right channels and learning from international green finance issuers are a great part of capacity building for the Kenyan economy." (KII No. 1, KenGen).

For financial access capacity improvement,

"…we collaborate with our partners to grow a green bonds market in Kenya as part of delivering lower cost capital to green projects, and developing capital markets in Kenya, for instance, in 2020 Kenya issued a sovereign green bond enhancing its strategic green financing position in Africa." (KII No. 1, KenGen).

Green bonds as climate financing instruments facilitates the achievement of Green Economy Strategy and Implementation Plan (GESIP) objectives and enhances Environmental, Social and Governance (ESG) sustainability by realigning investors to issuers same focus, hence raising Kenya's profile in capital markets as a climate finance frontier.

According to CMA participant:

"…the licensing of investment credit rating entity, Moody's Investors Service for risk analysis and training of investors ensures that they have information on the region's latest credit trends and market dynamics for a transparent and integrated financial market." (KII No. 6, CMA).

To enhance hedging derivatives trading in the capital markets NSE participant said that:

"…the Nairobi Securities Exchange is creating awareness on hedging derivatives

trading amongst investors and is in the process of upgrading its automated trading system besides working with other financial regulators in the region such as Uganda Capital markets Authority, Botswana Stock Exchange, Swaziland Financial Services Regulatory Authority, Zambia Securities & Exchange Commission, Ghana Securities and Exchange Commission and Tanzania Capital Markets & Securities Authority to facilitate transaction with credit worthy derivative providers." (KII No. 7, NSE).

Similarly, CMA participant responded that:

"…in order to ensure adequate capacity, the Authority has continued to engage the market through running a series of market awareness programs on Exchange Traded Derivatives with key focus on market intermediaries, policy makers value proposition on derivatives, technical training in trading and use of derivatives contracts to hedge against risk, Regulatory and coordinated supervision of Derivatives Market, compliance reporting and risk management." (KII No. 6, CMA).

For independence and transparency of information,

"…a consultant has been contracted to develop an information repository to streamline the Authority's use of business intelligence through improved data collection and analysis and to strengthen internal capacity through e-learning. The Derivatives Unit of the Authority has been undertaking various awareness and capacity building initiatives targeting key stakeholders in Kenya." Generally, *"…the Authority promotes an orderly, fair and efficient development of Kenya's' Capital Market through education and awareness creation to the relevant stakeholders by leveraging technology on new products and services for optimal uptake."* (KII No. 6, CMA).

An appropriate communication strategy with clear communication flow structure, innovative communication management tools, operational communication channels and quality information that integrates project stakeholders should be entrenched in projects for timely and accurate propagation of information concerning financial risk management instruments utilization and understanding of project objectives besides facilitating monitoring and review processes for appropriate corrective measures.

4.12.1 Correlation Analysis of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Inferential statistics was conducted on moderating influence of Communication strategy on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. Pearson product moment correlation coefficient was used to establish how Communication strategy moderates the relationships between financial risk management Instruments and Performance of Hydroelectric Energy projects. The correlation results are represented in Table 4.38.

Table 4.38: Correlation Analysis of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects. (n=84)

Communication Strategy, Financial Risk Management Instruments		**Performance of Hydroelectric Energy Projects**
Alternative Risk Transfer	Pearson correlation	0.562*
	sig. (2-tailed)	0.000
	n	84
Contingent Capital	Pearson correlation	0.632*
	sig. (2-tailed)	0.000
	n	84
Credit Enhancement	Pearson correlation	0.678*
	sig. (2-tailed)	0.000
	n	84
Hedging derivatives	Pearson correlation	0.646*
	sig. (2-tailed)	0.000
	n	84
Insurance	Pearson correlation	0.457*
	sig. (2-tailed)	0.000
Communication Strategy	*n*	84
	Pearson correlation	0.693
	Sig.(2-tailed)	0.000
	n	84
Overall correlation	**Pearson correlation**	**0.934***
	sig. (2-tailed)	**0.000**
	n	**84**

NB. *Correlation significant at 0.05 level (2-tailed)

The correlation results showed that all the financial risk management Instruments and Communication strategy, (Alternative Risk Transfer (r=0.562; p-value=0.000<0.05), Contingent Capital, (r=0.632; p-value=0.000<0.05), Credit Enhancement (r=0.678; p-value=0.000<0.05), Hedging Derivatives, (r=0.646; p-value=0.000<0.05), Insurance (r=0.457; p-value=0.000<0.05 and Communication strategy (r=0.693; p-value=0.000<0.05) were significantly related (P-values=0.000<0.05) against the Statements of Performance of

Hydroelectric Energy projects when moderated with communication strategy. The overall correlation coefficient for the moderating effect of communication strategy on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects was found to be 0.934 with a p-value of 0.000<0.05, implying that Communication strategy significantly moderates the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis; 7. H_0 Communication strategy does not significantly moderate the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The result supports the findings of studies by Serpell *et al.,* (2015) that communication strategy influences performance of projects by modeling the concept of Communication strategy.

4.12.2. Regression Analysis of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Stepwise simple linear regression analysis and Multiple linear regressions analysis as per Baron and Kenny (1986) were adopted to investigate in step 1 how communication strategy is predicted by each financial risk management instruments and then in step 2 how Communication strategy moderates the relationships between financial risk management Instruments and Performance of Hydroelectric Energy projects. The underpinning rational of using the regression analysis model was to establish how each predictor upon moderating effect of Communication strategy significantly or insignificantly predicted Performance of Hydroelectric Energy projects; secondly to find out which of the predictors best predicted Performance Hydroelectric Energy projects and finally to confirm whether the regression model was a best fit for predicting Performance of Hydroelectric Energy projects.

4.12.2.1 Hierarchical Regression Analysis of Moderating Influence of Communication Strategy on the Relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

In order to establish whether communication strategy moderated alternative risk transfer and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only alternative risk transfer (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of alternative risk transfer and communication strategy

towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.39

Table 4.39: Regression output for moderation effect of communication strategy on the relationship between alternative risk transfer and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.803	0.644	0.640	0.43	148.520	148.520	1,82	2,81
2	0.900	0.810	0.805	0.31	0.057	23.675		
				ANOVA				
		Sum of squares	**df**	**Mean square**	**F**	**Sig.**		
	Regression	26.899	1	26.899	148.520	0.000		
	Residual	14.851	82	0.181	3.113	0.050		
	Total	41.750	83					
	Regression	33.800	2	16.900	172.195	0.000		
	Residual	7.950	81	0.098				
	Total	41.750	83					
Model	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**			
	β	Std. error						
constant	1.181	0.256		4.614	0.000			
Alternative risk transfer	0.774	0.064	0.803	12.187	0.000			
constant	0.033	0.233		0.140	0.889			
Alternative .risk transfer	0.322	0.071	0.334	4.509	0.000			
Communication strategy	0.675	0.081	0.631	8.386	0.000			

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.900) between moderating influence of communication strategy on the relationship between alternative risk transfer and performance of hydroelectric energy projects. Model 1 without the moderating influence of communication strategy term only predicted up to 64.4% of the variance in performance of hydroelectric energy projects; whereas model 2 with moderating effect of communication strategy term predicted up to 81% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.057 showing an additional effect of 5.7% to the model due to the moderating influence of communication strategy. The adjusted R-square indicated that the model with the moderating effect of communication strategy as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 148.520 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 172.195 was statistically significant with P-value=0.000<0.05 indicating the model 2 with the moderator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between Alternative risk transfer and communication strategy on performance of hydroelectric energy projects was statistically significant (p = 0.000<0.05). Thus, communication strategy has moderation influence on the relationship between alternative risk transfer and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_1 X_1 M_{int.}$

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (Alternative risk transfer)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between alternative risk transfer and communication strategy

The proceeding multiple linear regression model was as follows: $\hat{Y} = 0.033 + 0.322X_1 + 0.675M_{int}$.

4.12.2.2 Hierarchical Regression Analysis of Moderating Influence of Communication Strategy on the Relationship between Contingent Capital and Performance of Hydroelectric Energy Projects

In order to establish whether communication strategy moderated contingent capital and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only contingent capital (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of contingent capital and communication strategy towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.40

Table 4.40: Regression output for moderation effect of communication strategy on the relationship between contingent capital and performance of hydroelectric energy projects

Model summary								
Model	**R**	**R^2**	**Adj.R^2**	**Std. error of estimate**	**R^2 Change**	**F-change**	**df 1**	**df 2**
1	0.895	0.802	0.799	0.320	0.802	331.81	1,82	2,81
2	0.914	0.836	0.832	0.291	0.019	124.99		
ANOVA								
		Sum of squares	**df**	**Mean square**	**F**	**Sig.**		
	Regression	33.477	1	33.477	331.81	0.000		
	Residual	8.273	82	0.101	206.82	0.000		
	Total	41.750	83					
	Regression	34.913	2	17.457				
	Residual	6.837	81	0.084				
	Total	41.750	83					
Model	**Unstandardized coefficients β**		**Standardized Coefficients Std. error**	**t**	**Sig.**			
Constant	1.773	0.140		12.631	0.000			
Contingent capital	0.629	0.035	0.895	18.216	0.000			
Constant	0.886	0.250		3.541	0.000			
Contingent capital	0.394	0.065	0.562	6.069	0.000			
Communication strategy	0.415	0.101	0.382	4.125	0.000			

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.914) between moderating influence of communication strategy on the relationship between contingent capital and performance of hydroelectric energy projects. Model 1 without the moderating influence of communication strategy term only predicted up to 80.2% of the variance in performance of hydroelectric energy projects; whereas model 2 with moderating effect of communication strategy term predicted up to 83.6% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.019 showing an additional effect of 1.9% to the model due to the moderating influence of communication strategy. The adjusted R-square indicated that the model with the moderating effect of communication strategy as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 331.81 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 206.82 was statistically significant with P-

value=0.000<0.05 indicating the model 2 with the moderator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between contingent capital and communication strategy on performance of hydroelectric energy projects was statistically significant (p = 0.000<0.05). Thus, communication strategy has moderation influence on the relationship between contingent capital and performance of hydroelectric energy projects. Given a model equation of $\hat{Y} = \beta_0 + \beta_2 X_2 + \beta_2 X_2 M_{int}$.

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (contingent capital)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between contingent capital and communication strategy

The proceeding multiple linear regression model was as follows: $\hat{Y} = 0.886 + 0.394X_2 + 0.415M_{int}$.

4.12.2.3 Hierarchical Regression Analysis of Moderating Influence of Communication Strategy on the Relationship between Credit enhancement and Performance of Hydroelectric Energy Projects

In order to establish whether communication strategy moderated credit enhancement and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only credit enhancement (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of credit enhancement and communication strategy towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.41

Table 4.41: Regression output for moderation effect of communication strategy on the relationship between credit enhancement on performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.858	0.737	0.734	0.366	0.737	229.63	1,82	2,81
2	0.898	0.806	0.801	0.316	0.069	0.878		

ANOVA

		Sum of squares	df	Mean square	F	Sig.
	Regression	30.764	1	30.764	229.629	0.000
	Residual	10.986	82	0.134		
					167.984	0.000
	Total	41.750	83			
	Regression	33.640	2	16.820		
	Residual	8.110	81	0.100		
	Total	41.750	83			

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	β	Std. error			
Constant	-0.049	0.286		-0.170	0.865
credit enhancement	1.009	0.067	0.858	15.154	0.000
Constant	-0.268	0.251		-1.069	0.288
credit enhancement	0.485	0.113	0.413	4.281	0.000
Communication strategy	0.562	0.105	0.517	5.359	0.000

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.898) between moderating influence of communication strategy on the relationship between credit enhancement and performance of hydroelectric energy projects. Model 1 without the moderating influence of communication strategy term only predicted up to 73.7% of the variance in performance of hydroelectric energy projects; whereas model 2 with moderating effect of communication strategy term predicted up to 80.6% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.069 showing an additional effect of 6.9% to the model due to the moderating influence of communication strategy. The adjusted R-square indicated that the model with the moderating effect of communication strategy as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 229.629 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 167.964 was statistically significant with P-value=0.05 indicating the model 2with the moderator included significantly improves the

ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between credit enhancement and communication strategy on performance of hydroelectric energy projects was statistically significant ($p = 0.000 < 0.05$). Thus, communication strategy has moderation influence on the relationship between credit enhancement and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_3 X_3 + \beta_3 X_3 M_{int}$.

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (credit enhancement)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between credit enhancement and communication strategy

The proceeding multiple linear regression model was as follows: $\hat{Y} = -0.268 + 0.485 X_3 + 0.562 M_{int}$.

4.12.2.4 Hierarchical Regression Analysis of Moderating Influence of Communication Strategy on the Relationship between Hedging derivatives and Performance of Hydroelectric Energy Projects

In order to establish whether communication strategy moderated hedging derivatives and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only hedging derivatives (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of hedging derivatives and communication strategy towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.42

Table 4.42: Regression output for moderation effect of communication strategy on the relationship between hedging derivatives and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.923	0.852	0.850	0.274	0.852	472.23	1,82	2,81
2	0.934	0.873	0.870	0.256	0.021	193.24		

ANOVA

		Sum of squares	df	Mean square	F	Sig.
	Regression	35.573	1	35.573	472.23	0.000
	Residual	6.177	82	0.075	278.99	0.000
	Total	41.750	83			
	Regression	36.458	2	18.229		
	Residual	5.292	81	0.065		
	Total	41.750	83			

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	β	Std. error			
Constant	1.002	0.152		6.577	0.000
hedging derivatives	0.786	0.036	0.923	21.731	0.000
Constant	0.509	0.195		2.607	0.011
hedging derivatives	0.570	0.068	0.670	8.439	0.000
Communication strategy	0.318	0.086	0.292	3.679	0.000

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.934) between moderating influence of communication strategy on the relationship between hedging derivatives and performance of hydroelectric energy projects. Model 1 without the moderating influence of communication strategy term only predicted up to 85.2% of the variance in performance of hydroelectric energy projects; whereas model 2 with moderating effect of communication strategy term predicted up to 87.3% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.021 showing an additional effect of 2.1% to the model due to the moderating influence of communication strategy. The adjusted R-square indicated that the model with the moderating effect of communication strategy as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 472.23 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 278.99 was statistically significant with P-value=0.000<0.05 indicating the model 2 with the moderator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy

projects).

From the coefficients table, the interaction term between hedging derivatives and communication strategy on performance of hydroelectric energy projects was statistically significant ($p = 0.000<0.05$). Thus, communication strategy has moderation influence on the relationship between hedging derivatives and performance of hydroelectric energy projects. Given a model equation of $\hat{Y} = \beta_0 + \beta_4 X_4 + \beta_4 X_4 M_{int}$.

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (hedging derivatives)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between hedging derivatives and communication strategy

The proceeding multiple linear regression model was as follows: $\hat{Y} = 0.509 + 0.570X_4 + 0.318M_{int}$.

4.12.2.5 Hierarchical Regression Analysis of Moderating Influence of Communication Strategy on the Relationship between Insurance and Performance of Hydroelectric Energy Projects

In order to establish whether communication strategy moderated insurance and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only insurance (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of insurance and communication strategy towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.43

Table 4.43: Regression output for moderation effect of communication strategy on the relationship between insurance and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.819	0.671	0.667	0.41	0.000	167.11	1,82	2,81
2	0.897	0.804	0.799	0.32	0.133	0.88		
				ANOVA				
		Sum of squares	**df**	**Mean square**	**F**	**Sig.**		
	Regression	28.007	1	28.007	167.11	0.000		
	Residual	13.743	82	0.168	166.23	0.000		
	Total	41.750	83					
	Regression	33.571	2	16.785				
	Residual	8.179	81	0.101				
	Total	41.750	83					
Model	**Unstandardized Coefficients**		**Standardized coefficients**	**t**	**Sig.**			
	B	Std. error						
Constant	1.490	0.218		6.834	0.000			
insurance	0.705	0.055	0.819	12.927	0.000			
Constant	0.250	0.238		1.050	0.297			
insurance	0.292	0.079	0.340	4.182	0.000			
Communication strategy	0.656	0.088	0.603	7.423	0.000			

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.897) between moderating influence of communication strategy on the relationship between insurance and performance of hydroelectric energy projects. Model 1 without the moderating influence of communication strategy term predict up to 67.1% of the variance in performance of hydroelectric energy projects; whereas model 2 with moderating effect of communication strategy term predicted up to 80.4% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.133 showing an additional effect of 13.3% to the model due to the moderating influence of communication strategy. The adjusted R-square indicated that the model with the moderating effect of communication strategy as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 167.785 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 166.228 was statistically significant with P-

value=0.000<0.05 indicating the model 2 with the moderator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between insurance and communication strategy on performance of hydroelectric energy projects was statistically significant (p = 0.000<0.05). Thus, communication strategy has moderation influence on the relationship between insurance and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_5 X_5 + \beta_5 X_5 M_{int}$.

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (insurance)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between insurance and communication strategy

The proceeding multiple linear regression model was as follows: $\hat{Y} = 0.250 + 0.292X_5 + 0.656M_{int}$

4.12.2.6 Model Summary of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The model summary sought to establish how each predictor upon moderating effect of Communication strategy significantly or insignificantly predicted Performance of Hydroelectric Energy projects. The results are presented in Table 4.44

Table 4.44: Regression Model Summary of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.934[a]	0.873	0.865	0.261

a. Predictors: (Constant), Communication strategies,

Financial risk management Instruments

The model summary suggested a positive multiple correlation (R=0.934) between Communication strategy moderating influence on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. In addition, 87.3% (R^2=0.873) of the variance in the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects is explained by the moderating influence of Communication strategy. The result supports the findings of studies by Serpell *et al.,* (2015) that communication strategy influences performance of projects by modeling the concept of moderating influence of Communication strategy on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects.

4.12.2.7 ANOVA of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought to establish whether the regression model is best fit for predicting Performance of Hydroelectric Energy projects. The ANOVA statistics are shown in Table 4.45.

Table 4.45: An ANOVA results of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.739	6	6.6230	253.75	0.000[b]
	Residual	2.011	77	0.0261		
	Total	41.750	83			

Dependent Variable: Performance of Hydroelectric Energy Projects
b. Predictors: (Constant), Communication Strategies, Financial Risk Management Instruments

The ANOVA results indicated that F-statistics (6,77)=253.75 is significant given that the P-value of 0.000<0.05; Implying that the regression model results is significantly better prediction of Performance of Hydroelectric Energy projects.

4.12.2.8 Coefficients for Regression of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought to establish whether Communication strategy moderately influences the relationship between financial risk management Instruments and Performance of

Hydroelectric Energy projects. The regression coefficients results are shown in Table 4.46.

Table 4.46: Coefficients for the Regression of Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Coefficients Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.588	0.300		1.962	0.053
	Alternative risk transfer	0.475	0.104	0.518	4.584	0.000
	Contingent capital	0.879	0.207	0.890	4.246	0.000
	Credit enhancement	0.951	0.207	0.962	4.684	0.000
	Hedging derivatives	0.544	0.109	0.593	4.171	0.000
	Insurance	0.243	0.103	0.224	2.232	0.000
	Communication Strategy	0.329	0.091	0.326	3.600	0.000

a. Dependent Variable: Performance of Hydroelectric Energy Projects

The multiple linear regression coefficients results indicated that Communication strategy significantly moderates the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects (P-Value=0.00<0.05). By substituting the beta value as well as the constant term, the proceeding multiple linear regression model was as follows:

$Y=-0.588+0.879X_1*CS+0.475X_2*CS+0.951\ X_3*CS+0.544X_4*CS+0.243X_5*CS+0.329CS$

Where by CS is communication strategy.

The model shows that Alternative risk transfer (P-value= 0.000<0.05), Contingent capital (P-value= 0.000<0.05), Credit enhancement (P-value= 0.000<0.05), Hedging derivatives (P-value= 0.000<0.05, and insurance (P-value= 0.000<0.05) had statistical significance (P-value= 0.000<0.05) after the moderating effect of Communication strategy. In terms of the best predictor for the Performance of Hydroelectric Energy projects, the study revealed that the best predictors were as follows; Credit enhancement (beta=0.962), Contingent capital (beta=0.890), Hedging derivatives (beta=0.593), Alternative risk transfer (beta=-0.518), Communication strategy (beta=-0.326), and Insurance (beta=0.224).

An effective communication strategy that integrates project stakeholders is de facto to a project's success as it helps in timely and accurate propagation of the required information concerning financial risk management instruments utilization and in understanding the Key Performance Indicator of any project to achieve optimum performance. Thus, to reduce information asymmetry due to conflict of interest amongst project partners, a well-organized

communication strategy is of essence to facilitate timely risk identification, analysis and response using appropriate risk mitigation instruments to optimize projects performance. Communication strategy key concepts should focus on clear communication flow structure, innovative communication management tools, well operational communication channels and quality information propagation.

4.13 Analysis of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought the views of participants on mediating influence of Contract Management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The subsequent results using descriptive statistics is given in Table 4.47

Table 4.47: Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Contract Management, Financial Risk Management Instruments	**n**	**Mean**	**Std. Deviation**
Alternative Risk Transfer	84	3.999	0.276
Contingent Capital	84	3.995	0.236
Credit Enhancement	84	4.145	0.180
Hedging Derivatives	84	4.079	0.209
Insurance	84	3.979	0.199
Contract Management	84	4.036	0.338
Composite mean& standard deviation	**84**	**4.039**	**0.206**

Table 4.47 presents the descriptive statistics on participants' perspectives on mediating influence of Contract Management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The study results indicates that following the mediating influence of Contract Management (Mean=4.039, SD=0.206), the means for Alternative risk transfer, contingent capital and insurance slightly increased while the means for credit enhancement and insurance slightly decreased. This can be shown by comparing mean scores results from Table 4.47 before mediating influence of contract management; (Alternative risk transfer (Mean=3.96), Contingent capital (Mean=3.95), Credit enhancements (Mean=4.25), Hedging derivatives (Mean=4.12) and Insurance (Mean=3.92)) with Table 4.42 mean scores results after the mediating influence of contract management (Alternative risk transfer (Mean=3.999), Contingent capital (Mean=3.995), Credit

enhancements (Mean=4.145), Hedging derivatives (Mean=4.079) and Insurance (Mean=3.979)). However, the mean for Credit enhancement was the highest (Mean=4.145, SD=0.180), followed by Hedging derivatives (Mean=4.079, SD=0.209), Alternative risk transfer (Mean=3.999, SD=0.276), Contingent capital (Mean=3.995, SD=0.236) and Insurance (Mean=3.979, SD=0.199). The study results further revealed that participants agreed (mean= 4.039) that Contract Management mediated the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. Though the previous studies by Saxena (2008) and Subramaniam and Shaw (2002) found that contract management influences Performance of Hydroelectric Energy projects, the current study modeled contract management mediating influence on the relationship between financial risk management instruments and performance of hydroelectric energy projects.

These findings were further supported by qualitative data and this is what the participant had to say on influence of contract management on performance of Hydroelectric Energy project. The participant from KenGEN said that:

> *"…the adoption of framework contracting for delivery of spare parts on a need-be-basis by suppliers and compliance with Public Procurement and Asset Disposal Act, 2015 for an equitable, transparent, competitive, timely and cost effective procurement processes is a major milestone in the sector. In addition, we undertake proper planning to ensure adherence to plant and equipment maintenance programs."* Equally, *"We continue to improve on procurement management to ensure only skilled and experienced Engineering, Procurement Construction (EPC) contractors and consultants are engaged for all projects besides execution of agreements that require the contractors to pay sufficient liquidated damages in the event of default."* Further, "…*for customer productivity and internal efficiency, robust leverage on ICT system has facilitated greater horizontal business solution,* for example, *"…the digitization of procurement process in order to get value for money in contracts has ensured efficient procurement of quality commodities that meets pre-specifications and cost efficiency."* (KII No. 1, KenGen).

When asked about contracting efficiency on power purchased, the KenGEN participant respondent that:

> *"…the 15 year long-term Power Purchase Agreement with Kenya Power, allows the company to bill and recover all realized foreign currency fluctuations relative to the base rates. This ensures power plants' availability meet threshold targets in*

harmony with industry practice that provides for planned and unforeseen machine outage as per the signed Power Purchase Agreements with the off-taker – Kenya Power." (KII No. 1, KenGen).

Concerning financial risks the participant from KenGEN said that:

"…market risk such as interest rate, equity prices and foreign exchange rates risks are managed through forward and future contracts and Power Purchase Agreement contracts that allows the company to recover a foreign exchange movement and price risk from Kenya Power while fixed rates on borrowings minimize exposure to interest rate risk and the company only sells generated electricity to Kenya Power to minimize credit risk exposure through a contract that stipulates a 40 day credit period." (KII No. 1, KenGen).

On liquidity risk management contract:

"…we manage an escrow account that considers the accounts receivables from KPLC and development funding from the Ministry of Energy and maturity of financial instruments, together with projected cash flows from operations to ensure there is always sufficient liquidity to meet liabilities when due, under both normal and stressed conditions, without incurring unacceptable losses or risking damage to our reputation." (KII No. 1, KenGen).

For uninterrupted electricity supply:

"…we ensure that equipment breakdown risks are contained through a stock holding policy and operational and maintenance contracts with the suppliers of equipment that ensures adequate spare parts are available all times hence minimizing the scope for equipment breakdown." Lastly, *"…we manage political risk, competition risk, fiscal policy risk, liquidity risk and default/credit risk through PPA contract with the off-taker, KPLC that penalizes the latter for delays in servicing the company's invoices thus optimizing the return on risk."* (KII No. 1, KenGen).

Contracts should be well documented with clear understandable language and defined roles for all the project parties' to achieve value for money, stakeholder satisfaction, quality products delivery, cost reduction, and competitive procurement besides risks and liabilities management.

4.13.1 Correlation Analysis of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Inferential statistics was conducted on Mediating influence of Contract Management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. Pearson product moment correlation coefficient was used to establish whether Contract management mediates the relationships between financial risk management Instruments and Performance of Hydroelectric Energy projects. The correlation result is shown in Table 4.48.

Table 4.48: Correlation Analysis of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects. (n=84)

Contract Management, Financial Risk Management Instruments		**Performance of Hydroelectric Energy Projects**
Alternative Risk Transfer	Pearson correlation	0.670*
	sig. (2-tailed)	0.000
	n	84
Contingent Capital	Pearson correlation	0.648*
	sig. (2-tailed)	0.000
	n	84
Credit Enhancement	Pearson correlation	0.707*
	sig. (2-tailed)	0.000
	n	84
Hedging derivatives	Pearson correlation	0.700*
	sig. (2-tailed)	0.000
	n	84
Insurance	Pearson correlation	0.486*
	sig. (2-tailed)	0.000
Contract Management	*n*	84
	Pearson correlation	0.652*
	Sig.(2-tailed)	0.000
	n	84
Overall correlation	**Pearson correlation**	**0.910***
	sig. (2-tailed)	**0.000**
	n	**84**

NB. *Correlation significant at 0.05 level (2-tailed)

The correlation results showed that all the financial risk management Instruments and Contract management, (Alternative Risk Transfer (r=0.670; p-value=0.000<0.05), Contingent Capital, (r=0.648; p-value=0.000<0.05), Credit Enhancement, (r=0.707; p-value=0.000<0.05), Hedging Derivatives, (r=0.700; p-value=0.000<0.05), Insurance, (r=0.486; p-value=0.000<0.05 and Contract management (r=0.652; p-value=0.000<0.05) were significantly related (P-values=0.000<0.05) against the Statements of Performance of

Hydroelectric Energy projects. The overall correlation coefficient for the mediating effect of contract management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects was found to be 0.910 with a p-value of 0.000<0.05; implying that Contract management has a significant mediating effect on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects, leading to rejection of the null hypothesis; 8. H_0: Contract management does not significantly mediate the relationships between financial risk management Instruments and Performance of Hydroelectric Energy projects. The result support findings by Lucas and Rambo (2016) and Subramaniam and Shaw (2002) that contract management influences performance of projects by modeling the concept of mediating influence of Contract management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects.

The small p-values (p=0.000<0.05) implies that Contract Management has a significantly mediating influence on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects, leading to rejection of the null hypothesis; 8. H_0: Contract management does not significantly mediate on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The result support findings by Píchaa, Tomekb and Löwittc (2015) that contract management influences performance of projects by modeling the concept of mediating influence of Contract management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects.

4.13.2. Regression Analysis of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Stepwise simple linear regression analysis and Multiple linear regressions analysis as per Baron and Kenny (1986) were adopted to investigate in step 1 how contract management is predicted by each financial risk management instruments and then in step 2 how contract management mediates the relationships between financial risk management Instruments and Performance of Hydroelectric Energy projects. The underpinning rational of using the regression analysis model was to establish how each predictor upon mediating effect of contract management significantly or insignificantly predicted Performance of Hydroelectric Energy projects; secondly to find out which of the predictors best predicted Performance

Hydroelectric Energy projects and finally to confirm whether the regression model was a best fit for predicting Performance of Hydroelectric Energy projects.

4.13.2.1 Hierarchical Regression Analysis of Mediating Influence of Communication Strategy on the Relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

In order to establish whether contract management mediated alternative risk transfer and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only alternative risk transfer (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interactions of alternative risk transfer and contract management towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.49

Table 4.49: Regression output for mediation effect of contract management on the relationship between alternative risk transfer and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.803	0.644	0.640	0.43	148.520	148.520	1,82	2,81
2	0.851	0.725	0.718	0.38	0.081	41.84		

ANOVA

		Sum of squares	df	Mean square	F	Sig.
	Regression	26.899	1	26.899	148.520	0.000
	Residual	14.851	82	0.181	3.113	0.050
	Total	41.750	83			
	Regression	30.262	2	15.131	106.685	0.000
	Residual	11.488	81	0.142		
	Total	41.750	83			

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	β	Std. error			
constant	1.181	0.256		4.614	0.000
Alternative risk transfer	0.774	0.064	0.803	12.187	0.000
constant	1.216	0.227		5.366	0.889
Alternative .risk transfer	0.100	0.149	0.104	0.668	0.596
Contract management	0.657	0.135	0.755	4.870	0.000

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple

correlation(R=0.851) between mediating influence of contract management on the relationship between alternative risk transfer and performance of hydroelectric energy projects. Model 1 without the mediating influence of contract management term only predicted up to 64.4% of the variance in performance of hydroelectric energy projects; whereas model 2 with mediating effect of contract management term predicted up to 72.5% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.081showing an additional effect of 8.1% to the model due to the mediating influence of contract management. The adjusted R-square indicated that the model with the mediating effect of contract management as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 148.520 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 106.685 was statistically significant with P-value=0.000<0.05 indicating the model 2 with the mediator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between Alternative risk transfer and contract management on performance of hydroelectric energy projects was statistically significant (p = 0.000<0.05). Thus, contract management has mediation influence on the relationship between alternative risk transfer and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 M_{int.}$

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (Alternative risk transfer)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between alternative risk transfer and contract management

The proceeding multiple linear regression model was as follows: $\hat{Y} = 1.216 + 0.100X_1 + 0.657M_{int.}$

4.13.2.2 Hierarchical Regression Analysis of Mediating Influence of Contract Management on the Relationship between Contingent Capital and Performance of Hydroelectric Energy Projects

In order to establish whether contract management mediated contingent capital and

performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only contingent capital (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of contingent capital and contract management towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.50

Table 4.50: Regression output for mediation effect of contract management on the relationship between contingent capital and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.895	0.802	0.799	0.320	0.802	331.81	1,82	2,81
2	0.902	0.814	0.809	0.310	0.012	151.52		
				ANOVA				
		Sum of squares	**df**	**Mean square**	**F**	**Sig.**		
	Regression	33.477	1	33.477	331.81	0.000		
	Residual	8.273	82	0.101	177.28	0.000		
	Total	41.750	83					
	Regression	33.986	2	16.993				
	Residual	7.764	81	0.096				
	Total	41.750	83					
Model	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**			
	β	Std. error						
Constant	1.773	0.140		12.631	0.000			
Contingent capital	0.629	0.035	0.895	18.216	0.000			
Constant	1.520	0.175		8.678	0.000			
Contingent capital	0.215	0.093	0.247	2.305	0.024			
contract management	0.473	0.075	0.674	6.286	0.000			

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.902) between mediating influence of contract management on the relationship between contingent capital and performance of hydroelectric energy projects. Model 1 without the mediating influence of contract management term only predicted up to 80.2% of the variance in performance of hydroelectric energy projects; whereas model 2 with mediating effect of contract management term predicted up to 81.4% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.012 showing an additional effect of 1.2% to the model due to the mediating influence of contract

management. The adjusted R-square indicated that the model with the mediating effect of contract management as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 331.81 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 177.282 was statistically significant with P-value=0.000<0.05 indicating the model 2 with the mediator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between contingent capital and contract management on performance of hydroelectric energy projects was statistically significant (p = 0.000<0.05). Thus, contract management has mediation influence on the relationship between contingent capital and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_2 X_2 + \beta_2 X_2 M_{int.}$

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (contingent capital)

β_2 = Constant of the Interaction term

X_2M_{int} = Interaction term between contingent capital and contract management

The proceeding multiple linear regression model was as follows: $\hat{Y} = 1.520 + 0.215X_2 + 0.473M_{int.}$

4.13.2.3 Hierarchical Regression Analysis of Mediating Influence of Contract Management on the Relationship between Credit Enhancement and Performance of Hydroelectric Energy Projects

In order to establish whether contract management mediated credit enhancement and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only credit enhancement (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of credit enhancement and contract management towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.51

Table 4.51: Regression output for mediation effect of contract management on the relationship between credit enhancement and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.858	0.737	0.734	0.366	0.737	229.63	1,82	2,81
2	0.888	0.789	0.783	0.330	0.052	78.49		

ANOVA

		Sum of squares	df	Mean square	F	Sig.
	Regression	30.764	1	30.764	229.629	0.000
	Residual	10.986	82	0.134		
					167.984	0.000
	Total	41.750	83			
	Regression	32.927	2	16.463		
	Residual	8.823	81	0.109		
	Total	41.750	83			

Model	Unstandardized coefficients		Standardized coefficients	t	Sig.
	β	Std. error			
Constant	-0.049	0.286		-0.170	0.865
credit enhancement	1.009	0.067	0.858	15.154	0.000
Constant	0.286	0.269		1.063	0.291
credit enhancement	0.379	0.085	0.435	4.456	0.000
contract management	0.574	0.115	0.488	5.005	0.000

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.888) between mediating influence of contract management on the relationship between credit enhancement and performance of hydroelectric energy projects. Model 1 without the mediating influence of contract management term only predicted up to 73.7% of the variance in performance of hydroelectric energy projects; whereas model 2 with mediating effect of contract management term predicted up to 78.9% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.052 showing an additional effect of 5.2% to the model due to the mediating influence of contract management. The adjusted R-square indicated that the model with the mediating effect of contract management as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 229.629 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 151.144 was statistically significant with P-

value=0.000<0.05 indicating the model 2 with the mediator included significantly improves the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between credit enhancement and contract management on performance of hydroelectric energy projects was statistically significant (p =0.000< 0.05). Thus, contract management has mediation influence on the relationship between credit enhancement and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_3 X_3 + \beta_3 X_3 M_{int.}$

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (credit enhancement)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between credit enhancement and contract management

The proceeding multiple linear regression model was as follows: $\hat{Y} = 0.286 + 0.379 X_3 + 0.574 M_{int.}$

4.13.2.4 Hierarchical Regression Analysis of Mediating Influence of Contract Management on the Relationship between Hedging Derivatives and Performance of Hydroelectric Energy Projects

In order to establish whether contract management mediated hedging derivatives and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only hedging derivatives (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of hedging derivatives and contract management towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.52

Table 4.52: Regression output for mediation effect of contract management on the relationship between hedging derivatives and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.923	0.852	0.850	0.274	0.852	472.23	1,82	2,81
2	0.923	0.852	0.848	0.276	0.000	238.99		
				ANOVA				
		Sum of squares	**df**	**Mean square**	**F**	**Sig.**		
	Regression	35.573	1	35.573	472.23	0.000		
	Residual	6.177	82	0.075	278.99	0.000		
	Total	41.750	83					
	Regression	35.573	2	17.787				
	Residual	6.177	81	0.076				
	Total	41.750	83					
Model	**Unstandardized coefficients**		**Standardized coefficients**	**t**	**Sig.**			
	β	Std. error						
Constant	1.002	0.152		6.577	0.000			
hedging derivatives	0.786	0.036	0.923	21.731	0.000			
Constant	1.003	0.156		6.438	0.011			
hedging derivatives	-0.003	0.096	-0.004	-0.033	0.973			
contract management	0.789	0.094	0.926	8.395	0.000			

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.923) between mediating influence of contract management on the relationship between hedging derivatives and performance of hydroelectric energy projects. Model 1 without the mediating influence of contract management term only predicted up to 85.2% of the variance in performance of hydroelectric energy projects; whereas model 2 with mediating effect of contract management term predicted also up to 85.2% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.000 showing a no additional effect to the model due to the mediating influence of contract management. The adjusted R-square indicated that the model with the mediating effect of contract management as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 472.23 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 233.239 was statistically significant with P-value=0.000<0.05 indicating the model 2 with the mediator included significantly improves

the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between hedging derivatives and contract management on performance of hydroelectric energy projects was statistically significant ($p = 0.000<0.05$). Thus, contract management has mediation influence on the relationship between hedging derivatives and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_4 X_4 + \beta_4 X_4 M_{int.}$

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (hedging derivatives)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between hedging derivatives and contract management

The proceeding multiple linear regression model was as follows: $\hat{Y} = 1.003 - 0.003X_4 + 0.789M_{int.}$

4.13.2.5 Hierarchical Regression Analysis of Mediating Influence of Contract Management on the Relationship between Insurance and Performance of Hydroelectric Energy Projects

In order to establish whether contract management mediated insurance and performance of hydroelectric energy projects learner, hierarchical linear regression was conducted stepwise in blocks; in the first step (Block 1) in the hierarchy only insurance (predictor) and performance of hydroelectric energy projects was included and in the second stage (Block 2), the interaction of insurance and contract management towards performance of hydroelectric energy projects was determined. The findings are shown in Table 4.53

Table 4.53: Regression output for mediation effect of contract management on the relationship between insurance and performance of hydroelectric energy projects

Model summary

Model	R	R^2	Adj.R^2	Std. error of estimate	R^2 Change	F-change	df 1	df 2
1	0.819	0.671	0.667	0.41	0.000	167.11	1,82	2,81
2	0.853	0.728	0.721	0.38	0.058	58.82		
				ANOVA				
		Sum of squares	**df**	**Mean square**	**F**	**Sig.**		
	Regression	28.007	1	28.007	167.11	0.000		
	Residual	13.743	82	0.168	166.23	0.000		
	Total	41.750	83					
	Regression	30.386	2	15.193				
	Residual	11.364	81	0.140				
	Total	41.750	83					
Model	**Unstandardized Coefficients**		**Standardized coefficients**	**t**	**Sig.**			
	B	Std. error						
Constant	1.490	0.218		6.834	0.000			
insurance	0.705	0.055	0.819	12.927	0.000			
Constant	1.258	0.207		6.066	0.297			
insurance	0.587	0.143	0.674	4.118	0.000			
contract management	0.163	0.141	0.189	1.158	0.025			

Dependent Variable: performance of hydroelectric energy projects

The model summary results suggest that there is a strong positive multiple correlation(R=0.853) between mediating influence of contract management on the relationship between insurance and performance of hydroelectric energy projects. Model 1 without the mediating influence of contract management term predict up to 67.1% of the variance in performance of hydroelectric energy projects; whereas model 2 with mediating effect of contract management term predicted up to 72.8% of the variance in performance of hydroelectric energy projects. The R^2 change in model 2 is 0.058 showing an additional effect of 5.8% to the model due to the mediating influence of contract management. The adjusted R-square indicated that the model with the mediating effect of contract management as a new term improves the model fit more than expected by chance alone implying that it was actually a better model in terms of goodness-of-fit for the regression model.

From the ANOVA table, both model 1; F (1, 82) = 167.785 was statistically significant (p-value 0.000<0.05) and model 2; F (2, 81) = 108.294 was statistically significant with P-value=0.000<0.05 indicating the model 2 with the mediator included significantly improves

the ability to predict the outcome variable (performance of hydroelectric energy projects).

From the coefficients table, the interaction term between insurance and contract management on performance of hydroelectric energy projects was statistically significant ($p = 0.025<0.05$). Thus, contract management has moderation influence on the relationship between insurance and performance of hydroelectric energy projects.

Given a model equation of $\hat{Y} = \beta_0 + \beta_5 X_5 + \beta_5 X_5 M_{int.}$

Where; $\hat{Y}$ = Dependent variable (performance of hydroelectric energy projects)

β_0 = Constant of the equation

β_1 = Constant of the independent variable (insurance)

β_2 = Constant of the Interaction term

$X_2 M_{int}$ = Interaction term between insurance and contract management

The proceeding multiple linear regression model was as follows: $\hat{Y} = 1.258 + 0.587X_5 + 0.163M_{int}$

Multiple linear regressions were adopted to investigate whether Contract management intervenes the relationships between the financial risk management Instruments and Performance of Hydroelectric Energy projects. The underpinning rational of using the regression analysis model was to establish how each predictor upon mediating effect of Contract Management significantly or insignificantly predicted Performance of Hydroelectric Energy projects; secondly to find out which of the predictors best predicted Performance Hydroelectric Energy projects and finally to confirm whether the regression model was a best fit for predicting Performance of Hydroelectric Energy projects.

4.13.2.6 Model Summary of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The model summary sought to establish how each predictor upon mediating effect of Contract Management significantly or insignificantly predicted Performance of Hydroelectric Energy projects. The model summary results is presented in Table 4.54

Table 4.54: Regression Model Summary of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.910[a]	0.829	0.826	0.274

a. Predictors: (Constant), Contract Management,
Financial risk management Instruments

The model summary suggested a positive multiple correlation (R=0.910) between mediating influence of Contract Management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. In addition, 82.9% (R^2=0.829) of the variance on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects is explained by the mediating influence of Contract Management. The result support findings by Píchaa, Tomekb and Löwittc (2015) that contract management influences performance of projects by modeling the concept of mediating influence of Contract management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects.

4.13.2.7 ANOVA of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought to find out whether the regression model is best fit for predicting Performance of Hydroelectric Energy projects. The ANOVA results are shown in table 4.55.

Table 4.55: An ANOVA Results of mediating influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	39.577	6	6.596	235.571	0.000[b]
	Residual	2.173	77	0.028		
	Total	41.750	83			

Dependent Variable: Performance of Hydroelectric Energy Projects
b. Predictors: (Constant), Contract Management, Financial Risk Management Instruments

The ANOVA results indicated that F-statistics (6,77)= 235.571 is significant given that the P-value= 0.000<0.05; which implies that the regression model results in significantly better prediction of Performance of Hydroelectric Energy projects.

4.13.2.8 Coefficients for Regression of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The study sought to find out whether Contract management mediated the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects. The regression coefficients results are in table 4.56

Table 4.56: Coefficients for the Regression of Mediating Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

Coefficients Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.049	0.245		4.285	0.000
	Alternative risk transfer	0.410	0.158	0.553	2.602	0.011
	Contingent capital	0.844	0.199	1.035	4.237	0.000
	Credit enhancement	1.156	0.235	1.315	4.922	0.000
	Hedging derivatives	0.786	0.039	0.910	3.908	0.000
	Insurance	0.477	0.201	0.494	2.369	0.020
	Contract Management	0.583	0.104	0.715	5.629	0.000

a. Dependent Variable: Performance of Hydroelectric Energy Projects

The multiple linear regression coefficients results indicated that there was significant mediating influence of Contract management on the relationship between financial risk management Instruments and Performance of Hydroelectric Energy projects (P-Value= 0.00<0.05). By substituting the beta value as well as the constant term, the proceeding multiple linear regression model was as follows:

$Y=1.049+0.410X_1*CM+0.844X_2*CM+1.156X_3*CM+0.786X_4*CM+0.477X_5*CM+0.583CM$

Where, CM is contract management

The model shows that Alternative risk transfer (P-value=0.000<0.05), Contingent capital (P-value 0.000<0.05), Credit enhancement (P-value=0.000<0.05), Hedging derivatives (P-value 0.000<0.05), and insurance (P-value=0.000<0.05) had statistical significance (P-value= 0.000<0.05) after the mediating effect of Contract Management. In terms of the best predictor for the Performance of Hydroelectric Energy projects, the study revealed that the best predictors were as follows; Credit enhancement (beta=1.315), Contingent capital

(beta=1.035), Hedging derivatives (beta=0.910), Contract management (beta=0.715), Alternative risk transfer (beta=0.553) and Insurance (beta=0.494).

Contract management practices are a necessity that project stakeholders must observe to achieve project objectives for quality delivery, effective cost of running the project, client satisfaction and completion of projects within scheduled time besides ensuring transparency and accountability.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1. Introduction

This chapter presents Summary of the findings as per the objectives, conclusions, contribution to the body of knowledge and recommendations for policy and practice besides suggestions for further research.

5.2. Summary of the Findings

This section discusses the findings of the study.

5.2.1. Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

The first research objective assessed the extent to which Alternative risk transfer influence Performance of Hydroelectric Energy projects. The composite mean and deviation for the Alternative risk transfer results were 3.96 and 0.445 respectively; this results implied that using the Likert scale, the participants agreed that Alternative risk transfer influence Performance of Hydroelectric Energy projects. These findings were further supported by qualitative data as KenGen participant said that:

> *"…captives in the projects "self-insurance" are a larger framework of the enterprise risk management applied instead of engaging a third entity that would require payment of premiums and additional costs."* (KII No. 1, KenGen).

However, unavailability of most ART products in the local capital market was seen to frustrate the adoption of ART in the project as remarked by an interviewee from KenGEN:

> *"...though the institution may want to utilize alternative risk transfer products they are not readily available in the domestic market and we only apply internal mechanisms to manage risks which would otherwise be better mitigated through advanced ART products"*. (KII No. 1, KenGen).

This aspect was further captured by a CMA respondent that:

> *"...Alternative risk transfer in projects complements insurance companies of compensation since the project itself has a cash reserve for settling financial distress. However, the capital market, for instance NSE currently does not provide the ART products leaving any project with the only option to self-insure "use captives" for securitization."* (KII No. 6, CMA).

The overall correlation coefficient for Alternative risk transfer and Performance of Hydroelectric Energy projects was found to be r=0.803; p-value =0.000<0.05, implying that from the views of participants in the study the results indicated that there is a significant relationship between Alternative risk transfer and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (1. H_0: There is no significant relationship between Alternative risk transfer and Performance Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for Alternative risk transfer results is significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The simple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) influence of Alternative risk transfer on Performance of Hydroelectric Energy projects. Thus, ART offers risk securitization, funding risk transfer, facilitates access to additional capitals and for project lenders and investors to directly transfer parts of their risk exposure to the capital markets thereby absorbing the resulting losses in cases of mega catastrophe while for the investors ART forms a different asset class for enhancing returns while controlling the portfolio variance for improved performance of projects.

However, the capital markets of developing nations like Kenya have not formally accommodated the adoption and utilization of advanced ART products and as such investors are left with captives as the only option. Therefore, targeted policy enactment for inclusion of Alternative Risk Transfer in hydroelectric energy projects and trading of ART products like Catastrophic (CAT) bonds, options, futures, and Industry Loss Warranties (ILW) in bourses of Nairobi Security Exchange for easier access by investors and energy developers are necessary.

5.2.2 Contingent Capital and Performance of Hydroelectric Energy Projects

The second research objective assessed the extent to which Contingent capital influence Performance of Hydroelectric Energy projects. The composite mean and composite deviation for the Contingent capital results were 3.95 and 0.344 respectively. This results implied that using the Likert scale, the participants agreed that Contingent capital influence Performance of Hydroelectric Energy projects. These findings were in tandem with qualitative data as captured by the interviewee from KenGEN:

> *"…due to the need to expand and initiate new energy infrastructure projects in 2016 demanding huge capital which was way above the institutions debt to equity*

threshold, the government had to convert its debt of Kshs 20.2 billion into equity before raising additional equity of Kshs 6.4 billion through Rights Issue to facilitate the infrastructural expansion." (KII No. 1, KenGen).

Further, contingent capital ensures prompt recapitalization and efficient liquidity flow which is key to systemic risk management of the projects as remarked by NSE interviewee:

"…in general prompt recapitalization by contingent capital enables investors to cheaply and easily acquire the much needed capital to facilitate the implementation of projects." (KII No. 7, NSE).

The overall correlation coefficient for Contingent capital and Performance of Hydroelectric Energy projects was found to be r=0.895; p-value=0.000<0.05, implying that from the views of participants in the study the results indicated that there is a significant relationship between Contingent capital and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (2. H_0: There is no significant relationship between Contingent capital and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for Contingent capital results is significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The simple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) influence of Contingent capital on Performance of Hydroelectric Energy projects.

This study demystify perception that contingent capital is only being used in the corporate financial institutions and in developed economies as findings show that it has been applied in hydropower projects in Kenya. However, lack of contingent capital in the capital market for trading has limited its widespread adoption.

Generally, contingent capital can reduce financial distress by injecting liquidity into the project thus offering cheaper capital compared to subordinated debt instrument and contemporary equity respectively besides reducing government bail-outs, reduces default probability and improving projects' risk tolerance. However, without certainty of equilibrium, contingent capital faces the challenge of equilibrium multiplicity with a potential of uncertainty in price, manipulation of the market, and inefficiency in capital allocation. To contain the equilibrium problem, market triggered contingent capital should be handled cautiously as a regulatory tool.

5.2.3. Credit Enhancement and Performance of Hydroelectric Energy Projects

The third research objective assessed the extent to which Credit Enhancement influence Performance of Hydroelectric Energy projects. The composite mean and composite deviation for the Credit Enhancement results were 4.25 and 0.210 respectively. This results implied that using the Likert scale, the participants agreed that Credit Enhancement influence Performance of Hydroelectric Energy projects. These findings were further supported by qualitative data captured by the interviewee from CMA:

> *"...in order to finance green infrastructure projects through accelerated private sector uptake of green bonds, the Capital Markets Authority has developed Guideline for Approval and Registration of Credit Rating Agencies while NSE has developed green bond guidelines under the Green Bonds Programme. This programme is expected to enhance accessibility of complementary longer-term capital besides conventional, short-term bank lending, to achieve "green" investments financing, thus reinforcing the role of Kenya as the leading financial service provider within the region as contained in Vision 2030 Green Economy Strategy."* Further, *"...as a commitment to stimulate private investors on renewable energy projects, the government has developed Green Bond Issuance Policy Guidance Note and NSE Green Bond Trading Rules of 2019 and as a result in August 2019, Acorn Project Limited Liability Partnership issued unlisted Green Bond for investors in East Africa backed by a 50% guarantee from Guarant Co Ltd.* Equally, "…*the amendment of the Income Tax Act (ITA) through the Finance Act 2019, to exempt from withholding tax, interest income payable to investors in Green bonds is a positive gesture."* As such, *"...the initiatives facilitate financing of climate change for greenhouse gas emissions reduction to below 2 ^{0}C through the capital market."* (KII No. 6, CMA).

Thus the Capital Markets Master Plan (CMMP) fosters to deepen local capital markets to bridge the national funding gap with KenGen being an active player. The supportive regulatory instruments for Green Bond issuances facilitates institutionalization of green capital markets in Kenya with both private and public sector participants in line with Marrakech Pledge 2016. A green bond provides easy access to a large-diverse low cost financial pool and risk adjusted returns to finance hydroelectric projects. Shifting to capital markets relieves cash trapped banks during early-stage project financing to facilitate carbon emissions reduction, raising resource efficiency and environmental benefits.

The overall correlation coefficient for Credit Enhancement and Performance of Hydroelectric Energy projects was found to be r=.858; p-value=0.000<0.05, implying that from the views of participants in the study the results indicated that there is a significant relationship between Credit Enhancement and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (3. H_0: There is no significant relationship between Credit Enhancement and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for Credit Enhancement results is significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The simple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) influence of Credit Enhancement on Performance of Hydroelectric Energy projects.

The Kenyan capital market has recognized credit enhancement products like green bonds to achieve green investments financing as contained in Vision 2030 Green Economy Strategy, supported by the existing Green Bond Issuance Policy Guidance Note and NSE Green Bond Trading Rules of 2019 besides the amendment of the Income Tax Act (ITA) through the Finance Act 2019, to exempt from withholding tax, interest income payable to investors in Green bonds.

Generally, Credit enhancement in a project provides stakeholders with comprehensive risk mitigation in areas such as political risk coverage besides improving project's creditworthiness for project bankability in cost effective resource mobilization and fulfillment of financial obligations like access to loans, green bonds, risk sharing facilities and credit guarantees at a cheaper cost thereby reducing the demand pressure on the banking system. Credit rating of the credit enhancement products is the surest way of making them tradable in the capital markets as it provides market signal for placement, bond pricing and access to bank financing.

5.2.4. Hedging Derivatives and Performance of Hydroelectric Energy Projects

The fourth research objective assessed the extent to which Hedging derivatives influence Performance of Hydroelectric Energy projects. The composite mean and composite deviation for the Hedging derivatives results were 4.12 and 0.197 respectively. This result implied that using the Likert scale, the participants agreed that Hedging derivatives influence Performance of Hydroelectric Energy projects. These findings were further supported by qualitative data as the interviewee from NSE said that:

"…NSE derivatives market enables trading of futures contracts as regulated by Capital Markets Authority protecting investors' portfolios from potential price declines "a form of insurance," for example, *"KenGen subscribed hedging derivatives during Public Infrastructure Bond offer in 2019 for efficiency in offsetting in future, making NSE the second exchange to offer traded derivatives in Africa, after Johannesburg Stock Exchange."* (KII No. 7, NSE).

Similarly, *"…CMA Strategic Plan 2018-2023 envisages the positioning of Kenya's domestic capital markets as the premier choice for investors and issuers of derivatives through robust regulation, supportive innovation and enhanced investor protection besides trading only in secure bourse of Nairobi Securities Exchange (NSE) and working with licensed credit rating agencies."* (KII No. 6, CMA).

In support, KenGen's participant said that:

"…the Company's Finance Division identifies, evaluates and hedges financial risks such as credit risk, liquidity risk, foreign exchange risk, interest rate risk and price risk through derivatives placed in NSE to minimize potential adverse effects on its financial performance." (KII No. 1, KenGen)

The overall correlation coefficient for Hedging derivatives and Performance of Hydroelectric Energy projects was found to be r=0.923; p-value=0.000<0.05, implying that from the views of participants in the study the results indicated that there is a significant relationship between Hedging derivatives and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (4. H_0: There is no significant relationship between Hedging derivatives and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for Hedging derivatives results is significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The simple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) influence of Hedging derivatives on Performance of Hydroelectric Energy projects.

The study thus, demystifies arguments that hedging derivatives have only been used in the corporate world and not in hydroelectric power projects like in the current study. Generally, hedging derivatives enhance financial market efficiency through increased liquidity depth besides maintaining high investment returns and preventing losses that would result from risks such as systemic risks or market risks.

5.2.5. Insurance and Performance of Hydroelectric Energy Projects

The fourth research objective assessed the extent to which Insurance influence Performance of Hydroelectric Energy projects. The composite mean and deviation for the Insurance results were 3.92 and 0.223 respectively. This result implied that using the Likert scale, the participants agreed that Insurance influence Performance of Hydroelectric Energy projects. These findings were further supported by qualitative data as the participant from KenGen said that:

> *"…insuring the hydroelectric energy projects has made investors to have increased confidence in the investments and this has also enabled access to borrowings from Multilateral financial institutions and local commercial market to be cheaper since the debt liquidity ratio threshold requirement is lowered due to the security item provided by the insurance."* (KII No. 1, KenGen)

The Insurance Regulatory Authority has equally managed to bring order in the insurance market to avoid transactions by insolvent entities through implementation of its mandate as captures by IRA participant who said that:

> "*…the Authority regulates, supervise and develop the insurance industry in Kenya by promoting consumer education and protection, promoting an inclusive, competitive and stable insurance industry; and Offer quality customer service. The insurance industry contributes to the economy by providing financial security, mobilizing savings, creating liquidity, releasing pressure on public sector finance and promoting direct and indirect investments at a lower cost."* (KII No. 8, IRA).

To strengthen the capacity of insurance companies in undertaking bigger risks IRA respondent said that:

> *"…so far we have licensed five reinsurance businesses in Kenya including Kenya Reinsurance Corporation Limited, East Africa Reinsurance Company Limited, Continental Reinsurance Company Limited, Ghana Reinsurance Company Kenya Limited and Waica Reinsurance Kenya Limited that aids in the provision of reinsurance or guarantees against political, commercial and non-commercial risks." (KII No. 8, IRA).*

The overall correlation coefficient for Insurance and Performance of Hydroelectric Energy projects was found to be r=0.819; p-value =0.000<0.05, implying that from the views of participants the results indicated a significant relationship between Insurance and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (5. H_0: There is no significant relationship between Insurance and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for Insurance results is significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The simple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) influence of Insurance on Performance of Hydroelectric Energy projects.

Generally, insurance act as a financial security tool and economic protection by underwriting risks. Insurance increases debt equity ratio without increasing level of risk, reduces debt service coverage ratio, reduces cost of capital due to the risk coverage, facilitates timely indemnification and liquidity of a project to its normal operation in the occurrence of a risk event, provides risk securitization through acceptance and retention, and improves project reputation for enhanced credit profile. However, Insurance leaves projects with certain risks such as political risk and revenue risk.

5.2.6. The Combined Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The sixth research objective assessed how the combined financial risk management instruments influence Performance of Hydroelectric Energy projects. The composite mean and deviation for the combined financial risk management instruments were 4.04 and 0.166 respectively; this result implies that using the Likert scale the participants agreed that combined financial risk management instruments influence Performance of Hydroelectric Energy projects. These findings were further supported by qualitative data as the interviewee from KenGEN said that:

> *"…if investors use financial risk management instruments in their projects and the financiers are rest assured that their loan will be repaid then they won't place the loan as high risk which reduces the requirements of quick amortization and higher charges. In the long run the project's cost of capital will be obviously reduced and the project will achieve high success probability."* (KII No. 1, KenGen).

In support of the findings a respondent by KPLC attributed that:

> *"…relevant steps have been taken to identify, analyze, evaluate and mitigate risks arising from day to day operations in consistent with legal and regulatory obligations besides embedding the company's Enterprise Risk Management (ERM) practice. Credit risk is managed through engagement with counter parties with high credit ratings and through Alternative risk transfer techniques such as captives "internal deposits" or a bank guarantee and market risks through hedging derivatives such as future and forward contracts and interest rate risk through long term fixed interest rates contracts."* (KII No. 5, KPLC).

The overall correlation coefficient for combined financial risk management instruments and Performance of Hydroelectric Energy projects was found to be r=0.931; p-value=0.000<0.05, implying that from the views of participants in the study the results indicated that there is a significant relationship between combined financial risk management instruments and Performance of Hydroelectric Energy projects, thus, rejecting the null hypothesis (6. H_0: There is no significant relationship between combined financial risk management instruments and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for combined financial risk management instruments results is significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The multiple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) influence of combined financial risk management instruments on Performance of Hydroelectric Energy projects. The study has shown that financial risk management instruments have been used in hydroelectric energy projects resulting into significant better performance. However, their widespread use has been limited by a gap in the local capital market, that is, they are not being traded in the stock market for easy access.

The study findings on financial risk management instruments in securitizing hydroelectric energy projects are in tandem with the tenets of prospect theory constructs of decision making under uncertainty. Investors find it more tenable to venture into risky hydroelectric energy projects if adequate financial risk management instruments are integrated into the project to ensure the probability of gain is high and the project does not suffer from revenue loss or cost and time overruns. Further, the investors have the ability to gauge which alternative financial risk management instrument such as ART, contingent capital, credit enhancement, hedging derivatives and insurance fits better into every project based on the

amount of gains calculated on accumulative basis. The linking of prospect theory to financial risk management instruments in securitizing hydroelectric energy projects enables the understanding of how investors can be attracted into funding risky but high return oriented hydroelectric energy projects with guaranteed revenue flow and debt repayment even in the event of uncertainty.

5.2.7. Moderating Influence of Communication Strategy on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The seventh research objective assessed the moderating influence of Communication strategy on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. The composite mean and composite deviation of the moderating influence of communication strategy on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects were 4.23 and 0.194 respectively; implying that using the Likert scale the study participants agreed that there is a moderating influence of Communication strategy on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. These findings were further supported by KenGen interviewee:

> *"...sensitizing market stakeholders on financial risk management through creating awareness using the right channels and learning from international green finance issuers are a great part of capacity building for the Kenyan economy."* (KII No. 1, KenGen).

According to CMA participant:

> *"...the licensing of investment credit rating entity, Moody's Investors Service for risk analysis and training of investors ensures that they have information on the region's latest credit trends and market dynamics for a transparent and integrated financial market."* (KII No. 6, CMA).

Similarly, CMA participant responded that:

> *"...in order to ensure adequate capacity, the Authority has continued to engage the market through running a series of market awareness programs on Exchange Traded Derivatives with key focus on market intermediaries, policy makers value proposition on derivatives, technical training in trading and use of derivatives contracts to hedge against risk, Regulatory and coordinated supervision of*

Derivatives Market, compliance reporting and risk management." (KII No. 6, CMA).

For independence and transparency of information,

"…the Authority promotes an orderly, fair and efficient development of Kenya's' Capital Market through education and awareness creation to the relevant stakeholders by leveraging technology on new products and services for optimal uptake." (KII No. 6, CMA).

The overall correlation coefficient for moderating influence of Communication strategy on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects was found to be 0.934 with a p-value of 0.000<0.05, implying that from all the views of participants in the study the results indicated that Communication strategy significantly moderated the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects leading to rejection of the null hypothesis (7. H_0: Communication strategy does not significantly moderate the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for moderating influence of Communication strategy on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects results in significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The multiple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) moderating influence of Communication strategy on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects.

An appropriate communication strategy with clear communication flow structure, innovative communication management tools, operational communication channels and quality information in projects facilitates effective utilization of financial risk management instruments in securitizing hydroelectric energy projects besides facilitating monitoring and review processes for appropriate corrective measures.

The findings are in tandem with the theory of diffusion of innovation which espouses that for financial risk management instruments to perform and self-sustain they must be communicated over time amongst project parties in the social system and must be widely adopted. Thus, the theory acknowledges the moderating influence of communication strategy

on the relationship between financial risk management instruments and performance of hydroelectric energy projects due to the existence of clear communication flow structures, organized communication management tools, cost-effective communication channels, and a well-defined communication scope as was in the hydroelectric energy projects. Effective Communication strategy ensured that project parties at initial stages had adequate knowledge of financial risk management instruments for integration into hydroelectric energy projects to achieve proper evaluation of the relative advantage of financial risk management instruments, enhance their compatibility with the system, ease their application complexity, and trigger chances of reinvention potential to mitigate any risk effects and lower potential loss.

5.2.8. Intervening Influence of Contract Management on the Relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

The eighth research objective assessed the Intervening influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. The composite mean and composite deviation for Intervening influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects were 4.04 and 0.206 respectively; implying that using the Likert scale the study participants agreed that there is Intervening influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. These findings were further supported by qualitative data from KenGEN's participant when asked about contracting efficiency on power purchased:

> *"…the 15 year long-term Power Purchase Agreement with Kenya Power, allows the company to bill and recover all realized foreign currency fluctuations relative to the base rates. This ensures power plants' availability meet threshold targets in harmony with industry practice that provides for planned and unforeseen machine outage as per the signed Power Purchase Agreements with the off-taker – Kenya Power."* (KII No. 1, KenGen).

Concerning financial risks the participant from KenGEN said that:

> *"…market risk such as interest rate, equity prices and foreign exchange rates risks are managed through forward and future contracts and Power Purchase Agreement contracts that allows the company to recover a foreign exchange movement and price risk from Kenya Power while fixed rates on borrowings minimize exposure to*

interest rate risk and the company only sells generated electricity to Kenya Power to minimize credit risk exposure through a contract that stipulates a 40 day credit period." (KII No. 1, KenGen).

The overall correlation coefficient for mediating influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects was found to be r=0.910; p-value=0.000<0.05, the study results imply that from the views of participants, the results indicated a significant relationship between mediating influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects leading to rejection of the null hypothesis (8. H_0: Contract management does not significantly mediate the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis. The ANOVA results indicated that the regression model for mediating influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects results in significantly (P=0.000<0.05) better prediction of Performance of Hydroelectric Energy projects. The multiple linear regression coefficient values indicated that there was a statistically significant (P=0.000<0.05) mediating influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects.

Even if financial risk management instruments are used to securitize hydroelectric energy projects, they can still underperform due to lack of proper contract management as the variable shown significant mediating influence on the relationship between financial risk management instruments and performance of hydroelectric energy projects. The project parties can fail to enforce their obligations as per the contract agreement when it falls due which demands for elaborate understanding of the contract language and details besides tracking of its implementation. An effective contract management ensures that project parties fulfill their contract mandate of meeting stakeholder needs, achieving optimum quality, ensuring efficiency in funding, stimulating competitive procurement, managing risks, implementation within time and cost, eventually influencing performance of hydroelectric energy projects.

The findings linked agency theory and the mediating effect of contract management on the relationship between financial risk management instruments and performance of

hydroelectric energy projects. To minimize principle-agent conflict, there was clear optimal contract with set obligations for improved performance of hydroelectric energy projects. An effective contract agreement for a balanced trade-off minimizes information asymmetry and ensures that the agents do not maximize their own gains while minimizing principal's economic objectives and in a vice versa the principal does not maximize his benefits while minimizing agent's reward in hydroelectric power projects.

5.3. Conclusions

This section presents the conclusions of the study. The study sought to examine the extent to which financial risk management instruments, communication strategy, contract management influence Performance of Hydroelectric Energy projects.

The first research objective assessed the extent to which Alternative risk transfer influence Performance of Hydroelectric Energy projects. The simple linear regression coefficients as well as the Pearson correlation results indicated that Alternative risk transfer significantly influence Performance of Hydroelectric Energy projects. Thus, ART offers risk securitization, funding risk transfer, facilitates access to additional capitals and for project lenders and investors to directly transfer parts of their risk exposure to the capital markets thereby absorbing the resulting losses in cases of mega catastrophe while for the investors ART forms a different asset class for controlling the portfolio variance for improved performance of projects.

The second research objective assessed the extent to which Contingent capital influence Performance of Hydroelectric Energy projects. The simple linear regression coefficients as well as the Pearson correlation results indicated that Contingent capital significantly influence Performance of Hydroelectric Energy projects. Thus, contingent capital in hydroelectric energy projects reduces financial distress by injecting liquidity and offering cheaper capital compared to subordinated debt instrument and contemporary equity respectively besides reducing government bail-outs, decreasing default probability and improving projects' risk tolerance. These eventually reduces the cost of capital and increases creditworthiness of a project which results into reduced investor's negative perception on the riskiness of hydroelectric energy projects.

The third research objective assessed the extent to which Credit enhancement influence Performance of Hydroelectric Energy projects. The simple linear regression coefficients as

well as the Pearson correlation results indicated that Credit enhancement significantly influence Performance of Hydroelectric Energy projects. Credit enhancement in hydroelectric energy projects provides stakeholders with comprehensive risk mitigation in areas such as political risk coverage besides improving project's creditworthiness for project bankability in cost effective resource mobilization and fulfillment of financial obligations like access to loans, green bonds, risk sharing facilities and credit guarantees at a cheaper cost thereby reducing the demand pressure on the banking system. Credit rating of the credit enhancement products is the surest way of making them tradable in the capital markets as it provides market signal for placement, bond pricing and access to bank financing.

The fourth research objective assessed the extent to which Hedging derivatives influence Performance of Hydroelectric Energy projects. The simple linear regression coefficients as well as the Pearson correlation results indicated that Hedging derivatives significantly influence Performance of Hydroelectric Energy projects. Hedging derivatives enhance financial market efficiency through increased liquidity depth besides maintaining high investment returns and preventing losses that would result from risks such as systemic risks or market risks such as interest rate, exchange, and inflation risks besides commodity risk.

The fifth research objective assessed the extent to which Insurance influence Performance of Hydroelectric Energy projects. The simple linear regression coefficients as well as the Pearson correlation results indicated that Insurance significantly influence Performance of Hydroelectric Energy projects. Insurance increases debt equity ratio without increasing level of risk, reduces debt service coverage ratio, reduces cost of capital due to the risk coverage, facilitates timely indemnification and liquidity of a project to its normal operation in the occurrence of a risk event, provides risk securitization through acceptance and retention, and improves project reputation for enhanced credit profile. However, Insurance leaves projects with certain risks such as political risk and revenue risk.

The sixth research objective assessed the extent to which combined financial risk management instruments influence Performance of Hydroelectric Energy projects. The multiple linear regression coefficients as well as the Pearson correlation results indicated that the combined financial risk management instruments significantly influence Performance of Hydroelectric Energy projects.

The seventh research objective assessed the moderating influence of Communication strategy on the Relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. The multiple linear regression coefficients as well as the Pearson correlation results indicated that there was significant moderating influence of Communication strategy on the Relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. An appropriate communication strategy with clear communication flow structure, innovative communication management tools, operational communication channels and quality information that integrates project stakeholders should be entrenched in projects for timely and accurate propagation of information concerning financial risk management instruments utilization and understanding of project objectives besides facilitating monitoring and review processes for appropriate corrective measures.

The eighth research objective was to determine the Intervening influence of Contract management on the Relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. The multiple linear regression coefficients as well as the Pearson correlation results indicated that there was significant mediating influence of Contract management on the relationship between financial risk management instruments and Performance of Hydroelectric Energy projects. Contracts should be well documented with clear understandable language and defined roles for all the project parties' to achieve value for money, stakeholder satisfaction, quality products delivery, cost reduction, and competitive procurement besides risks and liabilities management.

5.4 Contribution to the Body of Knowledge

This study examined the extent to which Financial Risk Management Instruments: ART, contingent capital, credit enhancement, hedging derivatives and, insurance independently and simultaneously influence performance of hydroelectric energy projects and the moderating influence of communication strategy and mediating influence of contract management on this relationship. Little information exists beyond establishing a significant association between individual independent variables and performance of projects from previous studies. Neither has the moderation effect of communication strategy on the relationship between financial risk management instruments and performance of hydroelectric energy projects and mediating effect of contract management on the relationship between financial risk management instruments and performance of hydroelectric energy projects been investigated.

The study equally provides a linkage between prospect theory and utilization of financial risk management instruments in securitizing hydroelectric projects; goal setting theory and performance of hydroelectric energy projects; Diffusion of innovation theory on explaining the moderating influence of communication strategy and Agency theory on explaining the mediating influence of contract management on the relationship between financial risk management instruments and performance of hydroelectric energy projects. This study thus furthers the use of prospect, diffusion of innovation, goal setting and Agency theories in this new sphere. The findings of this study thus provide significant contributions to the body of knowledge. The new findings are listed in Table 5.1.

Table 5.1: Contribution to Knowledge

Objectives of the study	Contribution to Knowledge
1. To establish the extent to which Alternative risk transfer influence performance of Hydroelectric Energy projects	1. The study reveals that alternative risk transfer improves performance of Hydroelectric Energy projects. Equally, the study shows that developing economies have embraced the utilization of alternative risk transfer in their hydroelectric energy projects which contradicts observations by previous studies.
2. To examine how Contingent capital influence performance of Hydroelectric Energy projects	2. The study links utilization of contingent capital in Hydroelectric Energy projects. The previous studies had only focused on contingent capital utilization in the corporate world.
3. To assess the extent to which credit enhancement influence performance of Hydroelectric Energy projects.	3. The study provides empirical evidence of the utilization of credit enhancements in hydroelectric energy projects in Kenya setting a local precedence.
4. To determine the extent to which Hedging derivatives influence performance of Hydroelectric Energy projects.	4. The study provides empirical evidence linking utilization of Hedging derivatives in Hydroelectric Energy projects in Kenya as a developing economy which was not initially available. The previous studies focused on the corporate world which has different structure of operation.
5. To assess the extent to which combined financial risk management instruments examine influence performance of Hydroelectric Energy projects.	5. The results of the study set a precedence of the empirical evidence that the combined financial risk management instruments improve performance of Hydroelectric Energy projects. No study had initially linked the five financial risk management instruments to the performance of hydroelectric energy projects.
6. To assess the moderating influence of communication strategy on the relationship between financial risk management instruments and performance of Hydroelectric Energy projects.	6. The results of the study reveal that communication strategy significantly moderated the relationship between financial risk management instruments and performance of Hydroelectric Energy projects. No study had been done initially to establish this moderating effect of communication strategy on the relationship between financial risk management instruments and performance of hydroelectric energy projects.
7. To assess the Intervening influence of contract management on the relationship between financial risk management instruments and performance of Hydroelectric Energy projects.	7. The results of the study provide empirical evidence of the significant mediating influence of contract management on the relationship between financial risk management instruments and performance of Hydroelectric Energy projects which was not initially available. This study sets precedence since no study had been done on the mediating influence of Contract management on the relationship between financial risk management instruments and performance of hydroelectric energy projects.

The study proved that ontologically reality can be discovered through both objective measurement of variables under study as captured by the quantitative data as well as

subjective opinions and experiences as captured by the qualitative data to bring out the relationship between the variables. Epistemologically the findings made meaning to the people as they are constructed from the participant's frame of reference that informs individual and group actions. The study Axiology observed ethical value proportion throughout the research period. The methodology enabled the establishment of the level of significance of the relationship between the variables under study.

5.5. Recommendations

From the findings of the study, the following recommendations for policy and action and for further research are made.

5.5.1. Recommendation for Policy Issues

Targeted policies should be enacted with focus on mandatory inclusion of financial risk management instruments in hydroelectric energy projects.

5.5.2 Recommendation for Practice

i) Financial institutions and credit rating agencies should commoditize green factors into investable assets for benchmarking and valuation of debts for their financial performance with renewable energy indices.

ii) Awareness creation on the availability and capacity building on the operations of financial risk management instruments should be done by relevant authorities to the instruments providers and investors in hydroelectric energy projects.

iii) The financial risk management instruments should be traded over the counter in Stock market at NSE for easy access.

iv) An appropriate communication strategy with clear communication flow structure, innovative communication management tools, operational communication channels and quality information that integrates project stakeholders should be entrenched in projects for timely and accurate propagation of information concerning financial risk management instruments utilization and understanding of project objectives besides facilitating monitoring and review processes for appropriate corrective measures.

v) Contracts should be well documented with clear understandable language and defined roles for all the project parties' to achieve value for money, stakeholder satisfaction, quality products delivery, cost reduction, and competitive procurement besides risks and liabilities management.

5.6 Areas for Further Research

For further research, the study suggests the following:

1. A study can be done on other infrastructure projects to establish how financial risk management instruments influence their performance for a further results authenticity and generalization.
2. A study should be done on Risk Financing as another financial risk management instrument to establish its influence on hydroelectric energy projects as suggested by the previous studies.
3. The study recommends that future studies should examine how policy and regulatory issues, human resource competency, financial resource allocation, capacity building and Information technology influence adoption of Financial Risk Management Instruments in projects.
4. Future studies should examine the moderating influence of policy and regulatory issues, human resource competency, financial resource allocation, capacity building and Information technology on the relationship between financial risk management instruments and performance of projects.

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APPENDICES

Appendix I: Letter of transmittal

AMOLO ELVIS JUMA AMOLO
GWENO KIPODI PRIMARY SCHOOL
P.O.BOX 92, KADONGO
E-mail: amoloelvis@gmail.com
0729819492
Date: 5 MAY, 2020

TO WHOM IT MAY CONCERN

I am a Doctor of Philosophy candidate at the University of Nairobi. As part of the requirement of the Doctoral degree in project planning and management, I am conducting research as a prerequisite for the course in project planning and management on influence of financial risk management instruments on performance of hydroelectric energy projects in Kenya and this will lead to suggestions on appropriate financial risk management instruments for securitizing hydroelectric energy projects thus stimulating financial pools from both the private and public investors to enhance project performance by ensuring quality, within cost and timely completion of the projects.

To enable me collect data for the research, you have been selected as one of the participants of the study. Kindly complete the data collection instruments such as the questionnaire and interview guide attached. The research is for academic purpose only and thus your identity will be kept confidential. You are requested to give your response as honestly as possible.
Thank you in advance for participating in this research.
Yours Sincerely,
Amolo Elvis Juma Amolo

Student, Faculty of Business and Management Science
Department of Management Science and Planning
University of Nairobi

Appendix II: Questionnaire for Hydroelectric Energy Projects Respondents (KENGEN and IPP)

This questionnaire attempts to ask questions related to Financial Risk Management Instruments, Communication Strategy, Contract Management and Performance of Hydroelectric Energy Projects in Kenya. Kindly answer the questions as honestly as possible. The instructions and room for responses are provided besides the questions.

Financial Risk Management Instruments			
No.	**QUESTIONS**	**RESPONSES**	**INSTRUCTIONS**
1.0	**Demographic Characteristics of Respondents**		
1.1	Date of interview		DD/MM/YY
1.2	Project category	1. KenGen (Mega-Hydro) 2. IPP (Independent power producer) (Mini-Hydro)	Tick as appropriate
1.3	Age	Below 30 years Between 30 and 39 Between 40 and 49 Over 50 years	Tick as appropriate
1.4	Gender	1. male 2. female	Tick as appropriate
1.5	Years of professional experience	Below 2years Between 3-4yrs Between 5-10yrs Above 15 yrs.	Tick as appropriate
1.6	Respondents education level	Diploma holder Bachelor's degree Post-graduate	Tick as appropriate

To what extent do you agree with the following statements? Please indicate your answer using the following 5-point scale where:

1. = Strongly Disagree (SD); 2. = Disagree; 3. = Neutral; 4. Agree (A); 5. Strongly Agree (SA)

	SECTION A: Alternative Risk Transfer					
4.0	**Statements**	**1**	**2**	**3**	**4**	**5**
4.1	ART ensures risk securitization which enhances the projects credit rating					
4.2	ART enables standardization of projects to determine market value of loans or pricing certainty					
4.3	ART enable funding risk transfer thereby smoothening the revenue flow due to low loss ratios					
4.4	ART provides complementary source of lower cost of capital					
4.5	ART allows insurers to increase their capacity by opening capital markets					
4.6	ART complements traditional insurance products for enhanced liquidity ratios					
4.7	ART constitute a different asset class that can enhance returns for competitive advantage					
4.8	ART provides diversification over portfolio to the investors					
4.9	ART reduces over insurance through participation in an own loss development					
4.10	ART reduces cost of borrowing through reduced credit risk					
	SECTION B: Contingent Capital					
5.0	**Statements**	**1**	**2**	**3**	**4**	**5**
5.1	Provides leverage in good times through timely conversion					
5.2	Provides buffer to absorb losses during financial distress					
5.3	Relief for debt servicing obligation in bad times due to reduction of coupon of straight debt					
5.4	Provide strong incentives for the prompt recapitalization in the event of increased risk					
5.5	Contain moral hazard of market manipulation through credible signal of default risk					
5.6	Ensure reduced cost of capital due to accounting tax advantages					
5.7	Provide a strong incentive to raise equity before facing insolvency risk					
5.8	Eliminates problems of enforcing book capital requirements					
5.9	Decrease incentives to raise new equity in a crisis which helps maintain shareholders value					
5.10	Supplement supervisory oversight with market discipline by reducing					

	managements' intent of taking excessive risk above tolerance level					
	SECTION C: Credit Enhancement					
6.0	**Statements**	**1**	**2**	**3**	**4**	**5**
6.1	Enhance credit worthiness of the project					
6.2	Enable expanded access to market borrowings					
6.3	Attract new sources of financing					
6.4	Mitigates credit risk					
6.5	Create more confidence among investors					
6.6	Acts as a security instrument by cushioning of underlying loans against default					
6.7	Provides an umbrella for political risk exposure hence eases debt covenants					
6.8	Reduces cost of capital through lower interest rate charges					
6.9	Enables favorable debt amortization through extended debt maturity					
6.10	Introduction of new borrowers to the market for large scale transaction					
	SECTION D: Hedging Derivatives					
7.0	**Statements**	**1**	**2**	**3**	**4**	**5**
7.1	Enhances profitability of the project					
7.2	Maintains liquidity flow within the project					
7.3	Reduces market risks for the project					
7.4	Reduces counterparty risk in the project					
7.5	Ensures price stability by managing transaction cost volatility					
7.6	Saves time by reducing transaction bookwork					
7.7	Facilitate efficiency in trading through market capitalization					
7.8	Reduces cost of capital through systemic risk coverage					
7.9	Facilitates steady revenue flow thus improving liquidity control					
7.10	Improves project reputation among investors					
	SECTION E: Insurance					
8.0	**Statements**	**1**	**2**	**3**	**4**	**5**
8.1	Increases debt equity ratio without increasing level of risk					
8.2	Reduces debt service coverage ratio					
8.3	Reduce cost of capital due to the risk coverage					
8.4	Facilitates timely indemnification of a project to its normal operation in the occurrence of a risk event					

8.5	Reduces financial distress through efficient claim duration which improves liquidity flow					
8.6	Provides risk securitization through acceptance					
8.6	Increases investors' confidence					
8.7	Improves project reputation through enhanced credit profile					
8.8	Reinsurance of risk increases insurance underwriting capacity					
8.9	Cushions projects from political risks					
8.10	Reduces the number of years to positive cash flow in the project					
	SECTION F: Communication Strategy					
9.0	**Statements**	**1**	**2**	**3**	**4**	**5**
9.1	Availability of clear communication flow structures facilitated utilization of financial risk management instruments which influenced performance of projects					
9.2	Availability of Communication management tools elaborating on financial risk management instruments influenced performance of projects					
9.3	Availability of modern communication channels for disseminating financial risk management instruments information influenced performance of projects					
9.4	Availability of Up-to-date Quality of information on financial risk management instruments influenced performance of projects					
9.5	Availability of adequate budgetary allocation for the communication function influenced performance of projects					
9.6	Availability of clear communication of Project objectives in relation to utilization of financial risk management instruments influenced performance of projects					
9.7	Availability of adequate Risk awareness communication influenced performance of the projects					
9.8	Availability of adequate Communication scope for financial risk management instruments influenced performance of projects					
9.9	Availability of dedicated communication professionals in financial risk management instruments utilization influenced performance of projects					
9.10	Availability of Communication function for delivery of quality professional advice on utilization of financial risk management instruments influenced performance of project					
	SECTION G: Contract Management					
10.0	**Statements**	**1**	**2**	**3**	**4**	**5**
10.1	The financial risk management instruments contracts met stakeholders needs in the					

	project					
10.2	The financial risk management instruments contracts met optimum quality conditions in the project					
10.3	The financial risk management instruments contracts ensured achievement of value for money for the projects					
10.4	The financial risk management instruments contracts achieved efficient funding for the various phases of the project					
10.5	The competitive bidding of financial risk management instruments contracts influenced performance of projects					
10.6	The clarity of role obligation to the project parties in Financial risk management instruments contract influenced performance of projects					
10.7	Effective handling of financial risk management instruments contract's potential liabilities during project execution influenced performance of projects					
10.8	Adherence to pre-approved contract language for the financial risk management instruments influenced performance of projects					
10.9	Achievement of financial risk management instruments activities within time influenced performance of projects					
10.10	Timely screening and approval of financial risk management instruments influenced performance of projects					
	SECTION H: Performance of Hydroelectric Energy Projects					
11.0	**Statements**	**1**	**2**	**3**	**4**	**5**
11.1	The project implementation is within time schedule					
11.2	The project cost of capital is reduced					
11.3	The project meets required quality standards in supply of electricity					
11.4	The project clients are satisfied with the project outcomes					
11.5	The project operates efficiently as required					
11.6	The access to power supply is easy					
11.7	The project has positive environmental impact					
11.8	The energy production capacity has increased					
11.9	The produced electricity is affordable					
11.10	The project generates adequate revenue					

Appendix III: Key Informant Interview Guide for Participants from Government Agencies

(Ministry of Energy, Ministry of Finance, Energy Regulatory Commission, Kenya Power and Lighting Company, Kenya Electricity Transmission Company, Geothermal Development Company, Capital Markets Authority, Nairobi Security Exchange and Insurance Regulatory Authority)

The purpose of this interview is to source for information regarding financial risk management instruments and performance of hydroelectric energy projects in Kenya. You are therefore kindly requested to participate and provide honest opinion knowledge and perceptions regarding the questions asked. The information you provide will remain confidential and used for this academic purpose only. Your participation will therefore be highly appreciated.

Date of interview

Institution's name

Respondent type/ designation

SECTION A: Alternative Risk Transfer

1. What advantages do you get when Alternative Risk Transfer is used in hydroelectric energy projects {***Instruction:*** Enumerate the advantages}
2. What are the major drivers in the utilization of Alternative Risk Transfer in hydroelectric energy projects {***Instruction:*** Enumerate the drivers}
3. Do you experience challenges in utilizing Alternative Risk Transfer in hydroelectric energy projects {***Instruction:*** Enumerate the challenges}

SECTION B: Contingent Capital

1. What advantages do you get when Contingent Capital is used in hydroelectric energy projects {***Instruction:*** Enumerate the advantages}
2. What are the major drivers in the utilization of Contingent Capital in hydroelectric energy projects {***Instruction:*** Enumerate the drivers}
3. Do you experience challenges in utilizing Contingent Capital in hydroelectric energy projects {***Instruction:*** Enumerate the challenges}

SECTION C: Credit Enhancement

1. What advantages do you get when Credit Enhancement is used in hydroelectric energy projects {***Instruction:*** Enumerate the advantages}
2. What are the major drivers in the utilization of Credit Enhancement in hydroelectric energy projects {***Instruction:*** Enumerate the drivers}

3. Do you experience challenges in utilizing Credit Enhancement in hydroelectric energy projects {***Instruction:*** Enumerate the challenges}

SECTION D: Hedging Derivatives

1. What advantages do you get when Hedging Derivatives is used in hydroelectric energy projects {***Instruction:*** Enumerate the advantages}

2. What are the major drivers in the utilization of Hedging Derivatives in hydroelectric energy projects {***Instruction:*** Enumerate the drivers}

3. Do you experience challenges in utilizing Hedging Derivatives in hydroelectric energy projects {***Instruction:*** Enumerate the challenges}

SECTION E: Insurance

1. What advantages do you get when Insurance is used in hydroelectric energy projects {***Instruction:*** Enumerate the advantages}

2. What are the major drivers in the utilization of Insurance in hydroelectric energy projects {***Instruction:*** Enumerate the drivers}

3. Do you experience challenges in utilizing Insurance in hydroelectric energy projects {***Instruction:*** Enumerate the challenges}

SECTION F: Communication Strategy

1. What are the strategies put into place to ensure elaborate communication on Alternative Risk Transfer {***Elaborate?***}

2. What are the strategies put into place to ensure elaborate communication on Contingent Capital {***Elaborate?***}

3. What are the strategies put into place to ensure elaborate communication on Credit Enhancement {***Elaborate?***}

4. What are the strategies put into place to ensure elaborate communication on Hedging Derivatives {***Elaborate?***}

5. What are the strategies put into place to ensure elaborate communication on Insurance {***Elaborate?***}

6. What are the strategies put into place to ensure elaborate communication on Performance of Hydroelectric Energy Projects {***Elaborate?***}

SECTION G: Contract Management

1. In your own opinion do you think contract management amongst project parties influence the performance of hydroelectric energy projects {***Elaborate?***}

SECTION H: Performance of Hydroelectric Energy Projects

1. Do the hydroelectric Energy Projects meet the following Performance indicators? {***Elaborate?***}

A.} There is Quality electricity supply from the hydroelectric Energy Projects

B.} There is Project cost reduction in hydroelectric Energy Projects

C.} There is increased generation capacity of electricity from the hydroelectric Energy Projects

D.} Hydroelectric Energy Projects are Implementation within time

E.} Hydroelectric Energy Projects are Operating efficiently

F.} There is Customer satisfaction in hydroelectric Energy Projects

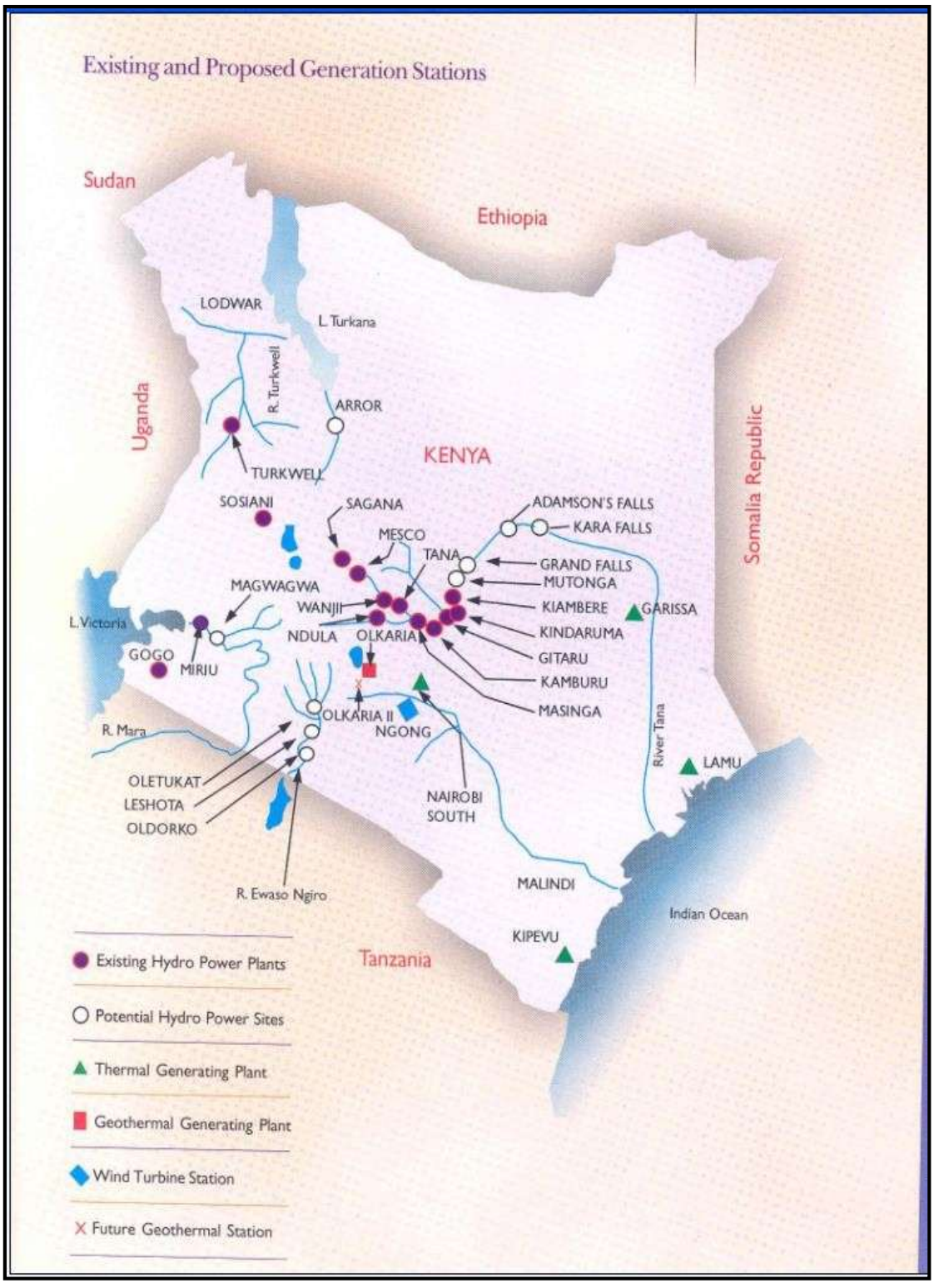
G.} Hydroelectric Energy Projects ensures Environmental safety

H.} There is increased profitability from the hydroelectric Energy Projects

I.} There is Competitive procurement within the hydroelectric Energy Projects

J.} There is adequate Risk management strategies in hydroelectric Energy Projects

Appendix V: Existing and selected proposed power plants



Existing and selected proposed power plant (KPLC annual report, 2017)

Appendix VI: Research Permit

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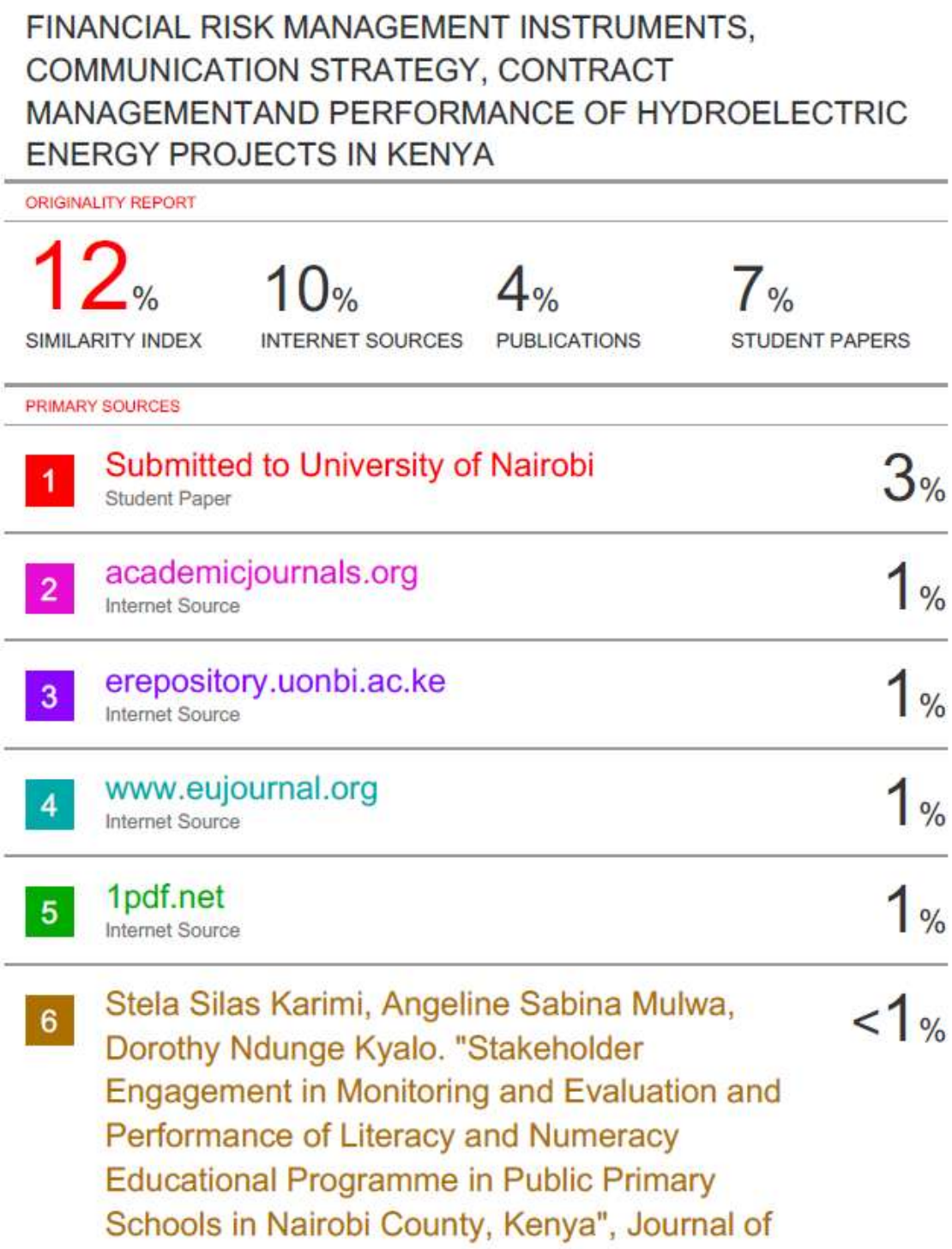
Appendix V: Anti-Plagiarism Report



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