



Financial risk management instruments and performance of hydro-power projects in Kenya



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ABSTRACT

This paper aims (i) to establish the extent to which alternative risk transfer influence the performance of hydroelectric energy projects in Kenya, (ii) to examine how Contingent capital influence the 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. The study adopted the pragmatism paradigm, mixed-method approach, and descriptive correlational survey design while questionnaires and interview guide were used to collect quantitative and qualitative data from a census of 94 participants. This study recommends that project management and policymakers should integrate appropriate financial risk management instruments to improve the performance of hydroelectric energy projects besides developing targeted policies for strengthening the implementation of the financial risk management instruments to boost investors and lenders confidence.

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Introduction

In spite of Africa's endowment with substantial renewable energy resources, most of it is under-exploited for instance only approximately 7% of the massive hydro potential has been harnessed (Frisari, Hervè-Mignucci, Micale, and Mazza, 2013) while in Kenya in spite of having an estimated hydropower potential of about 6,000MW for large hydros, only 823.8 MW has been exploited (Ministry of Energy, 2020).

Expanding economic demand has necessitated investment in power infrastructure in Sub-Saharan Africa and this if well implemented, can increase the estimated average regional GDP from the current 4% to more than 10% (Rosnes and Vennemo, 2009). But due to investors negative perception of Kenya's high investment risk and low creditworthiness, the degree of private capital penetration has generally remained low (OECD, 2013). For this massive infrastructural investment to be realized the financial markets must play critical role in stimulating private investments into the renewable energy development to bridge the scarce resources at disposal of the public sector (Rezec and Scholtens, 2017).

Thus, utilization of financial risk management instruments to de-risk renewable energy infrastructure projects is essential for reducing private investment cost. However, based on market statistics by IEG (2009), reluctance of investors and financial institutions has impeded the financial risk management instruments wide-spread provision and implementation due to the perceived high transaction cost.

Financial risk management instruments are approaches to risk mitigation for renewable energy projects and they include alternative risk transfer, contingent capital, hedging derivatives, credit enhancement, and insurance. Alternative risk transfer is the application

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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. Contingent capital is 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 and reduce systemic risks and default probability compared to pure debt instrument.

Credit enhancement is 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 and Co-financing. Hedging derivatives are contractual agreements on a security deriving its value from the value of a different asset for example forwards, futures, options and swaps to hedge against systemic risks such as interest rate risk, currency exchange risk, and inflation risk. Insurance is a mechanism of transferring risk where by an entity shifts some life uncertainties to other business enterprises' shoulders and in return pay premiums for the risk transfer. According to a review on the impact of market instruments on environmental challenges by 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 (Scholtens, 2006) in relation to financial risk management (Gitone, 2014).

Despite their effectiveness Frisari and Micale (2015) postulate that financial risk management instruments replication potential has been very limited as they have been utilized in few projects funded by World Bank Group and only represents in aggregate 4.5% of largest six multilateral DFIs total financing due to constraints of demand and supply which limits their utilization to large infrastructure projects only. 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).

The study problem is that financing of renewable energy projects remains constrained due to risk barriers in financial access and high sunk cost coupled with investors and developer's perception that the projects are highly risky even in the event that the project satisfies the economic feasibility in the long run especially in developing nations like Kenya. The purpose of the study is to assess the extent to which financial risk management instruments influence performance of hydroelectric energy projects in Kenya. The study provides a reference for other scholars, policy makers and investors besides contributing valuable knowledge on appropriate financial risk management instruments in reducing the inherent risks in hydroelectric energy projects thereby attracting securitized financing pools. The study was organized into introduction, literature review, findings and discussion, and conclusion.

Literature Review

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). 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) did not focus on how the performance of hydroelectric energy projects can be influenced by financial risk management instruments, a gap which the current study intends to fill through descriptive survey design and descriptive and inferential statistical analysis.

Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

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 infrastructure projects' cost as risks will be transferred away from investors and lenders (Suprpto *et al.*, 2016). Insurers have over the years used Alternative Risk Transfer (ART) products such as Catastrophic (CAT) bonds, CAT 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 (Sibindi, 2015) while for the investors ART forms a different asset class for enhancing returns while controlling the portfolio variance (Cummins, 2008). Wing and Jin (2015) through a desk review found that Catastrophe bonds enable the transfer of operational risk to bond investors thereby enabling renewable energy developers to secure low cost capital in the financial market.

Contingent capital provides projects with strong and efficient recapitalization incentives when they experience significant equity loss or upon reaching a trigger threshold (Calomiris and Herring, 2013). Vall'ee (2016) through desk review found that contingent capital offers cheaper recapitalization costs compared to ordinary equity offerings, hence limiting the cost of financial distress (Vall'ee, 2016). Contingent capital can reduce financial distress by injecting liquidity to the project hence reducing risks and improving performance of renewable 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 demand pressure on the banking system (Chowdhury, Chen and Tiong, 2015). A study by Dhruva (2018) focused 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.

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. In Kenya, Waswa and Wepukhulu (2018) examined the effect of the utilization of derivative instruments on financial performance of non-financial firms listed in NSE and findings through descriptive survey design and data collected using questionnaire from a sample size of 11 listed non-financial firms 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 to mitigate financial risks. 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.

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). 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).

Research and Methodology

The study adopted pragmatism paradigm, descriptive survey design and mixed method approach involving qualitative and quantitative data collection and triangulation of results to deduce in-depth knowledge of the problem under study without manipulating the environment (Wambugu, Kyalo, Mbii, and Nyonje, 2015; Creswell, 2013), hence, neutralizes biases and limitations inherent in any single method (Teddlie and Tashakkori, 2009). A census of 94 participants consisting of 84 respondents and 10 Key Informants were involved in the study while questionnaire and interview guide were pre-tested in 10 unselected participants and a validity coefficient of 0.775 and reliability coefficient of 0.781 obtained. Analysis involved descriptive statistics of mean and standard deviation and inferential statistics of correlation and regression at a significance level of 0.05 while qualitative data was analyzed manually through descriptive statistics of thematic content analysis. A simple and multiple regression models were used on each of the single independent variables, and the combined independent variables against dependent variable taking the form:

Performance= f (Alternative risk transfer, random variable)

$$Y = \beta_0 + \beta_1 X_1 + \alpha$$

H₀: There is no significant relationship between Alternative Risk Transfer and performance of hydroelectric energy projects in Kenya

H₀: There is no significant relationship between Contingent capital and performance of hydroelectric energy projects in Kenya

H₀: There is no significant relationship between Credit enhancement and performance of hydroelectric energy projects in Kenya

H₀: There is no significant relationship between Hedging derivatives and performance of hydroelectric energy projects in Kenya

H₀: There is no significant relationship between Insurance and performance of hydroelectric energy projects in Kenya

H₀: There is no significant relationship between the combined financial risk management instruments and performance of hydroelectric energy projects in Kenya

Findings and Discussion

The study realized a 100% questionnaire return rate. The study sought to assess the extent to which Financial risk management instruments influence performance of hydroelectric energy projects in Kenya. The study sought the perspectives of participants on Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. 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. The results are presented in Table 1.

Table 1: Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

| 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 presents the descriptive statistics on participants views on 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 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 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 influence of insurance on 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."*

In support of the findings a respondent by KPLC attributed that *"...relevant steps have been taken in identifying, analyzing, evaluating and mitigating risks that arise in day to day operations in tandem with legal and regulatory obligations as well as ensuring that Enterprise Risk Management (ERM) practice is embedded in the Company. 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."*

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

Inferential statistics was conducted on participants Perspectives on the relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. Pearson correlation coefficient was used to test the relationship between Financial risk management Instruments and Performance of Hydroelectric Energy projects, this was done at 95% level of confidence. To test the extent of the relationship between 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. H₀: There is no significant relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. The corresponding mathematical model for the hypothesis was identified as follows: Performance of Hydroelectric Energy projects = $f(\text{Financial Risk Management Instruments})$. The overall correlation coefficient for Financial risk management Instruments and Performance of Hydroelectric Energy projects was found to be 0.931 with a p-value of $0.000 < 0.05$, implying that there is a statistically significant relationship between Financial risk management Instruments and Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis (6. H₀: There is no significant relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy projects) and acceptance of the alternative hypothesis, and hence the research findings conclude that there is a significant relationship between Financial Risk Management Instruments and Performance of Hydroelectric Energy projects. This agrees with findings by Suprpto *et al.*, (2016); Frisari and Micale (2015) and; Gómez-Baggethun and Muradian (2015) who found that there is significant relationship between Financial risk management Instruments and Performance of Hydroelectric Energy projects. The results obtained are indicated in Table 2.

Table 2: Correlation Analysis of Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

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

Correlation significant at 0.05 level (2-tailed)

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

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

The model summary suggests that there is a positive multiple correlation ($R=0.931$) between 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 Financial risk management Instruments. The results are consistent with the findings by Suprpto *et al.*, (2016) who found that there is significant relationships between the Financial risk management Instruments and Performance of Hydroelectric Energy projects. Table 3 presents the regression model summary on the Financial risk management Instruments and Performance of Hydroelectric Energy projects.

Table 1: Regression Model Summary Table of 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), Financial risk management Instruments

The study sought to find out whether the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of financial risk management Instruments. The ANOVA results indicated that (F-statistics (5,78)= 101.436) 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. From the views of the participants, financial risk management Instruments had a significant positive influence on Performance of Hydroelectric Energy projects. The results are consistent with the findings of other studies by Suprpto *et al.*, (2016) who found that there is significant relationships between Financial risk management Instruments and Performance of Hydroelectric Energy projects. The regression ANOVA output statistics results are shown in Table 4.

Table 4: An ANOVA of the Regression of 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 | .000 ^b |
| | Residual | 5.565 | 78 | 0.071 | | |
| | Total | 41.750 | 83 | | | |

a. Dependent Variable: Performance of Hydroelectric Energy Projects

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

The study sought to find out whether there was influence of Financial risk management Instruments on Performance of Hydroelectric Energy projects. The multiple linear regression coefficients results indicated that there was significant relationship between Financial risk management Instruments and Performance of Hydroelectric Energy projects given P-Value=0.00<0.05. The model was $Y=0.919+0.397X_1+0.690X_2+1.276X_3+0.826X_4+0.192X_5$. 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 results are consistent with the findings of studies Suprpto *et al.*, (2016); Frisari and Micale (2015) and; Gómez-Baggethun and Muradian (2015) who found that there was significant influence of Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects. The regression coefficients results are in Table 5.

Table 5: Coefficients for the Regression of Financial Risk Management Instruments and Performance of Hydroelectric Energy Projects

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---------------------------|-----------------------------|------------|---------------------------|-------|-------|
| | B | Std. Error | Beta | | |
| (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 |

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.

Conclusions

The purpose of this study was to examine the extent to which financial risk management instruments influence Performance of Hydroelectric Energy projects. The first research objective was to examine 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 there was significant influence of Alternative risk transfer on Performance of Hydroelectric Energy projects. The small p-values ($0.000 < 0.05$), implies that there is a significant influence of Alternative risk transfer on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 1. H_0 : There is no significant relationship between Alternative risk transfer and Performance of Hydroelectric Energy projects; and so, it was concluded that there is significant relationship between Alternative risk transfer and Performance of Hydroelectric Energy projects.

The second research objective was to examine 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 there was significant influence of Contingent capital on Performance of Hydroelectric Energy projects. The small p-values ($0.000 < 0.05$) implies that there is a significant influence of Contingent capital on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 2. H_0 : There is no significant relationship between Contingent capital and Performance of Hydroelectric Energy projects; and so it was concluded that that there is significant relationship between Contingent capital and Performance of Hydroelectric Energy projects.

The third research objective was to examine 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 there was significant influence of Credit enhancement on Performance of Hydroelectric Energy projects. The small p-values ($0.000 < 0.05$) implies that there is a significant influence of Credit enhancement on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 3. H_0 : There is no significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects; and so it was concluded that there is significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects.

The fourth research objective was to examine 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 there was significant influence of Hedging derivatives on Performance of Hydroelectric Energy projects. The small p-values ($0.000 < 0.05$) implies that there is a significant influence of Hedging derivatives on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 4. H_0 : There is no significant relationship between hedging derivatives and Performance of Hydroelectric Energy projects; and so it was concluded that that there is significant relationship between hedging derivatives and Performance of Hydroelectric Energy projects.

The fifth research objective was to examine 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 there was significant influence of Insurance on Performance of Hydroelectric Energy projects. The small p-values ($0.000 < 0.05$) implies that there is a significant influence of Insurance on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 5. H_0 : There is

no significant relationship between Insurance on Performance of Hydroelectric Energy projects; and so it was concluded that there is significant relationship between Insurance and Performance of Hydroelectric Energy projects.

The sixth research objective was to examine 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 there was significant influence of combined financial risk management instruments on Performance of Hydroelectric Energy projects. The small p-values ($0.000 < 0.05$) implies that there is a significant influence of combined financial risk management instruments on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 6. H_0 : There is no significant relationship between financial risk management instruments and Performance of Hydroelectric Energy projects; and so it was concluded that there is significant relationship between combined financial risk management instruments and Performance of Hydroelectric Energy projects.

The findings of this study thus provide significant contributions to the body of knowledge as it establishes the relationship between financial risk management instruments and performance of hydroelectric energy projects. Based on the findings, the study recommends targeted policy enactment for inclusion of financial risk management instruments in hydroelectric energy projects and awareness creation on the operations of financial risk management instruments to the instruments providers and investors in hydroelectric energy projects. Further, the financial risk management instruments should be traded on the stock market for easy access. This study was delimited to Kenya and on hydroelectric energy projects alone and therefore, a study can be replicated in other developing countries and in projects other than hydroelectric energy projects to explain the possibility of other environmental factors thereby improving generalizability of the findings. Further, a research on risk financing for hydroelectric energy projects will provide novel information.

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