Influence of Construction Time Overrun Related Risks on Completion of Public Private Partnership Projects in Kenya. A Case of Sondu Miriu Hydropower Project

Pamela Akinyi Oyieyo, Prof Charles M. Rambo (PhD) & Dr. Anne Ndiritu (PhD)**
*PhD Candidate
**Senior Lecturer
School of Open and Distance Learning
University of Nairobi
P.O Box 30197-00100, Nairobi, Kenya
poyieyo@yahoo.com
crambo@uonbi.ac.ke
anniendiritu@yahoo.com

ABSTRACT

Keeping development projects inside timetables requires sound systems, great practices, and watchful judgment. The introduction of Public Private Partnership's in projects may not reduce Construction risks such as time overrun related risks, cost overrun related risks and labor related risks. However, it allows the public and private sector to share the risks between them in the partnerships. The study was anchored on the contingency theory while adopting pragmatic paradigm to assess the extent to which construction time overrun related risks influence completion of Public Private Partnership Project in Kenya. The study tested the null hypothesis that: Construction time 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 $\alpha = 0.786$. 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, $r(38) = -0.975$ ($p<.05$) which implies that construction time overrun related risks significantly influence completion of construction projects through PPPs. Thus, the null hypothesis was rejected. The study recommends that stakeholders in PPPs should come together at initial stages to ensure that project drawings are made and approved in time to facilitate speedy execution of the overall project and avoid unnecessary design changes by involving all stakeholders to reduce time overrun.

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

1. INTRODUCTION

Keeping development projects inside timetables requires sound systems, great practices, and watchful judgment. To the aversion of proprietors, contractual workers and experts, be that as it may, of the numerous projects encounter broad postponements and subsequently surpass time and cost estimates. This problem is more evident in the traditional or adversarial type of contracts in which the contract is awarded to the lowest bidder, which is the strategy in the majority of public projects in developing countries (Kumaraswamy and Zhang, 1995). The increasing complexity of infrastructure projects and the environment place greater demands on construction managers to deliver projects on time, within budget and to high quality (Enshassi, Al-Najjar and Kumaraswamy, 2008).Delay overruns have contributed to the high cost of construction in many countries for many years (Okpala and Aniekwu, 1988; Charles and Andrew, 1990; Zaki and James, 1987; Abdul-Rahman*et al*., 2008). Delays can be taken to be "incidents" that impact a project's progress and postpone project activities. Project delays may be caused by very bad weather, unavailability of resources, design delays, etc. In general, project delays result from activities that have both external and internal cause and effect relationships (Vidalis and Najafi, 2002).

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). 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.

1.1 Research Objectives

The objective of the study was to determine the extent to which construction time overrun related risks influence completion of Public Private Partnership Project in Kenya.

The study answered the question:to what extent does construction time overrun related risks influence completion of Public Private Partnership Project in Kenya?

1.2 Research Hypothesis

The study tested the null hypothesis that:

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

2. LITERATURE Review

2.1 Completion of PPP Projects

Completion of PPP projects refers to the lifecycle of a project where it meets the time target, budget, quality requirements, health, safety and environment and client satisfaction. In this study, completion refers to the ultimate delivery of the project as had initially been envisaged. Public Private Partnership (PPP) is an increasingly popular model for implementing important public projects (United

Nations Economic Commission for Europe (UNECE), 2008). Seen as a solution to completion of large scale construction projects the public, this strategy has been overly popular in most projects today. UNECE (2008) further puts it that Public-Private Partnerships (PPPs) have attracted much attention in recent years as possible means to handle large and costly projects, such as the construction of new infrastructure. The overall goal of PPP projects is to find solutions to problems in which the advantages of the private sector (such as financial assets, efficient management, propensity to innovative and entrepreneurship) are combined with the advantages of the public sector (such as social and environmental concern). To be economically sensible, a PPP project should generate a combination of allocative efficiency and productive efficiency that is superior to an entirely public or entirely private project (Mohr and Spekman, 1994). Thus, international organizations, governments and private developers have appreciated and embraced the cost benefits of such arrangements hence their popularity.

2.2 Construction time overrun related risks and completion of PPP projects

Construction time overrun is the delay beyond planned completion dates Delays can be taken to be "incidents" that impact a project's progress and postpone project activities and objectives which can be due to poor site management and supervision, inadequate planning and scheduling, frequent design changes, dispute among project participants, and late delivery of materials and equipment. Kaming (1997) defines time overrun as the delay beyond planned completion dates traceable to the contractors. Keeping development projects inside timetables requires sound systems, great practices, and watchful judgment.

On the consultant point of view: delay in making decision; slow supervision; poor planning; slowness in giving instructions; poor qualification of consultant engineer staff and waiting time for approval of drawing and tests samples of materials. A study carried out by Shebob, Dawood and Xu (2011) in Libya showed that: low skills workers; rise in material prices; delay in material delivery; changes in scope of project were critical delay factors in the Libyan construction industry on contractor point of view. On owner's point of view the most critical delay factors were low skills of manpower; delay in delivery of site to contractor, modification (replacement or addition of new works); changes in material specification. Where the nature of risks is understood less is known about likelihood of occurrence and the potential impact (Chileshe and Yirenkyi-Fianko, 2011). The function of project management is therefore to predict as many risks and problems as possible and plan, organize and control activities so that the project is completed successfully (Gwaya, Masu and Wanyona, 2014).

Previous research has identified construction phase as having significant effect on time and cost overruns in construction projects. Ismail (2014) conducted a study to assess the risk of various factors that cause time and cost overruns throughout the life cycle of construction projects in Malaysia**.** A total of 35 factors were identified from previous studies. The data collections were carried out using structured survey questionnaire. A pilot study was conducted to determine the level of occurrence and severity of each factor with respect to various phases of project life cycle. The actual survey was conducted in two rounds of Delphi. Delphi round 1 was conducted to assess the probability of occurrence and level of severity of each factor in the life cycle phases. Based on the survey, construction phase was found as the phase that had significantly contributed to time and cost overrun compared to other phases (Ismail, 2014). Then, Delphi round 2 was conducted to seek agreeability from respondents regarding the results obtained from the Delphi round 1. The result showed that majority of respondents had agreed with the results from Delphi round 1. This study found that there were 12 high risk factors on time overrun, namely: poor site management and supervision, incompetent subcontractors, inadequate planning and scheduling, frequent

design changes, mistakes and errors in design, change in the scope of the project, delay preparation and approval of drawings, lack of coordination between parties, slow information flow between parties, lack of communication between parties, shortages of materials, and late delivery of materials and equipment (Ismail, 2014). The study did not consider the effect of time and cost overrun risks on the completion of PPP projects. In as much as the study collected quantitative data, the method of analysis was not able to establish whether there was significant influence of time and cost overrun risks on the completion of construction projects.

Estimates of uncertainties and risks of the construction process are essential information for decision-making in infrastructure projects as the construction process is affected by different types of uncertainties. Spackova (2012) used descriptive research design where both questionnaires and interview schedule was used to collect data. Taking the example of tunnel construction projects, the study noted that a significant part of the uncertainty results from the unknown geotechnical conditions, human and organizational factors, whose effect is not known in advance. Spackova (2012) proposed adoption of reliable predictions which realistically estimate the parameters of the probabilistic model which does not rely on expert judgments as they tend to be strongly biased and unreliable, but the estimates should be supported by analysis of data from previous projects. The study developed a simple probabilistic model for the estimation of the delay due to occurrence of construction failures. The study focused on algorithm development using data from tunnel construction projects and not hydropower generation projects. Moreover, the study only modeled construction time of the projects and not the influence of time related delays on the completion of the projects.

The design of concession period for build–operate–transfer (BOT) projects is crucial to financial viability and completion of project (Ye and Tiong, 2003). Different designs reflect different risk control strategies for completion time overruns. The single-period concession structure requires the project company to assume completion risk, while the two-period concession structure could, to some extent, reduce the completion risk exposure to the project company, depending on the incentive schemes (Ye and Tiong, 2003). Consequently, Ye and Tiong (2003) used Monte Carlo simulation to evaluate the mean net present value (NPV), variance and NPV-at-risk of different concession period structures. Ye and Tiong (2003) analyzed the influence of project characteristics on concession period design to evaluate the feasibility of the design. It concludes that a well-designed concession period structure can create a 'win–win' solution for both project promoter and the host government. Whereas Ye and Tiong (2003) focused on design concession period, the study did not investigate the influence of time related risks on completion of PPPs hydropower projects. Moreover, the study focused on major build-operate and transfer projects (BOT) using developed Monte Carlo simulation to evaluate NPV at risk.

Due to the geographical, political, social and financial situation of the country, many construction projects are prone to delay (Mohamed, 2015). These delay factors can only be avoided by first identifying the factors and their sources. Mohamed (2015) conducted a study to establish the main causes of delay in Building construction projects in Sudan. The research design was quantitative, where the data was collected from clients, consultants and contractors using questionnaires. The questionnaire had a list of delay causing factors of which the respondents were ask to rank each according to the 5 point Likert scale. The results obtained indicate that the major causes of delay were; fluctuation of prices of construction materials, shortage of materials, inaccurate time estimation, and errors during construction, Cost overrun, acceleration of losses, time overrun, negative social impacts and litigation. Also the top major risks associated with construction delay were; too much pressure on project stake holders, price

inflation of materials and overall project, disputes amongst project participants, project abandonment, overall cost increase and decline in revenue.

The study was anchored on the contingency theory. The word "contingency" indicates how the environment (external source of risk) relates with the system, and determines the activities and construction of an organizational system (Longenecker and Pringle, 1978). Improvement in organizational effectiveness is what contingency theory aims at in order to respond to uncertainty in performance. Contingency is mainly generated for removing or decreasing the negative outcomes of unforeseen events. The novelty of contingency theory, as recognized by Steiner (1979), is adaption of a new way to be identified for specific structures and activities which are the most appropriate for the current requirement of the organization. Contingency theory recognizes that there are a range of factors leading to construction time overrun related risks which influence the project. This research investigates the influences of time overrun related risks and completion of PPP Projects. The risks may have an influence on the project and hence contingency theory can be suitable to be used for covering these influences depending on the situation of the project. The variables in the study were conceptualized to be related as shown in Figure 1.

3. METHODOLOGY

The study employs pragmatic paradigm to investigate the research problem (Tashakkoriand 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; MigiroandMagangi, 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 time overrun scale and completion of PPPs scale. Consequently, an overall instrument reliability of alpha (α) = 0.786 was obtained with completion of construction PPP projects scale having $\alpha = 0.830$ and construction time overrun $\alpha = 0.742$.
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, questionnaires 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) as software for

aiding data analysis. Regression analysis was used to establish the relationship between the independent variable and dependent variable modeled according to the equation: $Y = B_0 + B_1X + \varepsilon$
Where: Y is the completion of construction PPP project, B_1 is coefficient of construction time overrun.

4. RESULTS AND DISCUSSIONS

4.1 Demographic Characteristics of the Respondents

The study found a response return rate of 39 out of the 71 sampled respondents (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 Completion of PPP Projects

In the study, the dependent variable was completion of public private partnership projects, a case of Sondu-Miriu hydropower project. The dependent variable was measured using a 6- item 5-point Likert scale as 1 = strongly disagree (SD), 2 = disagree (D), 3 = neutral (N), 4 = agree (A) and 5 = strongly agree (SA). Data obtained was analyzed to show frequency of each response as well as percentage as shown.

From the findings in Table 1, the study found that the participants were satisfied with the overall outcome of the project (Mean = 4.03±1.04) where majority of the respondents 17(43.6%) agreed with the statement with another 14(35.9%) strongly agreeing. Cumulatively, 31(79.5%) of the respondents agreed that they were satisfied with the overall outcome of the project. Thus, in terms of completion of construction project, the outcome was satisfactory to a larger extent as indicated by the respondents who were also the key participants in the project. These findings correspond to those of Tipili and IIyasu (2014) noted that most important performance indicators for evaluating project performance were quality of finished project, construction cost and construction time.

Similarly, the project participants were satisfied with the quality of the work (Mean = 3.85±1.18). Majority of the respondents 15(38.5%) agreed that they were satisfied with the quality of the work with another 13(33.3%) strongly agreeing. Although 5(12.8%) of the respondents cumulatively disagreed that they were satisfied with the quality of the work, the overall opinion indicated satisfaction with the quality of work in the project. However, the study found that the project was not completed within the expected timeframe (Mean = 2.21±1.40). Specifically, majority of the study participants 17(43.6%) strongly disagreed that the project was completed within a reasonable timeframe with another 10(25.6%) disagreeing. Thus, overall, 27(69.2%) of the participants were of the opinion that the project was not completed within the expected time frame. This finding shows that there were general delays in completion of works which led to failure to complete the works in time.

Similarly, the study found that there were unnecessary delays in the construction of Sondu-Miriu Hydropower project (Mean = 2.33±1.22). This emerged as majority of the respondents (41.0%) disagreed that the construction project was completed without unnecessary interruption while 10(25.6%) strongly disagreed. Thus, 13(66.6%) of the respondents disagreed that there were delays in the construction work which ultimately affected the completion of the construction work. Similarly, Lyons and Skitmore (2004) found that bundling responsibilities for multiple infrastructure service components transfers more risk to private partners and lowers overall cost.The findings further show that the construction project was not

completed in strict adherence to safety requirements (Mean = 2.41±1.35). Majority of respondents 13(33.3%) disagreed while 12(30.8%) strongly disagreed. This shows that a cumulative 25(64.1%) of respondents consider that work was not completed in strict adherence to safety requirements.

In terms of risk hazards and injuries, there was an average view that there were no potential safety hazards that were not addressed (Mean = 3.31±1.47). This emerged as majority of respondents 21(53.8%) cumulatively agreed that there were no potential safety hazards that were not addressed. The finding shows that there are significant potential safety hazards which emerged during the construction project. To corroborate this, Kartam and Kartam (2001) also explains that risk is inherent with construction projects and PPP projects are no exception as stakeholders need to manage complexities associated with documentation, capital budget, taxation, technical details, policies and market conditions.

4.3 Construction time overrun related risks and completion of PPP projects

Construction time overrun was measured using a 10- 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 as shown in Table 2.

Delays occurring in the completion of the construction of Sondu - Miriu Hydropower Project were not due to supervisory practices. Specifically, 16(41.0%) of the respondents strongly disagreed with the statement while 12(30.8%) disagreed. This gives a total of 28(71.8%) of respondents who believe that delay in construction of the project were not due to supervisory practices. However, 7(17.9%) of the respondents were neutral regarding the statement that supervisory practices during project work led to delays in project completion with 3(7.7%) agreeing while 1(2.6%) strongly agreeing. Thus, the supervisory practices during project work did not lead to delays in project completion (Mean = 2.00±1.08). The overall mean for this item was lower than the composite mean (Mean = 3.141± 0.785) indicating that supervisory practices was not a significant cause of delay in completion of construction projects. This shows that there were noticeable delays attributable to supervisory practices during the project although this was not significant. This opinion was shared by managers who were interviewed during the study who provided explanation regarding the nature of delays. One of the managers said that:

> *"Community agitation led to stalling of the project since the community did not initially embrace the project. Consequently, the community was setting high demands to be met in terms of compensation and integration of community members to benefit from the project through supplies to the project and employment opportunities. [Project Manager, SonduMiriu Hydropower Project]."*

Similarly, the study found that the project work plan was adequate contrary to expectation that the plan was inadequate (Mean = 2.28±1.15). Compared against the composite mean of 3.141 (SD = 0.785), work plan was not a contributing factor in delays in completion as it had little effect. This was revealed as the overall response to the statement that the project work plan was not adequate, was a disagreement. Specifically, majority of the participants 14(35.9%) disagreed while 11(28.2%) strongly disagreed for a cumulative total of 25(64.1%) who disagreed. However, there was a considerable 6(15.4%) who cumulatively agreed that the project work plan was not adequate. Further, 8(20.5%) of the respondents were neutral thus undecided as to whether project plans were inadequate or not. This shows that although

project plans did not cause noticeable delays in completion, they were not that perfect thus leaving doubt into the minds of some of the project participants.

The study found that delays in delivery of materials and equipment affected the completion of the project (Mean = 4.00±1.17). Compared to the composite mean of 3.141 (Std. Dev. = 0.785), delay in delivery of materials and equipment was predominant and affected completion of the project. This emerged as majority of the respondents 17(43.6%) strongly agreed that there were delays in delivery of materials and equipment which affected the completion of the project with another 12(30.8%) agreeing. This shows that, among the project participants, delay in delivery of construction materials had a significant effect in the completion of the projects as reported by a cumulative 29(74.4%) of the study respondents. However, 5(12.8%) of the respondents cumulatively disagreed that the delay in delivery of materials affected the completion of the project while 4(10.3%) were neutral regarding this statement. These respondents considered the delays to be minimal hence with little effect on the completion of the project.

The study further found that there were schedule delays during project construction as a result of inadequate planning (Mean = 3.59±1.29) which affected the completion of the construction project. The item mean was higher than the composite mean (Mean = 3.141 ± 0.785) showing that this problem occurred frequently during the project implementation. Based on the findings, majority of the respondents 16(41.0%) agreed that there were schedule delays while another 10(25.6%) strongly agreed. This shows that at least two thirds 26(66.7%) admit that there were schedule delays which ultimately affected completion of the construction of Sondu – Miriu Hydropower project. Although 4(10.3% strongly disagreed while 5(12.8%) disagreed with this statement, the overall opinion points to the conclusion that there were schedule delays during the project construction as a result of inadequate planning. These findings agree with those of Shebob, Dawood and Xu (2011) who showed that: low skills workers; rise in material prices; delay in material delivery; changes in scope of project were critical delay factors construction industry.

As for the design changes during the construction of Sondu – Miriu Hydropower project, the study found that design changes interfered with construction project schedule (Mean = 3.82±1.12). Compared to the composite mean (Mean = 3.141± 0.785), design changes during implementation of the project was frequent that it highly affected the completion of the project. The effect of design changes on the completion of the construction project was observed by majority of the study respondents 17(43.6%) who agreed with the statement while another 11(28.2%) strongly agreed. Cumulatively, 28(71.8%) of the respondents agreed that design changes during the construction project interfered with the project schedule and thus, completion. Of the remaining 11(28.2%), 4(10.3%) cumulatively disagreed that design changes interfered with construction project schedule while 7(17.9%) were neutral. This might be due to the fact that changes did not occur in the sections where these study participants were involved. The findings are concurrent to those of Ismail (2014) who found that there were 12 high risk factors on time overrun, namely: poor site management and supervision, incompetent subcontractors, inadequate planning and scheduling, frequent design changes, mistakes and errors in design, change in the scope of the project, delay preparation and approval of drawings, lack of coordination between parties, slow information flow between parties, lack of communication between parties, shortages of materials, and late delivery of materials and equipment.

Similarly, the study found that the actual design process took longer than anticipated and this affected the time scheduled for project completion (Mean = 3.85±1.27) with a higher mean score than the

composite mean (Mean = 3.141± 0.785) showing the prolonged design process affected the completion of the project based on the original time schedules. This shows that protracted design period affected the scheduled completion time from the perspective of various stakeholders. Specifically, majority of the study respondents 15(38.5%) strongly agreed that design process took longer than anticipated and this affected the time scheduled for project completion while 13(33.3%) of the respondents agreed. This gave an overall 71.8% of the respondents who acknowledged the design process took longer thus affecting the overall timelines. However, 7(18.0%) of the respondents cumulatively disagreed that design process took longer than anticipated and this affected the time scheduled for project completion while 4(10.3%) were neutral. This divergent view could be attributed to participants who were involved in the project after the design stage. On the contrary, Tipili and IIyasu (2014) observed that delays and failure to deliver project phases affects the overall project delivery hence a significant factor in the completion of PPPs.

However, the study found that delays in resolving disputes interfered with construction schedule to a greater extent (Mean = 4.03±0.93) as the mean was significantly higher than the composite value (Mean = 3.141± 0.785) showing that dispute resolution was a greater challenge to completion of the project. From the responses of the study participants, majority 20(51.3%) agreed that the delays in resolving disputes among stakeholders interfered with the construction schedule while another 12(30.8%) strongly agreed giving a total of 32(82.1%) of the respondents who agreed that, indeed, delays in resolving disputes interfered with the construction schedule. Of the remaining 7(18%), 3(7.7%) cumulatively disagreed while the other 4(10.3%) were neutral as whether delays in resolving disputes interfered with the construction schedule. The divergent view could be due to participants who were never in conflict or in minimal conflict during the construction period. On the contrary, Ke, Wang and Chan (2010) noted that there were three risks, namely, "Change in law"; "Competition (Exclusive right)" and "Organization and coordination risk" had different allocations. The study also found that the extent to which delay in preparation and approval of drawings interfered with construction schedule was low (Mean = 2.59±0.50). The findings show that majority of the respondents 23(59.0%) were undecided and thus neutral while another 16(41%) out rightly disagreed regarding the statement that delay in preparation and approval of drawings interfered with construction schedule. This shows that there were minimal delays in preparation and approval of drawings thus did not interfere much with scheduling of activities in the construction project and eventual completion.

Similarly, the study found that incomplete designs were not a cause for delays in commencement and completion of various sections of the project (Mean = 2.62±0.94). Given that the composite mean (Mean = 3.141± 0.785) was higher than the item mean, there were minimal cases of incomplete designs delaying the commencement and completion of various sections of the project. Based on this statement 15(38.5%) of the respondents cumulatively disagreed out of which 6(15.4%) strongly disagreed. However, majority 18(46.2%) were neutral regarding the statement an indication that incomplete designs either did not cause delays or caused delays in the completion of various sections of the project. The findings are supported by those of Mohamed (2015) who found that the major causes of delay were; fluctuation of prices of construction materials, shortage of materials, inaccurate time estimation, and errors during construction, Cost overrun, acceleration of losses, time overrun, negative social impacts and litigation.

Further, the study found that scheduling errors were not the cause for contractor delays as the respondents generally disagreed with the statement that there were Scheduling errors which led to contractor delays (Mean = 2.64±0.78). The item mean was significantly lower than the construct overall

mean (Mean = 3.141± 0.785) showing that scheduling errors did not have a significant impact on completion of the construction project. Majority of participants in Sondu-Miriu Hydropower project 21(53.8%) disagreed that there were Scheduling errors which led to contractor delays. However, 7(17.9%) agreed that there were Scheduling errors which led to contractor delays. Significantly though, 11(28.2%) of the respondents were neutral as to whether there were Scheduling errors which led to contractor delays. This shows that these respondents might have noticed the scheduling delays but did not perceive them as being able to cause contractor delays. These findings show that there were errors in scheduling leading to contractor delays although such did not affect the completion of the project to a greater extent.

The managers attributed scheduling errors during the project to financing structure which meant that funds were availed late for the aspects of the project. Specifically, one manager said that:

> *"Financing structure of the project led to delays in accomplishing scheduled tasks. This emerged as money for various project phases were remitted way past the scheduled time. The materials and labour could not be paid for in time leading to overall delay in the completion of the project. [Project Manager, SonduMiriu Hydropower Project]*

In order to determine the relationship between construction time overrun related risks and completion of Sondu- Miriu Hydropower project, a correlation analysis was run. Since data for construction time overrun related risks and completion of construction project were measured on ordinal Likert level for each item, it was important to obtain continuous data to facilitate correlation analysis. Thus, summated scores for each respondent was obtained for each of the two scales such that, construction time overrun scale had a minimum score of 10 and a maximum score of 50 while completion of construction project scale had a minimum of score of 6 and a maximum of 30. The corresponding scores for each respondent were used as data points for the 39 participants as shown in Table 3.

The findings in Table 3 show that there is a strong negative relationship (R = -.975) between construction time overrun related risks and completion of construction projects which was statistically significant ($p < .001$; $p < 0.05$). This implies that it can be statistically shown that as construction time overrun increases, completion of construction projects through PPPs decline significantly. With the strong negative correlation, time overrun related risks have a greater negative effect on completion of PPP projects. This can be attributed to the fact that time overrun leads to overall delay in timelines thus affecting the project overrun cost. The delay and pressure that emerges may also lead to compromise in project deliverables quality.

To determine the effect of construction time overrun on completion of construction projects, regression analysis was conducted between the variables. Data collected was converted to continuous data by summating the individual item scores in the scale for each respondent. Thus, the minimum score on the construction time overrun related risks scale was 10 with the maximum being 50 while the minimum score on the completion of construction projects scale was 6 with the maximum score being 30. Data was obtained from the provided 39 data points as presented in Table 4.

The study found that construction time overrun related risks explained up to 95.1% (R square = .951) of variance in the completion of construction project. The model was found to be statistically significant as $F(1, 37) = 717.7$ [$p < .001$; $p < .05$]. This that from regression, construction time overrun related risks is able to account for 95.1% of variance in the completion of construction of PPPs.

Consequently, the variables were modeled to be connected by the linear regression equation in the form:

$$Y = B_0 + B_1X_1 + \varepsilon$$

Where Y is Completion of construction project, B_0 is Coefficient of constant term, B_1 is coefficient of construction time overrun related risks, X_1 is construction time overrun related risks and ε is error term. The coefficient output from regression is presented in Table 5.

Replacing the coefficients of regression the equation becomes;

$$Y = 38.95 - 0.663X_1$$

This shows that, when construction time overrun related risks changes by one positive unit, completion of construction project declines by 0.663. Thus, construction time overrun related risks negatively affect completion of construction of PPPs to a magnitude of 0.663 as indicated by the main effects. On its own, when time overrun related risks are considered in completion of construction of PPP projects, they have a significantly greater effect of delaying the project.

The null hypothesis tested at 95% confidence level. The hypothesis was stated as:

H_0: Time overrun related risk does not significantly influence completion of Public Private Partnership Project in Kenya.

Since there was a strong negative correlation between the variables, r (38) = -0.975 ($p<.05$) with regression showing that construction time overrun related risks explained up to 95.1% [R square = .951, F (1, 37) = 717.7; $p < .05$]. This implies that construction time overrun related risks significantly influence completion of construction projects through PPPs. Therefore, we reject the null hypothesis that *Time overrun related risk does not significantly influence completion of Public Private Partnership Project in Kenya.* This is because time overrun in construction projects affects project schedules and timelines leading to increased costs which affect the overall project budget.

5. CONCLUSIONS

The study concludes that supervisory practices during project work do not lead to delays in project completion when the project work plan is adequate. Further, the study concludes that preparation and approval of drawings interfere with construction schedule to low extent just as do incomplete designs while scheduling errors are not the cause for contractor delays. The study also concludes that delays in resolving disputes interfere with construction schedule to a greater extent while delays in delivery of materials are minimal and with little effect on the completion of the project. However, there were schedule delays which ultimately affected completion of the construction of Sondu – Miriu Hydropower project which emanate from design changes during construction as well as protracted design period which affects the scheduled completion time. Overall, the study concludes that construction time overrun significantly influences completion of construction projects through PPPs such that as construction time overrun increases, completion of PPP projects declines significantly.

6. RECOMMENDATION

The study recommends that stakeholders in PPPs should come together at initial stages to ensure that project drawings are made and approved in time to facilitate speedy execution of the overall project and avoid unnecessary design changes by involving all stakeholders to reduce time overrun. Similarly, dispute resolution channel should be clearly defined to address emerging disputes between the stakeholders to avoid protracted court cases which delay project execution and result in time overrun.

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Figures and Tables

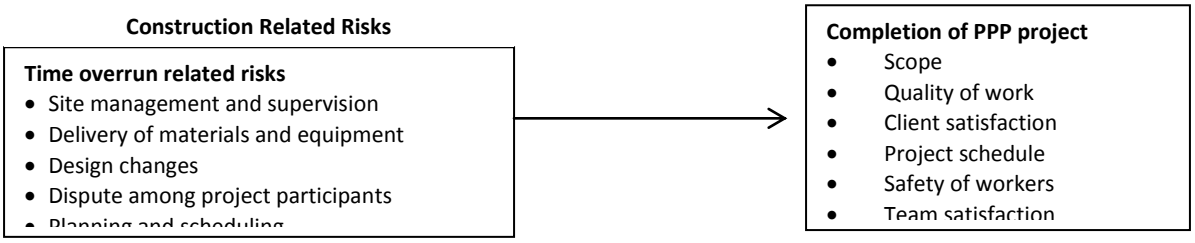

Figure 1: Conceptual Framework

Table 1

Statement	SD	D	N	A	SA	Mean±SD
I am satisfied with the overall outcome of the project	2 5.1%	1 2.6%	5 12.8%	17 43.6%	14 35.9%	4.03±1.04
I am satisfied with the quality of the work	3 7.7%	2 5.1%	6 15.4%	15 38.5%	13 33.3%	3.85±1.18
The project was completed within a reasonable timeframe	17 43.6%	10 25.6%	3 7.7%	5 12.8%	4 10.3%	2.21±1.40
During the work, there were no potential safety hazards that were not addressed	6 15.4%	8 20.5%	4 10.3%	10 25.6%	11 28.2%	3.31±1.47
The construction project was completed without unnecessary interruption	10 25.6%	16 41.0%	7 17.9%	2 5.1%	4 10.3%	2.33±1.22
The construction project was completed in strict adherence to the safety requirements	12 30.8%	13 33.3%	4 10.3%	6 15.4%	4 10.3%	2.41±1.35
Composite Mean ± Standard Deviation						3.021± 0.810

Completion of PPP Projects

Table 2

Statements	SD	D	N	A	SA	Mean ± SD
Supervisory practices during project work led to delays in project completion	16 41.0%	12 30.8%	7 17.9%	3 7.7%	1 2.6%	2.00±1.08
The project work plan was not adequate.	11 28.2%	14 35.9%	8 20.5%	4 10.3%	2 5.1%	2.28±1.15
There were delays in delivery of materials and equipment which affected the completion of the project	2 5.1%	3 7.7%	5 12.8%	12 30.8%	17 43.6%	4.00±1.17
There were schedule delay during project construction as a result of inadequate planning	4 10.3%	5 12.8%	4 10.3%	16 41.0%	10 25.6%	3.59±1.29
Design changes interfered with construction project schedule	3 7.7%	1 2.6%	7 17.9%	17 43.6%	11 28.2%	3.82±1.12
Design process took longer than anticipated and this affected the time scheduled for project	3 7.7%	4 10.3%	4 10.3%	13 33.3%	15 38.5%	3.85±1.27

completion.						
Delays in resolving disputes interfered with construction schedule	1 2.6%	2 5.1%	4 10.3%	20 51.3%	12 30.8%	4.03±0.93
Delay in preparation and approval of drawings interfered with construction schedule	0 0.0%	16 41.0%	23 59.0%	0 0.0%	0 0.0%	2.59±0.50
Incomplete designs lead to delays in commencement and completion of various sections of the project	6 15.4%	9 23.1%	18 46.2%	6 15.4%	0 0.0%	2.62±0.94
There were Scheduling errors which led to contractor delays	0 0.0%	21 53.8%	11 28.2%	7 17.9%	0 0.0%	2.64±0.78
Composite Mean ± Standard Deviation						3.141± 0.785

Construction Time Overrun Related Risks and Completion of PPPs

Table 3

Variables		Construction time overrun related risks	Completion of construction project
Construction time overrun related risk	Pearson Correlation	1	-0.975**
	Sig. (2-tailed)		0.000
	n	39	39
Completion of construction project	Pearson Correlation	-0.975**	1
	Sig. (2-tailed)	0.000	
	n	39	39

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

Correlation output for time overrun risks and completion of PPP projects

Table 4

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.975[a]	0.951	0.950	0.560

Model Summary

Table 5

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	38.95	0.782		49.78	0.000
	Construction time overrun related risk	-0.663	0.025	-0.975	-26.79	0.000

a. Dependent Variable: Completion of construction project

b. Predictors: (Constant), Construction time overrun

Coefficients Table