Alternative Risk Transfer and Performance of Power Projects in Kenya

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Abstract: **Renewable energy development has been underexploited in Kenya due to investor's negative perception of the projects' high investment risk which has depressed private capital penetration. The purpose of the study was to establish the extent to which Alternative Risk Transfer influence performance of hydroelectric energy projects in Kenya. The study adopted pragmatism paradigm, mixed method approach and descriptive survey design. Structured questionnaires and interview guide were used to collect quantitative and qualitative data from a census of 94 participants. Validity test of 0.775 and a reliability coefficient of 0.781 were obtained after pretesting of the instruments amongst 10% of the participants. Descriptive statistic and inferential statistic of Correlation and Regression was done at a significance level of 0.05 and thematic content analysis of qualitative data for triangulation. The hypothesis test results for H_0: Alternative Risk Transfer does not significantly influence performance of hydroelectric energy projects in Kenya was rejected since P=0.000<0.05.Therefore the study concluded that Alternative risk transfer significantly influence performance of hydroelectric energy projects in Kenya. It is recommended that Project management and policy makers should integrate alternative risk transfer products to improve performance of hydroelectric energy projects through targeted policies to boost investors and lenders confidence. Further research should be carried out on the determinants for adoption of Alternative risk transfer in power projects in Kenya.**

***Keywords*: Alternative Risk Transfer, Performance of projects, hydroelectric energy Projects**

I. INTRODUCTION

In spite of Kenya having an estimated hydropower potential of about 9,000MW for large and small hydros, only 848.8 MW has been exploited (Ministry of Energy, 2020) due to financial constraints. Financial markets play a role by stimulating private investments into the projects to bridge the scarcity in public resources (Rezec and Scholtens, 2017). However, the negative investor's perception of high investment risk impedes credit access (OECD, 2013). Thus, utilization of Alternative risk transfer to de-risk renewable energy projects is essential as it ensures risk securitization, risk standardization and non-indemnity trading, funding risk transfer and financial reinsurance in various forms (Cummins, 2008).

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). 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, 2004). 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). Renewable energy development thus demands attention on risk mitigation to facilitate pooling of local and international funding through capital markets to ensure improved performance of such project in terms of completion on schedule, within cost and quality. 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 was to establish how Alternative Risk Transfer influences performance of hydroelectric energy projects in Kenya. The study aimed at contributing valuable knowledge on the significance of the relationship between Alternative Risk Transfer and performance of hydroelectric energy projects thereby attracting securitized financing pools and to suggest appropriate policies for strengthening their implementation to boost investors and lenders confidence. The study also provides a reference to other researchers and policy developers on information concerning Alternative risk transfer as a form of risk securitization, risk standardization and non-indemnity trading, funding risk transfer and financial for optimal performance of hydroelectric energy projects. The study was organized into introduction, literature review, findings and discussion, and conclusion.

II. LITERATURE REVIEW

2.1 Performance of Hydro-Power Projects

Hydroelectric energy is a vital economic development tool due to its low carbon emission, low cost of production and maintenance, adjustability to meet consumer demands, stable revenue flow, and environmental safety (Luis *et. al.,* 2013). A study by Pramangioulis *et al.,* (2019) identified performance

indicators for hydroelectric plant as technical and economic performance, environmental safety, operation efficiency, and quality electricity while Waweru and Rambo (2017) revealed that effectiveness of hydroelectric power generation is defined in terms of profitability, increased power supply, customer satisfaction and increased household connectivity. However, despite the studies convergence in the measurement on performance indicators for hydro-power projects in the form of quality electricity supply, cost reduction, enhanced generation capacity, implementation within schedule, client satisfaction, environmental safety and increased profitability (Pramangioulis *et al.,* 2019; Waweru and Rambo, 2017; Luis *et. al.,* 2013), none focused on how the performance of hydro-power projects could be influenced by Alternative Risk Transfer, a gap to be filled by the current study.

2.2 Alternative Risk Transfer and Performance of Hydroelectric Energy Projects

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). 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.

A study by Bouriaux and MacMinn (2009) through a desk review assessed the growth of insurance securitization, 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).

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 methods from a sample size of 28 respondents selected through stratified sampling and judgemental sampling out of a target population of 253 short-term insurance players while analysis was done through descriptive statistics.

Wing and Jin (2015) through a desk review sought to establish risk management mechanisms in renewable energy projects. 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. The scarcity of literature linking the utilization of ART on performance of hydroelectric energy projects is a gap which the current study will bridge.

III. METHODOLOGY

The study adopted pragmatism paradigm, descriptive survey design and mixed method approach for collection of both qualitative and quantitative data for results triangulation (Wambugu, Kyalo, Mbii, and Nyonje, 2015). A census of 94 participants consisting of 84 respondents and 10 Key Informants were involved in the study while data was collected using Questionnaire and interview guide. The data collection instruments were pre-tested amongst 10% of unselected participants and a validity coefficient of 0.775 and reliability coefficient of 0.781 obtained. Descriptive statistics of mean and standard deviation and inferential statistics of correlation and regression at a significance level of 0.05 was done while thematic content analysis was used for qualitative data. A regression model to test the hypothesis: H_0: There is no significant relationship between Alternative Risk Transfer and performance of hydroelectric energy projects in Kenya, took the form:

Performance=f(Alternative risk transfer, random variable)

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

IV. FINDINGS AND DISCUSSION

The study realized a 100% questionnaire return rate. The study sought to establish the extent to which Alternative Risk Transfer influence performance of hydroelectric energy projects in Kenya. Participants gave 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 results are presented in Table 4.1

Table 4.1: 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

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 results 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 with a standard deviation of 0.445 and further revealed 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 influence of Alternative risk transfer on performance of hydroelectric energy projects. On risk management KenGen participant alluded 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."*

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."* This was consistent with findings by Chieh (2010) who observed 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"*.

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

The study sought to examine 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; this was done at 95% level of confidence. To test the extent 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 following hypothesis 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 was identified as follows: 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; Statement1 (ART1: Alternative Risk Transfer ensures risk securitization which enhances the projects credit rating; r=-0.404, P-value=0.304>0.05), Statement4 (ART4: Alternative Risk Transfer provides complementary source of lower cost of capital; r=-0.781, P-value=0.414>0.05), and Statement7 (ART7: Alternative Risk Transfer constitute different asset class which enhances returns for competitive advantage; r=-0.587, P-value=0.200<0.05) were not statistically significant whereas seven statements namely; Statement 2(ART2: Alternative Risk Transfer enables standardization of projects to determine market value of loans; r=0.775, P-value=0.000<0.05), statement3 (ART3: 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), Statement5 (ART5:Alternative Risk Transfer allows insurers to increase their capacity by opening capital markets; r=0.616, P-value=0.000<0.05), Statement6 (ART6: Alternative Risk Transfer complements traditional insurance products for enhanced liquidity ratios; r=0.483, P-value=0.000<0.05), Statement 8(ART8: Alternative Risk Transfer provides diversification over portfolio to the investors; r=0.591, P-value=0.000<0.05), Statement 9(ART9: Alternative Risk Transfer reduces over insurance through participation in an own loss development; r=0.651, P-value=0.000<0.05), Statement 10(ART10: 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 with a p-value of 0.000<0.05, implying that there is a significant relationship between Alternative Risk Transfer and 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 acceptance of the alternative hypothesis, and hence the research 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 standard deviation of 0.455 which indicated that the 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 found out that there is significant relationship between Alternative Risk Transfer and Performance of Hydroelectric Energy Projects. The correlations results obtained are shown in Table 4.2

Table 4.2: Correlations of Alternative Risk Transfer and Performance of Hydroelectric Energy Projects (n=84)

Alternative Risk Transfer Indicators		**Performance of Hydroelectric Energy Projects**
ART1	Pearson Correlation	-0.404*
	Sig. (2-tailed)	0.304
ART 2	Pearson Correlation	0.775*
	Sig. (2-tailed)	0.000
ART 3	Pearson Correlation	0.469*
	Sig. (2-tailed)	0.000
ART4	Pearson Correlation	-0.781*
	Sig. (2-tailed)	0.414
ART5	Pearson Correlation	0.616*
	Sig. (2-tailed)	0.000
ART6	Pearson Correlation	0.483*
	Sig. (2-tailed)	0.000
ART7	Pearson Correlation	-0.587*
	Sig. (2-tailed)	0.200
ART 8	Pearson Correlation	0.591*
	Sig. (2-tailed)	0.000
ART 9	Pearson Correlation	0.651*
	Sig. (2-tailed)	0.000
ART 10	Pearson Correlation	0 640*
	Sig. (2-tailed)	0.000
OVERRAL CORRELATIO N FOR ALTERNATIVE RISK TRANSFER	**Pearson Correlation**	**0.803**
	Sig. (2-tailed)	0.000

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

4.2. 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 regression model was to establish how Alternative

Risk Transfer as a predictor significantly or insignificantly predicted Performance of Hydroelectric Energy Projects.

The model summary results suggest that there is a strong 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 consistent with the findings of studies by Wing and Jin (2015); who found that there is a significant relationship between the Alternative Risk Transfer and Performance of Hydroelectric Energy Projects. The regression model summary results are presented in Table 4.3 is as shown;

Table 4.3: 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 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 ANOVA results indicated that (F-statistics (1,82)=148.520 is significant at P value =0.000<0.05 implying that the regression model results in significantly better prediction of Performance of Hydroelectric Energy Projects. The regression ANOVA output statistics results are shown in Table 4.4

Table 4.4: 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	.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 study sought to establish whether Alternative Risk Transfer influence Performance of Hydroelectric Energy Projects. The simple linear regression coefficients results indicated that there was 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 the findings by Wing and Jin (2015); Chieh (2010); Bouriaux and MacMinn (2009) and; Cummins (2008). The regression coefficients results are in Table 4.5

Table 4.5: 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						

V. CONCLUSIONS

The composite mean and composite deviation for the Alternative risk transfer results were 3.96 and 0.445 respectively; implying that participants agreed that Alternative risk transfer influence Performance of Hydroelectric Energy projects. 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 Alternative risk transfer on Performance of Hydroelectric Energy projects; leading to rejection of the null hypothesis 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 findings of this study thus provide significant contributions to the body of knowledge as it establishes the relationship between Alternative risk transfer and performance of hydroelectric energy projects in a developing economy like Kenya. Thus, ART offers risk securitization, funding risk transfer, facilitation of 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. Based on the findings, the study recommends targeted policy enactment for inclusion of Alternative Risk Transfer in hydroelectric energy projects and trading of ART products such as Catastrophic (CAT) bonds, CAT options, CAT futures, and Industry Loss Warranties (ILW) in bourses such as Nairobi Security Exchange for easier access by investors and energy developers. Further research should be done on adoption drivers for ART in Kenya for improved absorption of the ART products.

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