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Market risk factors and performance of public private partnership renewable energy projects: The case of geothermal renewable energy projects in Kenya

Kenneth Otieno Odhiambo (a), *Charles M. Rambo* (b), *Stephen O. Lucas* (c)

(a) *Phd candidate,University of Nairobi, Kenya*

(b) *Professor, University of Nairobi, Kenya*

(c) *Ph.D., University of Nairobi, Kenya Kenya*

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ABSTRACT

In spite of the rise in the global adoption of public private partnerships, developing countries have failed to attract private investments in equally measure as their developed partners. This has impacted on infrastructural financing in developing countries. The current study sought to establish how market risks influence the performance of public private partnership renewable energy projects. The study adopted a pragmatic paradigm and employed a mixed methods approach, correlational and descriptive survey design. Quantitative data was collected by use of a self-administered questionnaire and while an interview guide was used to collect qualitative data after piloting and reliability established. A sample size of 263 respondents was drawn from a target population of 769 using the Yamane formula. For descriptive statistics the study used the mean and standard deviation. For inferential statistics the study used Pearson's Product Moment Correlation (r) and Multiple Regression while the F-tests were used in hypothesis testing. The study established a significant influence of market risks on the performance of public private partnerships renewable energy projects F (1,204) =104.689, P=0.000< 0.05. H0 was consequently rejected. Based on this finding the study recommends hedging measures to promote public private partnerships.

Introduction

The Financing of renewable energy projects is not only critical but also responds to the United Nations call for universal access to energy (United Nations, 2015). Reliance on non-renewable traditional sources of energy has made the current and future energy demand (Pegels, A., 2009). This has created urgency for project financing with a focus to renewable sources. Adoption of renewable energy technologies presents a better option for sustainable development as opposed non-renewable carbon based fuels (Pegels, 2009;UN-Energy/Africa,2011).Financing development renewable energy will therefore contribute to sustainable economic development by satisfying increasing demand for access to commercial energy while also addressing the challenge of climate change (Krupa and Burch, 2011; Shen et al., 2011).

In terms of financing needs, the World Bank estimates that Africa needs an investment of USD 43 billion yearly in the power sector. African Development Bank and United Nations Environment Programme put their estimation at USD 41 billion yearly. The Africa Progress Panel recommends an additional investment of USD 55 billion will be needed yearly until 2030 so as to achieve universal access to electricity in Africa (Africa Progress Panel, 2015). With a specific focus on renewable energy , IRENA estimates that for African to fully exploit her potential, USD 32 billion will needed yearly from 2015-2030.

* *Corresponding author. ORCID ID:0000-0002-6119-6401*

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In light of the huge financing gap highlighted above, many economies are turning to off-balance balance sheet financing which brings the public and the private sector together (Alinaitwe and Ayesiga, ,2013,;Broadbent and Laughlin, 2009).This because of the reality that service provision cannot be met by the government alone given constrained budgets. The form of cooperation that brings together the public and private sectors is referred to as Public Private Partnerships (Checherita, Cristina and Gifford (2007). Many governments perceive public private partnerships as a win-win alternative for meeting their infrastructural investment needs.

In order to meet the projected electricity demand by 2035, an overall investment of USD 35 billion is required to successfully carry out the expansion plan (Ministry of Energy and Petroleum (2016). Like many other developing countries, Kenya faces significant financing gaps in infrastructure and utilities to attain country's vision 2030. Kenya like many developing countries consider public private partnership as a critical avenue for the pursuit of her development agenda. Public private partnerships not only enables the government to bridge the infrastructural budgetary deficit but also to tap on the technical know-how associated with private sector. Partnering with the private sector enables the government to reduce borrowing and associated risks, creation of sustainable long term funding.

Geothermal potential in Kenya is considered significant and reliable in mitigating the present and future power demand. It is approximated at about 10,000 MWe prospectively in the Kenya Rift region. The government consequently is right to have geothermal as the biggest contributor to the grid by year 2031. KenGen for instance has planned to produce 2500MWe by 2025 mostly from geothermal sources, this is guided buy vision 2030. Geothermal energy is considered as reliable, indigenous, clean, green, renewable and base load source of energy (Rotich, 2016).

A key challenge in financing renewable energy are the many barriers typical of developing nations which impede energy availability. These barriers include; high interest rates, high cost of capital and lack of access to capital. Of interest to this study is the risk-averse behavior of investors, due to risk investors tend to exercise increased caution when considering financing of renewable energy (Wang, and Chen, 2010; Delina, 2011). Similarly UNEP (2012) states that these risks discourage foreign investors as well as development agencies from financing renewable energy. This makes potential investors either fail to take up partnerships or the planned projects takes longer as the government seeks to convince the risk averse investors. Consequently this study sought to determine the influence of market risks on performance of public private partnership renewable energy projects. A study by Rambo (2013) concluded that Kenya had taken measures to improve her risk profile, however there were a number of issues that required further consideration to improve to attract and retain foreign investors.

The current study sought to determine the extent to which market risks influence the performance of public private partnership renewable energy projects in Kenya. Therefore the objective of the study was to assess the extent to which market risks influences performance of public private partnership renewable energy projects in Kenya.

A corresponding research hypothesis for the study was therefore stated as follows; *H0: There is no significant influence of market risks on performance of performance of Public-Private Partnership renewable energy projects in Kenya*. This was tested and discussed.

The other sections of the paper is organized as follows; the next section reviews literature related to the topic of the study. The next section discusses the methodology and data of the study. The final section, conclusions and implications of the study.

Literature Review

This study was grounded on the stakeholder theory that is linked to Freeman's (1984).The PMI (2013) describe stakeholders as groups, organization or individuals with influence on the completion or performance of a project. Stakeholders include the funders, clients, projects managers, contractors, designers, the suppliers and the community Newcombe (2003). Large complex projects like energy projects under PPP arrangement presents a very sensitive stakeholder situation. This theory describes this stakeholder scenario as an interplay of different stakeholders. It is a complex system where there is an exchange of services, various stakeholders are clustered into a central network, in this network services and information are exchanged (Freeman's (1984).The government is the principal and contracts the agent, the government then institutes measures of monitoring the behavior of the agent to ensure there is compliance with contractual terms. The exchange of information may result into information asymmetry thereby contributing to possibility of adverse selection and moral hazard. In public private partnership arrangement the agent is considered to be the expert hence more knowledgeable on the provision of the target service. This theory therefore presents a conceptual framework that public private partnership issues could examined, more so pertaining to management of interactions of parties with divergent capabilities and interests. The long term nature of public private partnerships presents challenges due to the diversity of stakeholders over the life time and different phases of the project. The project stakeholders are likely to expose different interests resulting into conflict Harris (2010). Mismanagement of these concerns may adversely impact on the performance of project. This theory acknowledges that the reliance of project performance on the stakeholders (Freeman et al 2010).

This study is consequently conceptualized on relationship between performance of public private partnership renewable energy projects and stakeholder management.

Market Risks

This is the possibility that a renewable energy public private partnership investment is going to experience losses because of the factors that affect the overall performance of the financial markets. Market risks in power sector can be contributed to by factors such as fossil fuel subsidies, price volatility, monopoly, and demand and revenue risk among other factors. Unpredictability of price levels in the power sector can reduce the incentives for investment hence discouraging the private partners (Neuhoff and de Vries, 2004).Renewable energy investors are in concurrence that besides favorable policies, market for power is a factor that drives investment in the renewable energy sector. Market risk is therefore seen as a significant barrier to ginning entry into the power market to private investors (Söderholm and Pettersson, 2007). Takizawa and Suzuki, (2004) aver that regulation of the market in favor projects that require a large initial capital outlay like renewable energy projects increases chances of investment. This is supported by Grobman and Cary, (2001) who observe that when the market is deregulated then prices go up affecting demand for energy.

One factor that contributes to poor or unreasonable pricing is government subsidies mainly enjoyed by conventional energy producers. This creates an unfair environment of competition which turns away private investors in renewable energy projects. Removal of subsidies to create fair completion which will support implementation of renewable energy projects (Sovacool, 2008). On the same note UNEP (2008) documented the effect of subsidies and noted that subsidies hindered renewable energy development. Subsidies discourage PPP performance by constraining financing. Similarly UNEP (2012) is in concurrence that transaction costs and subsidizing of fossil fuel is a major hindrance to deployment of renewable energy. They acknowledge major drivers of renewable energy deployment as profit and fair competition and that when electricity tariff scheme that is highly subsidized puts off private investment.

Market monopoly limits financial sustainability of a project hence obstructing renewable energy investments by the private sector (Pegels, 2009). Monopoly also discourages competition even among the dominant players in the market hence resulting to laxity or complacency in investments, for example Eskom, a dominant player in power investments in south Africa recorded a loss of SAR 9.7 billion despite incentives by the government. Poor performance is attributed to lack of competition on in the energy sector (Pegels, 2009). It is reiterated that poor performance among is as result of monopolies as one of main reasons why privatization is factored in economic reforms (Rambo, 2013). Monopolies results to price instability, this where the prices seldom reflects the cost of production or the dynamics in the market which is detrimental to revenue streams hence discouraging private investment (Pegels, 2009;Environics, 2010; Government of Mali, 2012).

A study on the impact of monopoly in the electricity sector on investment Ogira, (2014).The study followed a qualitative and quantitative method using interviews and questionnaires. The actual numbers of people interviewed were 931 with 510 from Kakamega and 421 from Bungoma. He established that by eliminating power monopoly from the power sector can accelerate industrialization. This study did not however draw correlation between monopoly and how it hinders financing of electricity initiatives. The current study used Pearson Correlation Coefficient to establish the influence of monopoly risks and financing of renewable energy projects.

A study by (Hammani et al., 2006) concluded that Public private partnerships tend to be more prevalent in countries where the aggregate demand for energy is sizeable since this would allow for cost recovery. A study on the determinants of PPPs indicate that market conditions is one of the most important determinant of PPPs. This particularly is related to the demand risk which is perceived as the most important risk associated with public private partnerships. Their evidence suggested that the size of the market and purchasing power are very important determinants of performance of public private partnerships

Revenue risk is a serious challenge that often drives private investors out of power market. Every investor is wary as to whether the generated revenue will cover the costs of operation and give an acceptable return on investment (Regional Economic Outlook, 2008). Another factor that contributes to low revenue risk especially in developing countries is low income, majority of whom can barely afford to pay for the power services rendered. Consumers with low income backgrounds present a very elastic demand for services hence creating a revenue risk. For example in Malawi when the prices of electricity by 25%, the government established that the use of charcoal went record high in as much as production of charcoal had been illegalized (Bayliss, McKinley, 2007). Low income also creates other problems to investors like illegal power connections, for instance the Regional Economic Outlook, (2008) established that losses recorded by power producers, 52% is attributed to collection losses. This serves as discouraging factor to private investors who constitute the any Public Private Partnership arrangement.

Generally, availability of market is crucial for the performance of Public Private Partnership renewable energy projects. Public Private Partnership model is supported by partial or non- recourse basis of financing. The security of the project loan comes from the project cash flow hence requiring little or no upfront collateral to guarantee the safety of loans. Market failures are likely to drive away investors consequently impacting on the performance of Public Private Partnership. Market risks can also exacerbate the cost of financing a renewable energy project because lenders will factor this risk before lending money to a prospective investor.

This study was guided by the following conceptual framework.

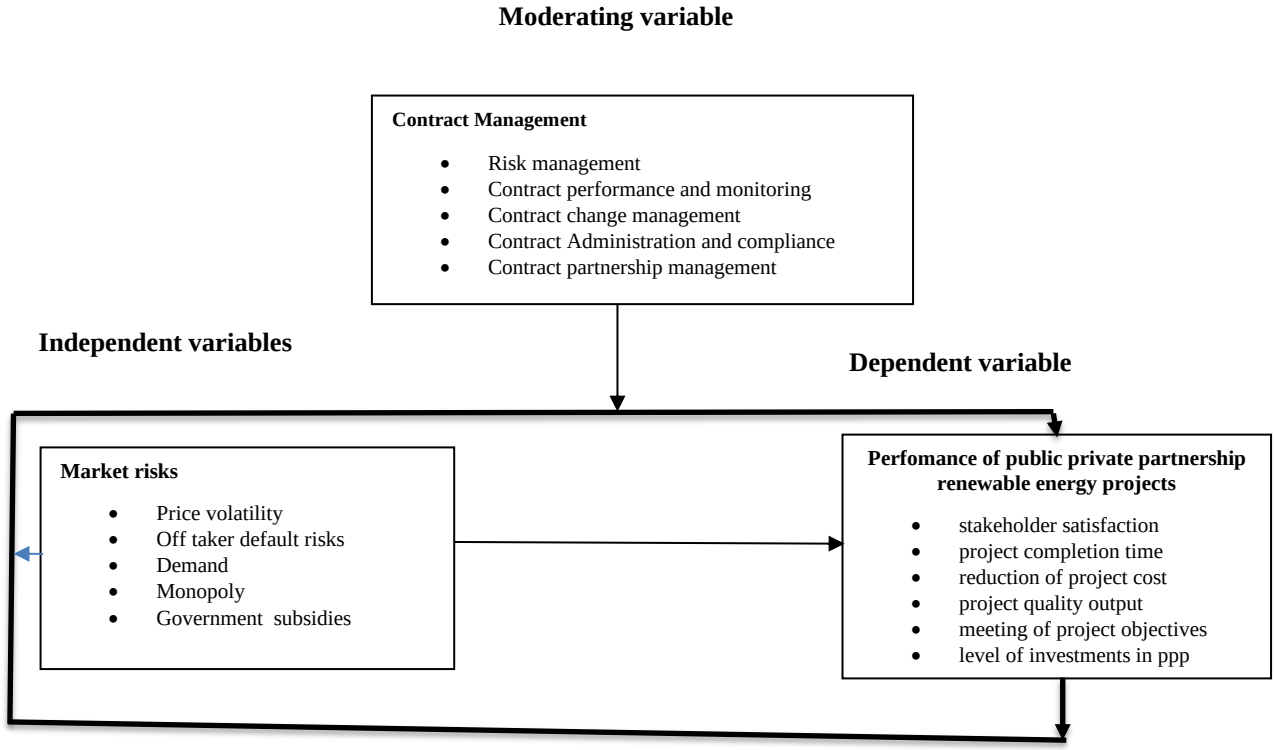

Figure 1: Conceptual Frame work for market risk factors, contract management and performance public private partnership renewable energy project

Research and Methodology

The study employed pragmatism research paradigm which informed the use of descriptive survey research design and correlational research design. Both quantitative and qualitative data was collected by use of a self-administered questionnaire and an interview guide after piloting and reliability established. The study employed descriptive survey and correlational research design which enabled testing of the hypothesis. The target population was derived from employees of KenGen which has a population of 2407. The study nevertheless focused on project employees under business development and geothermal development, the target population was therefore considered under this category who were 769 employees. The sample size was eventually drawn from the 769 employees under business development and geothermal which was relevant to the study. The target population, the company is having 98 senior managers, 259 middle level managers and 412 lower level manager under the Business Development and Geothermal Development. They entailed the target population from which the sampling was done. A sample size of 263 respondents was drawn from a target population of 769 using the (Yamane, T. 1967), formula. The instruments were piloted at the Kenya Electricity Generating Company Limited (KENGEN), Western hydro. The study found KENGEN western hydro appropriate because it presents similar characteristic to the main area of study. Just like KENGEN Olkaria, it has incorporated Public Private Partnership as an approach of financing its hydro-power development projects. Therefore, a random sampling of 27 employees of KENGEN; Western Hydro were selected and used for the pilot study. The Cronbach Alpha Reliability Coefficient for all the ten items used to measure of market risks was 0.811.This reliability coefficient was an indicator that there was internal consistency with the items that were used. A tool is considered reliable when r is equal or greater than 0.7 the researcher was therefore convinced the instrument was ready to solicit the required data.

Stratified Sampling Procedure was applied since the population comprised senior managers, middle level managers and lower level managers. The distribution of sample size is described in table 1

Table 1: Distribution of the sample size

Population	**Number of employees in strata**	**Number of people in a sample**	**Sample size**	**Proportion**
Senior management	98	98*263/769	33	13.4
Middle level management	259	259*263/769	88	33
Lower level management	412	412*263/769	141	53.6
Total	**769**		**263**	**100%**

Quantitative and qualitative data was collected using questionnaire and an interview schedule, which were structured as per the study objective. To analyze the Data descriptive statistics was used to summarize the distribution of scores, variability, relationship and association in frequencies. Both linear and multiple regressions were used to establish the relationship between variables.

For multiple regression the equation; $y=\beta 0+ \beta X_1+\beta X_2+\beta X_3+ \beta X_4+ \beta X_5+ \varepsilon i$,Y=Performance of PPP renewable energy projects ,β_0= constant,β=Beta coefficients, $X_{1...X5}$= Price volatility, Off taker default risks, Demand ,Monopoly Government subsidies and εi = error term.

For linear regression the equation; $y=\beta_0+\beta_1 X_1+ \varepsilon i$, where Y=Performance of PPP renewable energy projects, β_0= constant,1=Beta coefficient,X_1=Market risks and εi = error term.

The hypothesis was tested at 95% level of significance to ascertain the relationship between market risks and performance of public private partnership renewable energy projects in Kenya. Regression was conducted to establish the influence of market risks on performance of PPP renewable energy projects. The test was based on the following linear regression model; the following linear regression model was used;

Performance of Public Private Partnerships =$\beta 0+\beta X + \varepsilon i$

$y=\beta_0+\beta_5 X_5$, y = Performance of Public Private Partnership Projects, 0= Constant Term ,5 = Beta Coefficients ,X_5=Market risks and ε = Error Term

Results and discussion

Of the 263 questionnaires that were distributed to the respondents, 207 were collected and analyzed. This resulted to a return rate of 78.7% which is considered acceptable for social sciences (Saunders, 2003).Of the 207, 21 (10.1%) were senior managers. 76(36.7%) were middle level managers while 110(53.1%) were lower level managers. The study consequently concluded the respondents were well equipped to respond to research questions. This is presented in table 2.

Table 2: Questionnaires Return Rate

Category	Targeted Respondents(N)	Responsive Respondents(n)	Response Percentage
Senior management	33	21	10.1
Middle level management	88	76	36.7
Lower level management	141	110	53.1
Total	**263**	**207**	**100.0**

The table shows that the study targeted 263 participants from the Kenya National Generating Company Limited. The second column shows the number of participants that completed and successfully completed and returned questionnaires. The third column shows response rate percentage for each stratum.

Questionnaires were delivered and collected after a duration of four days. Out of the 263 targeted participants, 207 (78.7%) successfully completed and returned the questionnaires. This was very adequate considering Mugenda, & Mugenda, (2003) assertion that a response rate of 50% is adequate to conduct analysis and report in research. Table 1 shows the questionnaire return rates for each category of participants.

Market risks and performance of public private partnerships renewable energy projects

The objective of the study sought to assess the extent to which market risks influences performance of public private partnership renewable energy projects in Kenya. The market risk factors considered were price volatility, off taker risks, demand, monopoly and government subsidies.

These factors were developed into a ten item self-administered questionnaire. These were measured on likert scale of 1-5 where: 1= Not at all, 2= Agreed to a small extent, 3= Agreed to a moderate extent, 4= Agreed to a large extent and 5=Agreed to a very large extent. These items sought to determine the extent to which market risks influence the performance of public private partnership renewable energy projects.

The respondents therefore were requested to state the extent to which they agreed or disagreed with the statements in a likert scale of 1-5. The assumption of equidistance was fulfilled by adopting a decision rule such that Not at all 1.0 <NA<1.8; to a small extent 1.8<S<2.6; moderate extent 2.6<M<3.4; to a large extent 3.4<L<4.2; and to a very large extent 4.2<VLE<5.0, this gave an equidistance of 0.8. Market risks were measured by five indicators; price volatility, off taker default risks, demand, monopoly and government subsidies that were evaluated in the ten item questionnaire.

Table 3: Market risks and performance of public private partnerships renewable energy projects

Statements	n	1	2	3	4	5	Mean	Std. Dev
1.Price volatility has influenced the performance of public private partnerships	207	6 (2.9%)	120 (57.9%)	18 (8.7%)	61 (29.5%)	2 (1.0%)	2.6763	0.9637
2.Cost performance of PPP projects is impacted by price changes	207	2 (1.0%)	108 (52.2%)	41 (19.8%)	35 (16.9%)	21 (10.1%)	2.8309	1.0545
3. The possibility of power off-taker default has influenced the cost performance of public private projects.	207	4 (1.9%)	116 (56.1%)	27 (13.0%)	58 (28.0%)	2 (1.0%)	2.7005	0.9333
4. Power off take agreements has improved financing of PPP projects.	207	6 (2.9%)	88 (42.5%)	37 (17.9%)	65 (31.4%)	11 (5.3%)	2.9372	1.0339
5.Demand influence the performance of PPPs.	207	7 (3.4%)	103 (49.8%)	38 (18.3%)	54 (26.1%)	5 (2.4%)	2.7440	0.9634
6. Demand risk has influenced financing of public private partnership projects.	207	11 (5.3%)	112 (54.1%)	18 (8.7%)	64 (30.9%)	2 (1.0%)	2.6812	1.0023
7.Monopoly has complicated initiation of public private partnerships	207	6 (2.9%)	93 (44.9%)	46 (22.2%)	41 (19.9%)	21 (10.1%)	2.8937	1.0786
8.Monopoly has influence on financing of public private partnerships	207	0 (0.0%)	0 (0.0%)	0 (0.0%)	133 (64.3%)	74 (35.7%)	4.3575	0.4804
9.Government subsidies influence investment decisions in public private partnerships	207	0 (0.0%)	13 (6.3%)	0 (0.0%)	159 (76.8%)	35 (16.9%)	4.0435	0.6484
10.Subsidies are attractive to private investors	207	0 (0.0%)	54 (26.1%)	50 (24.2%)	31 (15.1%)	72 (34.8%)	3.5845	1.2113
The composite mean score composite standard deviation of							3.1449	0.5615

The first item sought to determine if price volatility had influence on public private partnership performance. Participants in this study were 207 of which 6(2.9%) indicated not at all, 120 respondents ,about (57.9%) were in agreement to a small extent with the statement, another 18 or (8.7%) were moderately in agreement , 61 participants or (29.5%) indicated they were largely in agreement while 2(1.0%) were in agreement to a very large extent. This item mean obtained was 2.6763 and 0.9664 was obtained as the standard deviation, this means that the respondents agreed to a moderate extent. This mean was lower than 3.1449 which was obtained as the composite mean the standard deviation was 0.5615, implying price volatility had inversely influenced PPP performance in the renewable energy sector.

As to whether the cost performance of PPP renewable energy was impacted on by price changes. From the responses, 2 respondents or (1.0%) indicated not at all, 108 respondents (52.2%) indicated they were to a small extent were in agreement, 41respondents,(19.8%) were moderately n agreement, 35 respondents (16.9%) responded that they were in agreement to a large extent while 21 respondents (10.1%) indicates they were to a very large extent in agreement .The mean obtained was 2.8309 and a standard deviation of 1.0545 was obtained , this was inferred that most interviewees were of the opinion that price changes impacted on the cost performance of PPPs. This item mean was below the composite mean score of 3.1449 with standard deviation of 0.5615.This indicated that price changes negatively influenced performance of public private partnership renewable energy. Price stability is therefore an important factor that should be taken into account as to improve PPP performance.

This statement sought to establish if the possibility of power off taker default had influenced the cost performance of the public private partnership renewable energy projects. Out of the 207 responses, 4(1.9%) indicated not at all, 116(56.1%) indicated to a small extent, 27(13.0%) agreed to a moderate extent, 58(28.0%) while 2(1.0%) were to a very large extent in agreement .The item mean score was 2.7005 this had 0.9333 as the standard deviation, implying majority of the interviewees were in moderate agreement. Possibility of power off taker default was construed to influence the cost performance of PPPs renewable energy projects. This mean was below the mean for all items which was 3.1449 with 0.5615 as the corresponding standard deviation. This indicated that off taker default risk has a negatively influenced PPP performance in the renewable energy project.

The fourth item sought to assess if power off take agreements had improved performance of public private partnership projects under renewable energy. Out of the participants 6(2.9%) indicated not at all, 88(42.5%) agreed to a small extent, 37 respondents, (17.9%) were moderately in agreement, 65(31.4%) agreed to a large extent while 11 respondents (5.3%) were to a very large extent in agreement. This item mean was 2.6812 with a corresponding standard deviation of 1.0023. This mean score was lower than the composite mean score of 3.1449 with standard deviation of 0.5615 implying power off take agreement had influenced the performance of public private partnership renewable energy projects. This is an aspect that the government consider to improve the performance of PPP renewable energy projects.

This question sought to inquire if power demand influenced public private partnership performance with regard to renewable energy projects. From the responses 7(3.4%) indicated not at all, 103 respondents (49.8%) indicated they were in agreement to a small extent ,38 interviewees (18.3%) moderately agreed, 54 respondents (26.1%) largely agreed 5 respondents (2.4%) were in agreement to a large extent with the statement. A mean score of 2.744 with 0.9640 as the corresponding standard deviation was obtained. Compared

the mean of means which was 3.1449 with a corresponding standard deviation of 0.5615 shows that the item mean was below. This shows that demand had a negative contribution to the performance of PPP. Demand for power is therefore an important aspect that should be addressed to enhance public private partnership.

As to whether demand risk had influenced the financing of public private partnership renewable energy projects. Of the respondents 11(5.3%) indicated not at all while 112 respondents (54.1%) indicated that they were to small extent in agreement, 18 respondents(8.7%) moderately agreed, 64 respondents (30.9%) were in agreement to a large extent 2(1.0%). This item mean was 2.6812 the corresponding standard deviation was 1.0023.Compared with the composite mean score of 3.1449 with 0.5615 as the corresponding standard deviation, the item mean was below. This indicates demand risk negatively influenced PPP performance considering the renewable energy projects

As to whether monopoly had complicated initiation of public private partnerships. Of the respondents 6(2.9%) indicated not at all, 93 respondents (44.9%) were bin agreement to a small extent, 46 respondents (22.2%) moderately agreed, 41respondets (19.8%) largely agreed with the statement while 21 respondents (10.1%) were to a very large extent in agreement. A mean score of 2.8937 with a standard deviation of 1.0786, this was below the composite mean score of 3.1449 with standard deviation of 0.5615. This show that monopoly has an influence on the performance of public private partnership renewable energy projects. It implies that monopoly is an important aspect that should be addressed so as to improve of public private partnership performance.

Whether monopoly had influenced financing of public private partnerships renewable energy projects. None of the respondents indicated not at all, 0(0.0%), similarly there was no response for the options of to a small extent and to a moderate extent, their score was there at 0(0.0%). Never the less, 133 respondents (64.3%) indicated they were in agreement to a large extent a large extent while 74 respondents (35.7%) indicated they were in agreement to a very large extent. This item mean was 4.3575 with 0.4804 as the corresponding standard deviation. Since this mean was above the mean of means which was 3.1449 with a corresponding standard deviation of 0.5615, there was an implication that monopoly influenced the performance of public private partnership renewable energy projects.

This item sought to establish if Government subsidies had influence investment decisions of public private partnerships renewable energy projects. From the results none of the respondents indicated not at all, 0(0.0%), 13(6.3%) agreed to a small extent, 0(0.0%) indicated to a moderate extent, 159(76.8%) of the respondents agreed to a large extent while 35 respondents (16.9%) were in agreement to a very large extent. This item mean was 4.0435 with 0.64841 as the corresponding standard deviation of, this was above the composite mean score of 3.1449 with standard deviation of 0.5615, it was therefore deduced that government subsidies influenced the performance of PPP renewable energy projects.

Finally to determine if subsidies attracted investors into public private partnership renewable energy projects. Out of the participants, 0(0.0%) indicated not at all, 54(26.1%) agreed to a small extent, 50 respondents (24.2%) responded they were in agreement to a moderate extent, 31 respondents (15.0%) were largely in agreement while 72 respondents (34.8%) to a very large extent were in agreement. This item was 3.5845 with 1.2113 as the corresponding standard deviation. This item mean was higher than the mean of means which was 3.1449 with 0.5615 as the corresponding standard deviation, subsidies positively influenced PPP performance in renewable energy projects.

Market risk factors on performance of public private partnerships renewable energy projects

To establish the influence of market risk factors on the performance of renewable energy projects, multiple regression was performed. Indicators of market risks were used as the predictors. The results were presented in table 4

$Y=\beta_0+\beta_5X_51……..+ \beta_5X_55+\varepsilon$ for multiple regressions

Where Y= Performance of public private partnership renewable energy projects

β_0=Constant,X_1= Price volatility,X_2= off taker default risks,X_3= Demand,X_5= Monopoly,X_5= Government subsidies and ε = Error term

Market risk factors that were studied explain a variation of 65.3% of the performance of public private partnership renewable energy projects as represented by R_2=0.653. This implies that 34.7% of the performance of public private partnership renewable energy projects were explained by other factors outside the current scope of study. It reveals that there are other factors that influence performance of public private partnership renewable energy projects in Kenya.

Table 4: Model Summary

Model	R	R square	Adjusted R square	Std.Error of the Estimate
1	0.808[a]	0.653	0.645	0.16788

a. Predictors: (Constant), Government subsidies, Monopoly, Demand, Price volatility, Off taker default risks

F (5,201) = 75.749, P<0.05

The overall model statistic F (5,201) = 75.749, P<0.05 showed there is a significant influence of market risk factors on the performance of public private partnerships renewable energy projects. The study therefore concluded that market risks to a large extent influenced the performance of public private partnerships.

Table 5: Analysis of variance

model		**Sum of Squares**	**df**	**Mean square**	**F**	**Sig**
1	Regression	10.675	5	2.135	75.749	0.000b
	Residual	5.665	201	0.028		
	Total	16.340	206			

a. Dependent Variable: Performance

b. Predictors: (Constant), Government subsidies, Monopoly, Demand, Price volatility, Off taker default risks

Table 5 show analysis of variance. The tabled results show that the model was statistically significant, the p-value is 0.00, and this is less than 0.05 level of significance. This further prove that the market risk factors, Government subsidies, Monopoly, Demand, Price volatility, and Off taker default risks influence the performance of public private partnership renewable energy projects.

Table 6: Regression coefficients

Coefficients								
Model		Unstandardized coefficients		standardized coefficients	t	Sig	Collinearity Statistics	
		B	Std.Error	Beta			Tolerance	VIF
1	(Constant)	0.835	0.102		8.174	0.000		
	Price volatility	-0.011	0.024	-0.033	-0.440	0.660	0.299	3.340
	Off taker default risks	-0.095	0.025	-0.300	-3.737	0.000	0.267	3.747
	Demand	-0.160	0.024	-0.476	-6.658	0.000	0.337	2.966
	Monopoly	0.025	0.030	0.056	0.834	0.405	0.388	2.575
	Government subsidies	0.081	0.017	0.211	4.867	0.000	0.915	1.093

a. Dependent Variable: Performance

The regression equation was;

Y = 0.835-0.011-0.095- 0.160+ 0.025+0.081+ ε

This regression equation reveals that by taking all the market risk factors into account constant, the performance of public private partnership renewable energy projects will be 0.835 units. These findings further reveal that there is an insignificant inverse relationship between price volatility and performance of public private partnership renewable energy projects. This is shown by a coefficient of -0.011(p-value= 0.660).On the other hand there was a significant inverse significant relationship between off taker risks and performance of public private partnership renewable energy projects, -0.095(p-value=0.00).On the same note, the study established a significant inverse relationship between demand and performance of public private partnership renewable energy projects,-0.160 (p-value=0.00).There was an insignificant relationship between monopoly and performance of public private partnership renewable energy projects, 0.025(p-value=0.405). Finally the study established a significant positive relationship between government subsidies and performance of public private partnership renewable energy projects, 0.081(p-value=0.000).

From these findings we can deduce that off taker risks and demand influence the performance of public private partnership renewable energy projects negatively. There was no statistically significant relationship between price volatility, monopoly and performance public private partnership renewable energy projects. Government subsidies contributed to a positive performance public private partnership renewable energy projects.

Hypothesis Testing

The hypothesis tested the relationship between market risks and performance of public private partnership renewable energy projects in Kenya. Consequently regression was conducted to assess the influence of market risks on performance of PPP renewable energy projects. A composite mean for the indicators of market risks was used as the independent variable. The test was based on the following linear regression model; the following linear regression model was used;

Performance of Public Private Partnerships =β0+βX + εi

$y=\beta_0+\beta_5 X_5$, y = Performance of Public Private Partnership Projects, 0= Constant Term ,5 = Beta Coefficients ,X_5=Market risks and ε = Error Term

The results for the regression analysis was presented in table 7

Table 7: Market risks and performance of public private partnerships renewable energy projects

Model summary						
Model	R	R square	Adjusted R square	Std.Error of the Estimate		
1	0.582a	0.339	0.336	0.22992		
a. Predictors: (Constant), Market risks						
b. Dependent Variable: Performance of public private partnerships						
ANOVA						
model		Sum of Squares	df	Mean square	F	Sig
1	Regression	5.534	1	5.534	104.689	0.000b
	Residual	10.784	204	0.053		
	Total	16.318	205			
a. Dependent Variable: Performance of public private partnerships						
b. Predictors: (Constant), Market risks						
Coefficients						
Model	Unstandardized coefficients		standardized coefficients	t	Sig	Collinearity Statistics
	B	Std.Error	Beta			Tolerance VIF
1 (Constant)	0.802	0.033		24.226	0.000	
Market Risks	-0.589	0.058	-0.582	-10.232	0.000	1.000 1.000
a. Dependent Variable: Performance						

Regression result presented in table 4.34 show that the correlation r=0.582, this indicate a relatively strong influence of market risks on the Performance of PPP. The R-square value of 0.339 suggests that market risk explain 33.9% of the variation in the Performance of PPP. This implies that 66.1% of performance of PPP renewable energy projects is explained by other factors.

The F ratio was significant as F (1,204) =104.689, P=0.000< 0.05. This show that market risk had significant influence on the performance of PPP renewable energy projects. The result of the test provides adequate ground for the rejection of the null hypothesis. The alternate hypothesis was therefore adopted by the study. There is therefore a significant influence of market risks on the performance of PPP renewable energy projects at 95% level of significance.

The study hypothesis sought the level of significance market risks had on the performance of public private partnership renewable energy projects. From the regression analysis it was conclusive that market risks had significant influence on the performance of public private partnership renewable energy projects. With F (5,201) = 75.749, P<0.05, it is clear there is a significant influence of market risks on the performance of public private partnership renewable energy projects. The analysis also yielded a correlation of R=0.808, this indicates a strong relationship between the study variables, market risks and performance of public private partnership renewable energy projects. The regression model further revealed that market risks factors explained 65.3% of the performance of public private partnership renewable energy projects in Kenya. 34.7% may be explained by other factors not included in the model.

This regression equation reveals that by taking all the market risk factors into account constant, the performance of public private partnership renewable energy projects will be 0.835 units. These findings further reveal that there is an insignificant inverse relationship between price volatility and performance of public private partnership renewable energy projects. This is shown by a coefficient of -0.011(p-value= 0.660).On the other hand there was a significant inverse significant relationship between off taker risks and performance of public private partnership renewable energy projects, -0.095(p-value=0.00).On the same note, the study established a significant inverse relationship between demand and performance of public private partnership renewable energy projects,-0.160 (p-value=0.00).There was an insignificant relationship between monopoly and performance of public private partnership renewable energy projects, 0.025(p-value=0.405). Finally the study established a significant positive relationship between government subsidies and performance of public private partnership renewable energy projects, 0.081(p-value=0.000).

From these findings we can deduce that off taker risks and demand influence the performance of public private partnership renewable energy projects negatively.

Discussion

The findings of this study is discussed based on the objective of the study. This study reveal that market risks significantly influence the performance of PPP renew able energy projects. The insignificant inverse relationship between price volatility and performance could be explained in line by a participant who opined that PPP are guaranteed against price fluctuation. Influence of off-taker risk was corroborated by the significant inverse relationship with performance of PPP renewable energy projects. That demand had a significant inverse relationship with the performance again this echoed a participant who stated that PPPs tend to perform better when the intended services are in demand. The study also established that monopoly did not have a significant influence of performance,

this was justified by a participant who elaborated that PPPs are based on government guarantees hence market was not an issue. The study determined that government subsidies influenced the performance of PPP renewable energy projects.

Conclusions

The purpose of this study was to determine how market factors influence performance of public private partnership renewable energy projects. The findings reveal that there is statistically significant influence of market risks on the performance of public private partnership renewable energy projects. Off taker risks and demand risks had an inverse relationship with the performance of public private partnerships renewable energy projects. The study concluded that price volatility and monopoly had no statistically significant relationship with the performance of public private partnerships renewable energy projects. Government subsidies had a statistically positive relationship with the performance of public private partnerships renewable energy projects. The study consequently recommended that there should be effective management of market risks. Also adequate awareness of both the public and private partners on the inherent market risks in PPPs. This can be done by the PPP unit through workshops, seminars and conferences. Further, given that this study was conducted in a power generation company, the study therefore recommends replication of the study in other sectors of the economy to enable generalization of the findings.

References

Africa Progress Panel (2015). People, Power, Planet: Seizing Africa's Energy and Climate Opportunities.

Africa Progress Report (2015). Geneva, Switzerland.http://www.africaprogresspanel.org/publications/policy-papers/2015-Africa-progress-report

Alinaitwe, H., Ayesiga, R. (2013), Success Factors for the Implementation of Public– Private Partnerships in the Construction Industry in Uganda. *Journal of Construction in Developing Countries*, 18(2), 1–14.

Bayliss, McKinley, (2007). Privatizing Basic Utilities in Sub-Saharan Africa: The MDG impact. Policy research Brief, 3, International poverty center: UNDP.

Broadbent, J., Laughlin, R., (2009). The PFI: Clarification for a future research agenda", Financial Accountability & Management, 15(2), 95-114.

Checherita Cristina and Jonathan Gifford, (2007). Risk Sharing in Public-Private Partnerships:General Considerations and an Evaluation of the U.S. Practice in Road Transportation No 207820, 48th Annual Transportation Research Forum, Boston, Massachusetts, March 15-17, 2007.

Delina, L.L, (2011). Clean energy financing at Asian Development Bank, *Energy for Sustainable Development*, 15, pp. 195–199

Environics, (2010). Prospects of the renewable energy sector in Egypt focus on photovoltaic and wind energy, Cairo: Egyptian-German Private Sector Development Programme.

Freeman, R. E. (1984). Strategic management: a strategic stakeholders' management, Boston: Pitman.

Freeman, R. E., Harrison, J. S., Wicks, A. C., Parmar, B. L. & De Colle, S. (2010). *Stakeholder theory. The state of the art*. Cambridge: Cambridge University

Government of Mali (2012), Renewable energy in Mali: Achievements, challenges and opportunities, Bamako.

Grobman, J.H and J.M. Cary, (2001). Price Caps and Investment: Long-Run Effects in the Electric Generation Industry. *Energy Policy*, 29(7):542-552.

Hammami, Mona, Ruhashyankiko, Jean-Francois, and Yehoue, Etienne B., (2006). Determinants of Public-Private Partnerships in Infrastructure. *IMF Working Paper*, WP/06/99.

Harris, F. (2010). A Historical Overview of Stakeholder Management, In: Chinyio, E. A. O., P. ed/eds. *Construction Stakeholder Management*. Chichester: Backwell Publishing Ltd. pp. 41-55

Krupa, J. & Burch, S. (2011). A new energy future for South Africa: The political ecology of South African renewable energy. *Energy Policy*, 39, 6254-6261.

Ministry of Energy and Petroleum (2016). Power Generation and Transmission Master Plan for the years 2015-2035(May, 2016).

Mugenda and Mugenda (1999). Research Methods: Quantitative and Qualitative approaches. Nairobi. Act Press

Mugenda, M. O & Mugenda, G.A., (2003). Research methods: Quantitative and Qualitative approaches. Nairobi: ACTS press.

Neuhoff, K. and L. De Vries. (2004). Insufficient Incentives for Investments in Electricity Generation. *CMI Working Paper*. 42, Cambridge

Newcombe, R. (2003). From client to project stakeholders: a stakeholder mapping approach. *Construction Management and Economics*, 21: 841-848.

Ogira, P.G. (2014). Monopoly in Electricity Generation and Electricity Supply is a threat to Investment Expansions in Kenya International *Journal of Science and Research*, 3(9), 2014

Pegels, A. (2009). Prospects for renewable energy in South Africa: mobilizing the private sector (No. 23/2009). Discussion Paper.

PMI. (2013). A Guide to the Project Management Body of Knowledge: PMBOK Guide (5th ed.). Newtown Square, PA: Project Management Institute, Inc.

Rambo, CM, (2013). Renewable energy project financing risks in developing countries: Options for Kenya towards the realization of vision 2030. *International Journal of Business and Finance Management Research*, 1,1-10.

Regional Economic Outlook, Sub- Saharan Africa (2008), IMF World Economic and Financial Surveys; October 2008http://www.imf.org/external/pubs/ft/reo/2008/AFR/eng/sreo1008.pdf

Rotich Abel K. (2016). Kengen Geothermal Development Status and Future Expansion plans, Proceedings, *6th African Rift Geothermal Conference Addis Ababa*, Ethiopia, 2nd – 4th November 2016

Shen, Y., Chou, C.J., Lin, G (2011) The portfolio for renewable energy sources for achieving the three E policy goals, *Energy* 36, pp. 2589–2598

Söderholm, P., K. Ek, and Pettersson. M. (2007). Wind power development in Sweden: Global policies and local obstacles. *Renewable and Sustainable Energy Reviews*, 11:365-400.

Sovacool, B. K. (2008). The importance of comprehensiveness in renewable electricity and energy-efficiency policy. *Energy Policy*, 37 (2009), 1529-1541.

UN-Energy/Africa, (2011). Energy for Sustainable Development: Policy Options for Africa. Publication to CSD15, UN-Energy/Africa

UNEP (United Nations Environment Programme), (2008), Global Trends in Sustainable Energy Investment Report 2008: Analysis of

UNEP, (2012). Global Trends in Sustainable Energy Investment 2012. Frankfurt School UNEP Collaborating Centre for Climate & Sustainable Energy Finance, http://fs-unep-centre.org

Wang, Q., and Chen, Y (2010). Barriers and opportunities of using the clean development mechanism to advance renewable energy development in China, *Renewable and Sustainable Energy Reviews*, 14, pp. 1989–1998

Yamane, T. (1967). Statistics. An Introducing Analysis. 2nd Ed, Harper & Row Ltd. New York, USA.