Credit Enhancement and Performance of Hydroelectric Energy Projects in Kenya

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Abstract

Renewable energy investment has been underexploited in Africa and Kenya in specific due to financing constraints arising from 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 assess the extent to which Credit enhancement influence performance of hydroelectric energy projects in Kenya. The study was underpinned on pragmatism paradigm which allows the use of mixed method approach and descriptive correlational survey research design. Structured questionnaires and interview guide were used to collect quantitative and qualitative data from a sample size of 94 participants out of a target population of 94 subjects. Validity test was done on the instruments and a coefficient of 0.775 obtained using Content Validity Index while reliability involved pretesting of the instruments amongst the 10% of the participants and Cronbach's alpha coefficient of 0.781 obtained. Analysis was done using both descriptive statistic of mean and standard deviation and inferential statistic 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. Simple linear regression and Pearson Correlation Coefficient models were used to determine the influence between independent and dependent variable and the result H_0 : Credit enhancement does not significantly influence performance of hydroelectric energy projects in Kenya was rejected since $P=0.000<0.05$. Therefore the study concluded that there is significant influence of credit enhancement on performance of hydroelectric energy projects in Kenya. It is recommended that Project management and policy makers should integrate appropriate credit enhancement instruments to improve performance of hydroelectric energy projects besides developing targeted policies for strengthening implementation of the credit enhancement instruments to boost investors and lenders confidence. Further research should be carried out on the determinants influencing effective utilization of credit enhancement in power projects in Kenya.

Keywords: Credit; Energy; Project; Performance

JEL Classifications: O22; P18

Introduction

In Kenya, in spite of 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 (Ministry of Energy, 2020). 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). 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). Thus, utilization of credit enhancement to de-risk renewable energy infrastructure projects is essential for reducing private investment cost.

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 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).

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). The financial giants' potential can thus be harnessed through securitization of energy project debt into investable assets for benchmarking of their financial performance with renewable energy indices. 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. 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).

Renewable energy development thus demands attention on risk mitigation to ensure adequate funds can be solicited from both the local and international financial markets so as to reap from their benefits and improve performance of such project by ensuring their successful completion on schedule, within 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). The purpose of the study is to examine how Credit enhancement 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 utilization of Credit enhancement 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

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). 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). 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.

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 hydroelectric energy projects perform when they obtain profitability, increased power supply, improved customer satisfaction and increased household connectivity. This study defines performance of hydroelectric energy projects as the success in meeting predefined measurable standard objective indicators of quality electricity supply, project cost reduction, increased generation capacity or scope, affordable electricity supply, adherence to implementation time schedule, operational efficiency, customer satisfaction, positive environmental effect and increased profitability. 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 credit enhancement, a gap which the current study intends to fill through descriptive survey design and descriptive and inferential statistical analysis.

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). 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 (IRENA, 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). 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 seem to overstate credit risk in renewable energy projects as they do not incorporate the positive environmental externalities towards achievement of sustainability into the rating system. The inclusion of green factors "positive externality factors" into renewable energy projects credit ratings can reduce credit risk in the long-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 (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 a descriptive survey design and data collected using questionnaire from a sample of 120 respondents 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.

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 mitigate counterparty risk faced by project sponsors and banks indirectly 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.

Based on the reviewed 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.

Methodology

The study was underpinned on pragmatism paradigm and descriptive correlational survey research design which allows generation and testing of hypothesis through 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, Kyalo, Mbii, and Nyonje, 2015; Creswell, 2013), hence, neutralizes biases and limitations inherent in any single method (Teddle and Tashakkori, 2009).

The target population had 94 subjects consisting of 84 respondents and 10 Key Informants. The study sample size comprised all the 94 participants "Census", which were proportionately distributed across all the 12 hydroelectric energy projects in the study area and the agencies concerned with the variables under study. 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 while the 10 Key Informants (finance managers) were drawn from relevant government ministry and agencies like 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 to provide insight of Alternative Risk Transfer utilization in hydroelectric energy projects.

The study used both primary and secondary data to source for information concerning Alternative Risk Transfer and performance of hydroelectric energy projects. For the case of primary data, structured questionnaire was used to collect quantitative data 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 questionnaire and the Key informant interview were pre-tested in 10 unselected participants and a validity coefficient of 0.775 and reliability coefficient of 0.781 obtained. Data was analyzed using descriptive statistics of mean and standard deviation and inferential statistics of correlation and regression to fulfill research objective, test hypothesis and show the relationship between the variables at a significance level of 0.05. The qualitative data was analyzed manually through descriptive statistics of thematic content analysis method that follows an interview question approach.

A simple regression model was used on each of the single independent variables, and the combined independent variables against dependent variable taking the form: H_0 : There is no significant relationship between Contingent capital and performance of hydroelectric energy projects in Kenya

Performance = f (Credit enhancement, random variable)

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

Findings and Discussion

The study realized a 100% questionnaire return rate. The study sought to assess the extent to which Credit enhancement influence performance of hydroelectric energy projects in Kenya. Participants gave 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 1.

Table 1: Credit Enhancement and Performance of Hydroelectric Energy Projects

Statements	SA	A	N	D	SD	Mean	Std. dev
CE1	77(91.7%)	7(8.3%)	0(0.00%)	0(0.00%)	0(0.00%)	4.92	0.278
CE2	18(21.4%)	66(78.6%)	0(0.00%)	0(0.00%)	0(0.00%)	4.21	0.413
CE3	18(21.4%)	66(78.6%)	0(0.00%)	0(0.00%)	0(0.00%)	4.21	0.413
CE4	73(86.9%)	11(13.1%)	0(0.00%)	0(0.00%)	0(0.00%)	4.87	0.339
CE5	40(47.6%)	44(52.4%)	0(0.00%)	0(0.00%)	0(0.00%)	4.48	0.502
CE6	10(11.9%)	72(85.7%)	2(2.40%)	0(0.00%)	0(0.00%)	4.10	0.368
CE7	24(28.6%)	59(70.2%)	1(1.20%)	0(0.00%)	0(0.00%)	4.27	0.475
CE8	6(7.1%)	71(84.5%)	7(8.3%)	0(0.00%)	0(0.00%)	3.99	0.396
CE9	20(23.8%)	49(58.3%)	15(17.9%)	0(0.00%)	0(0.00%)	4.06	0.647
CE10	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	29(34.5%)	48(57.2%)	7(8.3%)	0(0.00%)	0(0.00%)	4.25	0.210

NB. CE1-10 is the statements of Credit Enhancement

Ten statements were developed to measure the extent to which Credit Enhancement influence performance of hydroelectric energy projects. Statement (CE1) that 'credit enhancement improves credit worthiness of the project' had a mean of 4.92 and standard deviation of 0.278. This results indicate that out of 84 participants, 77(91.7%) strongly agreed that 'credit enhancement enhance credit worthiness of the project, and 7(8.3%) agreed that 'credit enhancement enhance credit worthiness of the project. The result shows that the line statement mean of 4.92 and standard deviation of 0.278 were above the composite mean of 4.25 and standard deviation of 0.210; implying that credit enhancement improves credit worthiness of the project and hence positively influencing the performance of Hydroelectric Energy projects. The study results support finding by Dhruba (2018) 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 (CE2) that 'Credit enhancement enable expanded access to market borrowings' had a mean of 4.21 and standard deviation of 0.413. The result indicate that out of 84 participants, 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 results show that the line statement mean of 4.21 and standard deviation of 0.413 were slightly below the composite mean of 4.25 and standard deviation of 0.210. This result implies that Credit enhancement moderately enables expanded access to market borrowings thereby moderately influencing the performance of Hydroelectric Energy projects. The study results support finding by Chowdhury, Chen and Tiong (2015) that credit enhancement increases project parties' creditworthiness to access additional cheaper capital in the capital markets.

Statement (CE3) that 'Credit enhancement attracts new sources of financing' had a mean of 4.21 and standard deviation of 0.413. The result indicate that out of 84 participants, 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 results show that the line statement mean of 4.21 and standard deviation of 0.413 were slightly below the composite mean of 4.25 and standard deviation of 0.210. This results implies that Credit enhancement moderately attract new sources of financing and hence moderately influencing the performance of Hydroelectric Energy projects. 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 (CE4) that 'Credit enhancement mitigates credit risk' had a mean of 4.87 and standard deviation of 0.339. The result 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 results show that the line statement mean of 4.87 and standard deviation of 0.339 was above the composite mean of 4.25 and standard deviation of 0.210. This results implies that Credit enhancement mitigate credit risk and hence positively influence the performance of Hydroelectric Energy projects. The study results support findings by Yoshino and Taghizadeh-Hesary (2015) 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 (CE5) that 'Credit enhancement create more confidence among investors' had a mean of 4.48 and standard deviation of 0.502. The result indicate that out of 84 participants, 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 results show that the line statement mean of 4.48 and standard deviation of 0.502 was above the composite mean of 4.25 and standard deviation of 0.210. The result implies that Credit enhancement create more confidence among investors and hence positively influence the performance of Hydroelectric Energy projects. The study results support finding 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 (CE6) that 'Credit enhancement acts as a security instrument by cushioning of underlying loans against default' had a mean of 4.10 and standard deviation of 0.368. The result indicate that out of 84 participants, 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. The result show that the line statement mean of 4.10 and standard deviation of 0.368 was slightly below the composite mean of 4.25 and standard deviation of 0.210. This results implies that Credit enhancement moderately acts as a security instrument by cushioning of underlying loans against default and hence moderately influence the performance of Hydroelectric Energy projects. The study results supports finding 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 (CE7) that 'Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants' had a mean of 4.27 and standard deviation of 0.475. The result indicate that out of 84 participants, 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. The result show that the line statement mean score of 4.27 and standard deviations of 0.475 were above the composite mean of 4.25 and standard deviation of 0.210. The result implies that Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants and hence positively influence the performance of Hydroelectric Energy projects. The study results support finding 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 (CE8) that 'Credit enhancement reduces cost of capital through lower interest rate charges' had a mean of 3.99 and standard deviation of 0.396. The result indicate that out of 84 participants, 6(7.1%) strongly agreed that Credit enhancement reduces cost of capital through lower interest rate charges, 71(84.5%) agreed that Credit enhancement reduces cost of capital through lower interest rate charges and 7(8.1%) were neutral that Credit enhancement reduces cost of capital through lower interest rate charges. The result shows that the line statement means of 3.99 and standard deviation of 0.396 was slightly below the composite mean of 4.25 and standard deviation of 0.210. This result implies that Credit enhancement moderately reduce cost of capital through lower interest rate charges and hence moderately influence the performance of Hydroelectric Energy projects. The study results support finding 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 (CE9) that 'Credit enhancement enables favorable debt amortization through extended debt maturity' had a mean of 4.06 and a standard deviation of 0.647. The result indicate that out of 84 participants, 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 of 4.06 and standard deviation of 0.647 was slightly below the composite mean of 4.25 and standard deviation of 0.210. The result implies that Credit enhancement moderately enables favorable debt amortization through extended debt maturity and hence moderately influences performance of Hydroelectric Energy projects. The study results support findings by Clean Bonds Initiative (2017) that credit enhancement products softens debt amortization rate because of the reduced chances of default risk in the project.

Statement (CE10) that 'Credit enhancement enables introduction of new borrowers to the market for large scale transaction' had a mean of 3.43 and standard deviation of 0.566. This results indicate that out of 84 participants, 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. The result show that the line statement mean of 3.43 and standard deviation of 0.566 was below the composite mean of 4.25 and standard deviation of 0.210. The result implies that Credit enhancement does not enable introduction of new borrowers to the market for large scale transaction' and hence might negatively influence the performance of Hydroelectric Energy projects. The study results contradicts finding by IRENA (2016) that credit enhancement products when rated makes them tradable in the capital markets there by creating new networks of project financiers.

The overall composite score of all indicators of Credit enhancement had a mean of 4.25 with a standard deviation of 0.210 and further indicated 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 Dhruva (2018); Clean Bonds Initiative (2017); IRENA (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 on influence of Credit enhancement on 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 Guidelines on the Approval and Registration of Credit Rating Agencies for the purpose of rating issuers of debt securities while NSE has developed green bond guidelines under the Green Bonds Programme. This programme is expected to improve access to a complementary source of longer-term capital alongside traditional, shorter term bank loans, while contributing to the financing of "green" investments and reinforcing Kenya's role as a regional leader in financial services as contained in Vision 2030 and Kenya's Green Economy Strategy and Implementation Plan (GESIP)."* 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 °C through the capital market."* 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 being signatories to the Principles of Responsible Investing (PRI) 16 signed in November 2019 are aligning their functions to ESG factors with a likelihood of redirecting significant funding from fossil fuel based companies to those focused on clean energy."*

Correlation Analysis

The study sought to examine the relationship between Credit enhancement and Performance of Hydroelectric Energy projects. Pearson correlation coefficient was used to test the relationship between Credit enhancement and Performance of Hydroelectric Energy projects; this was done at 95% level of confidence. 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 following 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 was identified as follows: Performance of Hydroelectric Energy projects = $f(\text{Credit enhancement})$. 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; $r=-0.339$, $P\text{-value}=0.110>0.05$) and Statement 10(Credit enhancement enables introduction of new borrowers to the market for large scale transaction; $r=-0.256$ $P\text{-value}=0.06>0.05$) were not statistically significant whereas eight statements namely: Statement 1(credit enhancement enhance credit worthiness of the project; $r=0.403$, $P\text{-value}=0.000<0.05$), statement 2(Credit enhancement enable expanded access to market borrowings; $r=0.315$, $P\text{-value}=0.003<0.05$), Statement 3(Credit enhancement attract new sources of financing; $r=0.474$, $P\text{-value}=0.000<0.05$), statement 4(Credit enhancement mitigate credit risk; $r=0.332$, $P\text{-value}=0.002<0.05$), Statement 5(Credit enhancement create more confidence among investors; $r=0.238$, $P\text{-value}=0.029<0.05$), Statement 6(Credit enhancement acts as a security instrument by cushioning of underlying loans against default; $r=0.260$, $P\text{-value}=0.017<0.05$), Statement 7(Credit enhancement provides an umbrella for political risk exposure hence eases debt covenants; $r=0.229$, $P\text{-value}=0.036<0.05$), and Statement 9(Credit enhancement enables favorable debt amortization through extended debt maturity; $r=0.358$, $P\text{-value}=0.001<0.05$) had significant correlation.

Similarly the overall correlation coefficient for Credit enhancement and Performance of Hydroelectric Energy projects was found to be $r=0.858$ with a $p\text{-value}$ of $0.000<0.05$, implying that there is a significant relationship between Credit enhancement and 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 acceptance of the alternative hypothesis, hence the research findings conclude that there is significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects. The correlation results are in tandem with the descriptive overall composite mean scores of 4.25 and standard deviation of 0.210 which indicated that the participants agreed that Credit enhancement influence Performance of Hydroelectric Energy projects. This finding is in agreement with studies done by Dhruva (2018) and Chowdhury, Chen and Tiong (2015) that there is significant relationship between Credit enhancement and Performance of Hydroelectric Energy projects. The correlations results obtained are shown in Table 2.

Table 2: Correlations of Credit Enhancement and Performance of Hydroelectric Energy Projects

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

Overall correlation for Credit enhancement	Pearson Correlation	0.858*
	Sig. (2-tailed)	0.000

(n=84; *correlation significant at 0.05 level, 2-tailed)

Regression Analysis

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.

The model summary table suggest that there is 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 Dhruva (2018) and Chowdhury, Chen and Tiong (2015) that suggest significant relationships between Credit enhancement and Performance of Hydroelectric Energy projects. The regression model summary is presented in Table 3.

Table 3: Regression Model Summary table 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 study sought to establish if the regression model is best fit for predicting Performance of Hydroelectric Energy projects after use of Credit enhancement. The ANOVA results indicated that (F-statistics (1,82)=229.629) 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. The regression ANOVA output statistics results are shown in Table 4.

Table 4: 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	0.00
	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 study sought to establish whether there was influence of Credit enhancement on Performance of Hydroelectric Energy projects. The simple linear regression coefficients results indicated that there was significant influence of Credit enhancement on 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 of studies by Atal, Shrimali, and Singh (2018) and; Giuliani and Sonerud (2017) that there is significant influence of Credit enhancement on Performance of Hydroelectric Energy projects. The regression coefficients results are in table 5.

Table 5: 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

Conclusions

The simple linear regression coefficients p-values ($0.000 < 0.05$) as well as the Pearson correlation p-values ($0.000 < 0.05$) results indicated that there was significant influence of Credit enhancement on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 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 findings of this study thus provide significant contributions to the body of knowledge as it establishes the relationship between Credit enhancement and 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. Based on the findings, the study recommends targeted policy enactment for inclusion of Credit enhancement products in hydroelectric energy projects and trading of credit enhancement products on the stock market for easy access by investors and providers. 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.

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