

Risks with Cost Overruns and Project Completion in Public-Private Partnerships: An Examination of the Sondu-Miriu Hydropower Project

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Abstract: *The onset of PPP as a strategy in the management of public service and projects was concisely presented in 1990s as the cornerstone for promoting sustainable development for low income countries (World Bank Report, 1993). This combination is expected to enhance time, quality and cost efficiency of resultant projects (Savas, 2000). The study was anchored on the principal agent theory while adopting pragmatic paradigm to determine the extent to which construction cost overrun related risks influence completion of Public Private Partnership Project in Kenya. The study tested the null hypothesis that: Construction cost overrun related risks do not significantly influence completion of Public Private Partnership Project in Kenya. The study targeted the entire management of Sondu-Miriu Power project totaling 85 obtained from the contracting parties where a sample of 71 was selected through proportionate sampling. Questionnaires and interview schedules were used for data collection while Cronbach Alpha was used as a measure of reliability and established that the overall questionnaire reliability was $\alpha = 0.730$. Quantitative and qualitative techniques were used in analysis where regression analysis was used to establish the relationship between the variables. The null hypothesis was tested at 95% confidence level and found that there was a strong negative correlation between the variables, $r(38) = -0.682$ ($p < .05$) with regression showing that construction cost overrun related risks explained up to 46.5% [$R^2 = .465$, $F(1, 37) = 32.153$; $p < .05$]. This implies that construction cost overrun significantly influences completion of construction projects through PPPs. Thus, the null hypothesis was rejected. The study recommends that the project stakeholders should minimize the number of contractors by vetting and prequalifying contractors with capability to deliver the services. This will prevent outsourcing and minimize cost overrun.*

Keywords: Construction cost overrun related risks, completion of construction projects, public private partnerships

1. Introduction

The onset of PPP as a strategy in the management of public service and projects was concisely presented in 1990s as the cornerstone for promoting sustainable development for low income countries (World Bank Report, 1993). Due to its perceived success, PPP is accepted and recommended worldwide as a tool for efficient, transparent and effective strategy which guaranteed value for money for public sector projects which had previously known persistent and consistent failure leading to disappointments. This was so much so because the failure in the projects was attributed to wrong or poor choices of policies as well as bureaucracy (Alexanderson and Hulten, 2008). The expansion of the public sector consequently ceased to be the automatic policy preference in most developing countries (World Bank Report, 1993).

A well thought out and adequately structured, Public-Private-Partnership arrangement should efficiently and effectively achieve superior results than the traditional public sector infrastructure financing approaches. This is because the Public-Private-Partnership approach strives to harness a wide range of managerial, commercial and technical skills of the private sector while benefiting from the low risk, socio-political goodwill and the lower cost of capital of the public sector. This combination is expected to enhance time, quality and cost efficiency of resultant projects (Savas, 2000). According to Farlam (2005) the

private provision of public infrastructure and services has the potential to offer enhanced value for money and enable the government to use the private sector's delivery and project collection expertise and capabilities for the benefit of the people and the wellbeing of the country at large. Additionally it also helps the government to better understand the whole of life cycle cost of investment and enable more rigorous project assessment and sharing of risk with the private sector (Lucey, 1997).

Cost overrun is the excess of actual cost over budget. Cost overrun is also sometimes called "cost escalation," "cost increase," or "budget overrun" (Zhu and Lin, 2004). The degree of cost overruns can be compared by measuring the change in contract amount divided by the original contract award amount. This calculation can be converted to a percentage for ease of comparison (Jackson, 1999). Koushki, AL-Rashid and Kartam (2005) examined delays and cost increments in the developments of private residential venture in Kuwait. The amount of time-delays and cost-increases was greater when the total cost of a residential project was higher. A major factor contributing to the time-delay and cost-increase was the inadequacy of money and time allocated to the design phase.

Frimpong, Oluwoye and Crawford (2003) studied 26 factors that cause cost overruns in construction of ground water projects in Ghana. According to the contractors and consultants, monthly payments difficulties was the most

important cost overruns factor, while owners ranked poor contractor management as the most important factor. Despite some difference in viewpoints among the three groups, there is a high degree of agreement among them with respect to their ranking of the factors. The overall ranking results indicate that the three groups felt that major factors that cause excessive groundwater project cost overruns in developing countries are poor contractor management, monthly payment difficulties, material procurement, poor technical performances, and escalation of material prices

1.1 Purpose of the study

The purpose of the study was to determine the extent to which construction cost overrun related risks influence completion of Public Private Partnership Projects: Case of Sondu-Miriu Hydroelectric Power Project, Kisumu County, Kenya.

1.2 Research Objectives

The objective of the study was to determine the extent to which Construction Cost Overrun related risks influence completion of Public Private Partnership Project in Kenya.

1.3 Research Hypothesis

The study tested the null hypothesis that:

H_0 : Construction Cost Overrun related risks does not significantly influence completion of Public Private Partnership Project in Kenya

2. Literature Review

2.1 Completion of PPP projects

In recent times, there has been an increased discussion on various national platforms across the world on the manner in which different governments are partnering the Private Sector in the provision of Infrastructure and services such as Sanitation, Water, Roads, Railways, Housing, Harbor, and Airport (OECD, 2010). Studies all over the world have constantly shown that infrastructure is an essential prerequisite for economic growth and therefore the need for a consistent provision of infrastructure as well as social services to maintain such growth is very paramount (Ismail and Ajija, 2014). This premise on the role of infrastructure in development necessitates scrutiny of PPP projects, especially their completion.

While there may be many factors that might impact the successful completion of the PPP Hydroelectric power projects, construction risk may also significantly influence the completion of these projects. For instance, In Queensland Australia, a study by Lyons and Skitmore (2004) on Project management in the Queensland engineering industry found that bundling responsibilities for multiple infrastructure service components transfers more risk to private partners and lowers overall cost. In the case of the Sondu-Miriu Hydropower project, there were many tasks and phases where bundling could hamper completion and quality of various tasks as pointed out by Lyons and Skitmore (2004). All infrastructure projects involve some

level of risk, given the complex, long-term nature of physical investments (Lyons and Skitmore, 2004). Lyons and Skitmore (2004) further puts it that the implementation of PPP across the developing world may vary due to the varying levels of risks and constraints.

Other researchers have shown that critical success factors are necessary if PPPs are to be successfully completed. Wijekoon (2006) evaluated the implementation of energy and transportation projects using Public Private Partnership (PPP) Model in Kenya. The study analyses two case studies namely; Kenya and Uganda Railways Concession and Kipevu II Power Project to assess the impact of the Critical Success Factors (CSFs) on the successful implementation of the project. The frameworks presented at the time of implementation were also taken into account. The study revealed that the CSFs influenced the successful implementation of the project. The study also established that the impact of the CSFs is dependent on the framework in place at the time of implementation and the risks associated with the Project.

As the size and complexity of the projects increases, an ability to manage risks throughout the construction process becomes a central element preventing unwanted consequences. In Sweden, Osipova (2008) investigated risk management in construction projects in a comparative study of the different procurement options. Osipova (2008) noted that risks have a significant impact on a construction project's performance in terms of cost, time and quality. How risks are shared among the project actors and to a large extent governed by the procurement option and the content of the related contract documents. Osipova (2008) identified 9 projects that were on going in Sweden and focused on procurement options as the cause of risks. However, the study did not investigate cost related risks in PPP projects especially hydropower projects.

Risks can cause losses that lead to increase in costs, time delays and lack of quality of projects. Tipili and Ilyasu (2014) noted that one of the challenges facing the construction industry in Nigeria is how to assess the risk of cost overruns and deliver projects within budget. In their study, Tipili and Ilyasu (2014) sought to identify and assessed the likelihood of occurrence and degree of impact of the risk factors on construction projects within the Nigerian construction industry. A self-administered questionnaire was employed to the construction industry professional for their responses on the likelihood of occurrence of risk factors and the impact of these risk factors on project performance. A total of seventy Eight questionnaires were sent to construction industry professionals which comprises of Contractors, Architects, Quantity Surveyors and Engineers but 58 was returned which was later analyzed using descriptive statistic and analyses of variance, (ANOVA) and subsequently exposure rating levels were determined which enabled the categorization of the probability- impact score in Low, medium and high levels. Results of the study indicated a disparity of the ranking of the degree of occurrence and impact among the group. Based on the composite of risk factors, the cost related risk and time related risk was found to be the most likely to occur and have the most impact on

project, whereas environmental risk factor was found to be low weighted risk, as it had the least likelihood to occur and the least impact score.

2.2 Construction cost overrun related risks and completion of PPP projects

Cost overrun is the excess of actual cost over budget. Cost overrun is also sometimes called “cost escalation,” “cost increase,” or “budget overrun” (Zhu and Lin, 2004). The degree of cost overruns can be compared by measuring the change in contract amount divided by the original contract award amount. Sondu-Miriu Hydropower Project is an infrastructural project undertaken by Kenya Electricity Generating Company limited (Kengen) under the Ministry of Energy of the Republic of Kenya. Kengen is the implementing agency of the project. The project cost exceeded the plan and the project period exceeded the plan. The project was estimated to cost a total of Kshs 8,156million JPY but the actual cost was 9,088 million JPY, which is 111% of the planned cost (Takashi, Park and Hong, 2012).

Adhikari (2011) conducted a study whose aim was to analyze the sustainability of the hydropower in Nepal, India. The analysis of the parameters was made and then expressed in a quantitative form to make it easy for anyone to understand the theme at a single glance. The analysis by Adhikari (2011) was based on literature review drafted by the Nepal government, private and public companies and organizations, non-government organizations (NGOs), international non-government organizations (INGOs), individual power producers association of Nepal (IPPAN), hydropower journals and the water resources journalists who have been directly or indirectly involved in hydropower development in Nepal. The case studies of some hydropower plants operating or under construction were also considered for analyzing the parameters. The core parameters for analyzing the sustainability of hydropower as determined by the International Hydropower Association were analyzed in the context of Nepal. All the possible supporting facts and evidence were collected and analyzed. However, the study by Adhikari (2011) faced two main challenges: 1) reliability of the available data and the supporting argumentations from the lists of numerous available sources and 2) the difficulty of getting updated information.

Rapid increases experienced in utility construction costs have raised the price of recently completed infrastructure projects (Mweresa, 2013). Thus, Mweresa (2013) investigated the impact of increasing building construction costs on effective implementation of public projects. The population of the study consisted of contractors, consultants and clients. Purposive sampling was used to select 40 respondents. Questionnaires and document analysis guide were used as the data collection instruments with data being analyzed quantitatively using descriptive methods in form of frequencies and percentages. Factor analysis of 33 significant variables from the survey, revealed eight underlying factors namely; contractor inabilities, improper project preparation, resource planning, interpretation of requirements, works definition, timeliness, government bureaucracy, and risk allocation as having been significant

contributors to overruns. The Projects had time overruns ranging between 9.4% and 29%.

Sondu-Miriu hydropower (SMHP) project experienced delay for about five years and one of the contributing factors was delayed payment of the contractor, with ripples effect extending down the contractual hierarchy (Okeyo, Rambo and Odundo, 2015). Okeyo, Rambo and Odundo (2015) assessed the effects of delayed payment of the contractor on the completion of SMHP project in Kisumu County, Kenya. More specifically, the study addressed the relative importance of delayed payment of the contractor compared to other forms of contractual delays and the perceived effect of delayed payment of the contractor on the project's completion. A causal-comparative design was adopted and primary data sourced in May 2011 from 39 senior management staff of contractual parties. Relative importance index (RII) was used to determine the relative importance of perceived effects of delayed payment of the contractor on the project's completion; while Kendell's coefficient of concordance was applied to determine the degree of agreement among participants regarding their perceived effects of delayed payment. The study found that delayed payment of the contractor affected the project by causing: loss of productivity and efficiency (71.8%); increase in time-related costs (71.8%); re-scheduling and re-sequencing of works (69.2%); extension of time and acceleration (69.2%); as well as prevention of early completion (53.8%).

2.3 Theoretical Framework

The study was anchored on principal-agent theory. Principal-agent theory was developed by Eisenhardt (1989) to addresses a risk-sharing problem called agency problem. And agency problem occurs when cooperating parties have different goals, information, and division of labor (Jensen and Meckling, 1976). Specifically, principal-agent theory concentrates on the ubiquitous agency-relationship, "in which one party (principal) delegates work to another (the agent), who performs that work in behalf of the principal" (Eisenhardt, 1989). And principal-agent theory seeks to portray this relationship using the metaphor of a contract (Jensen and Meckling, 1976).

In determining the most efficient contract, principal-agent theory brings up certain hypotheses about people, organizations and information. It assumes that agents and principals will act in their self-interest to maximize their own welfare. Agents possess more information than their principals possess. As a result, it identifies two impediments to effective contractual performance: moral hazard and adverse selection. Moral hazard refers to that the agent doesn't put agreed-upon efforts to the tasks. That is, the agent is shirking. Adverse selection refers to "the misrepresentation of ability by the agent" (Eisenhardt, 1989). The agent may claim to have certain skills, experiences, or capabilities when he or she is hired. Adverse selection arises because the principal cannot completely verify these skills, experiences, or capabilities either at the time of recruitment or while the agent is working (Eisenhardt, 1989).

2.4 Conceptual Framework

The variables in the study were conceptualized to be related as shown in Figure 1.

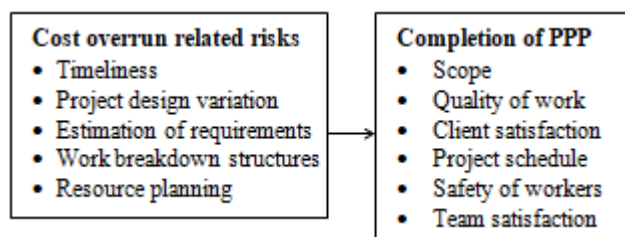


Figure 1: Conceptual Framework

3. Methodology

The study employs pragmatic paradigm to investigate the research problem (Tashakkori and Teddie, 1998) basing on the case study of Sondu-Miriu Hydroelectric Power Project. Consequently, mixed methods approach was utilized in data collection and analysis which entails the application of both qualitative and quantitative methods simultaneously and progressively in the study (Bulsara, 2010; Migiyo and Magangi, 2011). Correlation design is used to establish the relationship between the study variables. The target population for the study was the management staff of Sondu-Miriu Power project made up of 85 personnel. To determine the study sample size, Yamane (1967) formula was used thus giving a sample of 71. The respondents were selected using proportionate random sampling to include the employer, financier, contractor and the project engineer. This was to ensure representation across all participants.

Since the study adopted mixed methods approach, qualitative and quantitative data was collected thus interview schedules and questionnaires were used respectively. The questionnaires used were semi structured to cover the study objectives in Likert format. In order to ascertain the reliability of the questionnaires, pilot test was done at OluchKimira Irrigation project in Homabay County which was an ongoing PPP project. To ensure content validity, experts in the field of project planning and management were involved in determining accuracy and logical aspect of the research variables. Cronbach alpha was used as a measure of reliability computed from the construction cost overrun scale, managerial skills scale and completion of PPPs scale. Consequently, an overall instrument reliability of alpha (α) = 0.730 was obtained with completion of

construction PPP projects scale having $\alpha = 0.830$ and construction cost overrun $\alpha = 0.630$.

For data collection, the researcher distributed the questionnaires to the selected respondents in person. However, for the respondents who had moved to far geographical areas, questions were sent through Email. The researcher made follow up calls to ensure the questionnaires were filled and returned. Data analysis involved both qualitative and quantitative approaches where descriptive statistics was used to describe the data using measures of central tendency, variability, relationship and association in frequencies and percentages using Statistical Package for Social Sciences version 20 software to aid in data analysis. Regression was used to establish the relationship between the independent variable and dependent variable modeled according to the equation: $Y = B_0 + B_1X + \epsilon$; where: Y is the completion of construction PPP project, B_1 is coefficient of construction cost overrun, and X is construction cost overrun related risks.

4. Results and Discussions

4.1 Background and demographic information

The study found a response return rate of 39 respondents out of the sampled 71 (54.93%) which according to Saunders (2003), a response return rate of at least 50% is acceptable in social sciences research. A cumulative majority 25(64.1%) had worked for at least 3 years in their respective organizations. Majority of the respondents 24(61.5%) were graduates with another 10(25.6%) having post graduate qualification while only 5(12.8%) had diploma qualification. Further, majority of the study participants 28(71.8%) had engineering training while 4(10.3%) had training in administration.

4.2 Construction cost overrun related risks and completion of PPP projects

Construction cost overrun related risks was measured using a 5- item 5-point Likert scale as 1 = strongly disagree (SD), 2 = disagree (D), 3 = neutral (N), 4 = agree (A) and 5 = strongly agree (SA). The data obtained was analysed to show frequency of each response as well as percentage per item. Item mean and standard deviation was equally computed and presented alongside each item as shown in Table 1.

Table 1: Construction cost overrun related risks and completion of PPP Projects

Statement	SD	D	N	A	SA	Mean \pm SD
The contractor was unable to complete certain aspects of the project resulting into outsourcing some services	3 7.7%	2 5.1%	5 12.8%	16 41.0%	13 33.3%	3.87 \pm 1.17
Emerging tasks during the project affected the timelines leading to increased project cost	1 2.6%	3 7.7%	6 15.4%	14 35.9%	15 38.5%	4.00 \pm 1.05
The changes in design during construction resulted into additional costs thus raising the overall project cost	2 5.1%	1 2.6%	3 7.7%	15 38.5%	18 46.2%	4.18 \pm 1.05
Design variation resulted in the need for more experts hence raising the overall project costs.	2 5.1%	2 5.1%	7 17.9%	12 30.8%	16 41.0%	3.97 \pm 1.14
Work breakdown structure during the project necessitated involvement of many sub-contractors leading to increased project cost	1 2.6%	2 5.1%	7 17.9%	16 41.0%	13 33.3%	3.97 \pm 0.99
Composite Mean \pm Standard Deviation						3.970 \pm 0.124

As an aspect of construction cost overrun related risks, the study found that the contractor was unable to complete certain aspects of the project resulting into outsourcing some services (Mean = 3.87 ± 1.17). However, the effect of contractor not being able to complete certain aspects of the project resulting into outsourcing some services was low compared to the composite mean (Mean = 3.970 ± 0.124). This shows that there are other aspects of construction cost overrun related risks which affected the completion of the project more. Outsourcing services implies additional costs in documentation as well as equipment. Thus such increase affects completion of the project. Specifically, majority of the study participants 16(41.0%) agreed that the contractor was unable to complete certain aspects of the project resulting into outsourcing some services while 13(33.3%) strongly agreed. With 74.3% of the study respondents identifying that the contractor was unable to complete certain aspects of the project resulting into outsourcing some services, this reveals a dominant problem during the construction of Sondu – Miriu Hydropower project. However, 10(25.6%) of the study participants were not of the opinion that the contractor was unable to complete certain aspects of the project resulting into outsourcing some services with 3(7.7%) strongly disagreeing, 2(5.1%) disagreeing while 5(12.8%) being neutral. This shows that there were none or little contractor delays in some aspects of the construction project.

Similarly, the study found that emerging tasks during the project influences positively the timelines leading to increased project cost (Mean = 4.00 ± 1.05). The item mean was slightly higher than the composite mean for construction cost overrun (Mean = 3.970 ± 0.124) showing that the problem of emerging tasks existed to a large extent during the implementation of the project. Based on this statement, majority of the respondents 15(38.5%) strongly agreed while another 14(35.9%) agreed that emerging tasks during the project affected the timelines leading to increased project cost. However, a significant 6 (15.4%) were neutral regarding this statement although 4(10.3%) cumulatively agreed with the statement. This implies that as the tasks emerged during the project, additional costs were incurred thus ultimately resulting into increased project costs. Similarly, Okeyo, Rambo and Odundo (2015) found that delayed payment of the contractor affected the project by causing: loss of productivity and efficiency (71.8%); increase in time-related costs (71.8%); re-scheduling and re-sequencing of works (69.2%); extension of time and acceleration (69.2%); as well as prevention of early completion (53.8%). The view was shared by managers who participated in the study. In this case one of the managers said that:

“Time related risks resulted into delays in completing the project thus leading to delay to enjoying the benefits of the project as planned. The delay, which was by 4 years led to an overall cost overrun of 4 KES 4 billion, thus lowering the cost benefit value of the project.” [Interview: Manager 2]

The study also found that there were changes in design during construction which resulted into additional costs thus

raising the overall project cost (Mean = 4.18 ± 1.05). Compared to the composite mean (Mean = 3.970 ± 0.124), the changes occurred and had significant effect on the completion of the project as the item mean was higher than the composite mean. This view was supported by majority of the respondents 18(46.2%) who strongly agreed while 15(38.5%) agreed with the statement. However, 3(7.7%) cumulatively disagreed that changes in design during construction resulted into additional costs for the project with another 3(7.7%) being neutral. This shows that although there were changes in design during construction, this did not occur in the entire project thus some sections were not affected. However, the changes in design had an overall effect of increasing the project costs.

Similarly, the study found that design variation resulted in the need for more experts hence raising the overall project costs (Mean = 3.97 ± 1.14) contributing to significant increase in project completion costs based on the composite mean (Mean = 3.970 ± 0.124) as reported by majority of the respondents 16(41.0%) who strongly agreed as well as 12(30.8%) who agreed. Thus, 28(71.8%) of the study respondents noted that design variation resulted in the need for more experts hence raising the overall project costs. However, 7(17.9%) of the respondents were neutral regarding the view that design variation resulted in the need for more experts hence raising the overall project costs with 4(10.3%) cumulatively disagreeing. The findings agree with those of Mweresa (2013) who revealed that there are eight underlying factors namely; contractor inabilities, improper project preparation, resource planning, and interpretation of requirements, works definition, timeliness, government bureaucracy, and risk allocation as significant contributors to overruns.

The study further found that work breakdown structure during the project necessitated involvement of many sub-contractors leading to increased project cost (Mean = 3.97 ± 0.99). The challenge was found to be occurring significantly when compared to the composite mean which was slightly higher than the item mean (Mean = 3.970 ± 0.124). This view was supported by majority of the respondents 16(41.0%) who agreed while 13(33.3%) strongly agreed that work breakdown structure during the project necessitated involvement of many sub-contractors leading to increased project cost. However, 10(25.6%) did not agree with the opinion as 3(7.7%) cumulatively disagreed while 7(17.9%) remained neutral to the statement that work breakdown structure during the project necessitated involvement of many sub-contractors leading to increased project cost. This implies that based on the magnitude of the project; there was need for breakdown to facilitate completion. However, the breakdown implied the need for more sub-contractors hence increased costs. Overall, the study found that there were costs overrun resulting from delays, design changes, use of sub-contractors as well as emerging tasks (Mean = 3.970 ± 0.124). This emerged as the mean falls at a rating equal to 4. The cost overrun affects completion of the project. Similarly, one of the managers observed that:

“In the final analysis, time overrun occurring during the project implementation led to

increase project cost due to changing prices. This is because prices of materials and cost of labour changes with time due to inflation on various factors of production. Thus, the initial estimates on costs of materials and labour were overtaken by prevailing market prices during the later stages of the project which were out of the initial project schedule. [Interview: Manager 4]

In order to determine the relationship between construction cost overrun related risks and completion of Sondu- Miriu Hydropower project, a correlation analysis was conducted between the two variables. Since data collected was measured on an ordinal Likert level for each item, it was important to obtain continuous data to facilitate performance of correlation analysis. Thus, summated scores for each respondent was obtained for each of the two scales such that, construction cost overrun related risks scale had a minimum score of 5 and a maximum score of 25 for the 5 items, while completion of construction project scale had a minimum score of 6 and a maximum of 30 for the 6 items in the scale. The corresponding scores for each respondent were used as data points for the 39 participants. The correlation output is presented in Table 2.

Table 2: Correlation output for cost overrun risks and completion of PPP projects

Variables		Construction cost overrun related risks	Completion of construction project
Construction cost overrun related risks	Pearson Correlation	1	-0.682**
	Sig. (2-tailed)		0.000
	n	39	39
Completion of construction project	Pearson Correlation	-0.682**	1
	Sig. (2-tailed)	0.000	
	n	39	39

** . Correlation is significant at the 0.01 level (2-tailed)

The findings in Table 2 show that there is a strong negative correlation ($R^2 = -.682$) between construction cost overrun related risks and completion of construction projects which was statistically significant ($p < .001$; $p < 0.05$). This implies that, statistically, as construction cost overrun related risks increase, completion of construction projects through PPPs decline significantly. On a similar note, Tipili and Ilyasu (2014) found that the cost related risk and time related risk were the most likely to occur and have the most impact on project, whereas environmental risk factor was found to be low weighted risk, as it had the least likelihood to occur and the least impact score. Cost overrun related risks imply that there is need for additional funding for the project which may always be difficult to secure. The difficult encountered in securing more funds for additional costs affect completion due to emerging disputes and compromise on quality of deliverables.

To determine the effect of construction cost overrun related risks on completion of construction projects, regression analysis was conducted between the variables. Data collected was converted to continuous data by summing the individual item scores in the scale for each respondent. Thus, the minimum score on the construction cost overrun

was 5 with the maximum being 25 while the minimum score on the completion of construction projects scale was 6 with the maximum score being 30. Data obtained from the 39 respondents effectively provided 39 data points. The regression output is presented in Table 3.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.682 ^a	0.465	0.450	1.849

The study found that construction cost overrun related risks explain up to 46.5% ($R^2 = .465$) of variance in the completion of construction project. The model was found to be statistically significant as $F(1, 37) = 32.153$ [$p < .001$; $p < .05$]. This shows that from regression, construction cost overrun related risks are able to account for 46.5% of variance in the completion of construction of PPPs.

The variables were modeled by the linear regression equation in the form: $Y = B_0 + B_2X_2 + \epsilon$ where Y is Completion of construction project, B_0 is Coefficient of constant term, B_2 is coefficient of construction cost overrun related risks, X_2 is construction cost overrun related risks and ϵ is error term.

Table 4: Regression Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	34.83	2.960		11.77	0.000
	Construction cost overrun related risks	-0.694	0.122	-0.682	-5.670	0.000

a. Dependent Variable: Completion of construction project

b. Predictors: (Constant), Construction cost overrun related risks

Thus, replacing the coefficients of regression, the equation becomes;

$$Y = 34.83 - 0.694X_2$$

This shows that, when construction cost overrun related risks change by one positive unit, completion of construction project declines by 0.694. Thus, construction cost overrun related risks negatively affect completion of construction of PPPs to a magnitude of 0.694 as indicated by the main effects. The findings agree with those of Rwelamila (2003) who showed that 80% of projects are not completed as scheduled due to contract forms that are not negotiated in order to ensure a fair and familiar distribution of risks.

Hypothesis was developed to test if there was a significant influence of construction cost overrun related risks on completion of Public Private Partnership Projects in Kenya at $p = 0.05$. Thus, the null hypothesis was stated as:

H_0 : Construction cost overrun related risks does not significantly influence completion of Public Private Partnership Project in Kenya

Since there was a strong negative correlation between the variables, $r(38) = -0.682$ ($p < .05$) with regression showing that construction cost overrun related risks explained up to 46.5% [$R^2 = .465$, $F(1, 37) = 32.153$; $p < .05$]. This implies that construction cost overrun significantly

influences completion of construction projects through PPPs. Therefore, we reject the null hypothesis. The relationship shows that when there are higher chances and occurrences of construction cost overrun related risks, the completion of PPP projects is significantly negatively affected. This is because the cost overruns related risks results into additional project cost not envisaged in the initial budget as well as the time due to emerging disputes on the costs as well as sourcing for additional funds.

5. Conclusions

The study concludes that outsourcing services results additional costs in documentation as well as equipment. Similarly, as the tasks emerged during the project execution, additional costs were incurred thus ultimately resulting into increased project costs. Further, changes in design during construction resulted into additional costs while need for work breakdown to facilitate completion necessitated the use of more sub-contractors hence increased costs. Overall, the study concludes that costs overrun result from delays, design changes, use of sub-contractors as well as emerging tasks during execution of projects thus affecting completion. On the hypothesis, the study concludes that construction cost overrun significantly negatively influences completion of projects through PPPs such that, as construction cost overrun increases, completion of PPP projects decline.

6. Recommendation

The study recommends that the project stakeholders should minimize the number of contractors by vetting and prequalifying contractors with capability to deliver the services. This will prevent outsourcing and minimize cost overrun to ensure the project is completed as designed. Moreover, stakeholders should participate fully in the project from design to avoid design changes which lead to cost overrun.

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