LABOUR RELATED RISKS AND COMPLETION OF PPPS PROJECTS: A
CASE OF SONDU-MIRIU HYDROELECTRIC POWER PROJECT

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Abstract

The purpose of the study was to examine the extent to which Labour related risks influence completion of PPP Projects in Kenya. The null hypothesis was formulated as: Labour related risks do not significantly influence the completion of Public Private Partnership Project in Kenya. The study adopted a case study of a completed PPP project, the Sondu-Miriu Hydroelectric Power Project in Kisumu County Kenya. A descriptive survey design was used where 37 members of the management team of various project stakeholders were sampled purposively from a population of 85 determined using Yamane (1967) equations to take part in the study. Questionnaires were sent to participants and direct interviews conducted with the lead managers. The study found that labour related risks associated with the construction of Sondu – Miriu Hydropower project included failure by employees and experts to complete assigned tasks, injuries and deaths, poor work organizations, assignment of work to inexperienced sub-contractors and supervisors, changing labour demands during the project as well as cases of go slow. The established that there is a strong negative correlation between labour related risks and completion of construction projects such that as labour related risks increase, completion of PPP projects decline.

Keywords: Labour related Risks, Completion of Construction Projects, Public Private Partnerships
1. INTRODUCTION

Public Private Partnership (PPP) refers to contracts and arrangements where public and private investors jointly come together so as to realize a symbiotic relationship to finance, execute and deliver projects aimed at public benefit (Kucukali, 2011). Consequently, PPPs focus on mutual involvement through sharing of costs, risks as well as benefits interlinked between participants from across sectors by engaging each other’s strong points to overcome barriers. Thus, PPP is a mechanism for governments to attain the elusive social goals since its participation in project design and execution incentivizes communities to undertake individual development initiatives. In this study, completion of Public Private Partnership Hydro power project refers to the ultimate delivery of the project as had initially been envisaged.

Labour Related Risks is the overruns that are associated with human resource or workers in the construction project which according to this study include Selection of employees, Work organization, Supervision, excessive hours of work, wage compensation and assignment of duties. Risks attributed to labour in construction manifest in different images of which disputes are the prevalent and predominant forms. Murali and Yau (2007) identify labour supply and labour productivity as the cause of delays. Odeh and Batainehe (2002) identify labour supply and productivity as delay contributors while Yaw and Oluwoye (2003) identify labour shortages. Sadi, Asce and Muhammad (2006) identify shortage and low productivity level of labour that contribute to causes of delays. Sweis, Sweis, Abu Hammad and Shboul (2007) identify the shortage of manpower and the absence of skills leading to delays.

1.1 Problem

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. 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. Actual construction was started in March 1999 for the first phase which was to be completed in March 2003.

1.2 Purpose

To examine the extent to which Labour related risks influence completion of PPP Projects in Kenya.

1.3 Hypothesis

H0: Labour related risks does not significantly influence the completion of Public Private Partnership Project in Kenya
2. LITERATURE REVIEW
For delivery of beneficial projects in construction as desired and ensure overall project success, the productivity factors with realizable influence on labour must be controlled significantly (Soham, 2013). This makes ultimately necessary to identify and investigate factors underlying productivity of labour to enhance efficiency as desired by contractors and the construction project managers more so in mega projects especially those under PPPs (Attar, Gupta and Desai, 2012).

Practically, in most construction projects, aspects of work is sub-contracted to minimize costs while increasing efficiency so as to work within the scheduled timelines (Ghoddousi and Hosseini, 2012). This method is prevalent in the industry since it encourages the subcontractor to increase work force and increase productivity. HenceAttar, Gupta and Desai (2012) opine that it is therefore upon the sub-contractor to source for laborers and negotiate remuneration terms consistent with the amount of work done thus there focus is on speedy completion of work for cost savings.

Elsewhere, performance of personnel, existence of skilled personnel, supervision framework, project design, project constructability, accurate estimates and challenges in construction have been postulated as factors affecting completion of construction PPPs. Wijekoon (2006) conducted a study on the dimensions of productivity of employed labour for bridge projects in Sri Lanka. The study adopted a questionnaire survey divided into two sections where participants provided ratings on various factors modeled as influencing completion in the first section and indicated whether the factors adversely affected construction of bridge in the next section.

In summary, literature on labour related risks and completion of PPPs such as Kucukali (2011); Takashi, Park and Hong (2012) and Salah and Moselhi (2016) mainly focused on only the host community and not stakeholders in the project. The present study used both interviews and questionnaires to collect qualitative and quantitative data respectively from project stakeholders. Some of these studies also focused on only risk identification using an analysis model, with little emphasis on the effect of such risks on completion of construction projects which is the focus of the present study.

3. METHODOLOGY
This study adopted a case study of a completed PPP project, the Sondu-Miriu Hydroelectric Power Project in Kisumu County Kenya. A descriptive survey design was used where 37 members of the management team of various project stakeholders were sampled purposively from a population of 85 determined using Yamane (1967) equations to take part in the study. Questionnaires were sent to participants and direct interviews conducted with the lead managers. Data was analysed using SPSS and thematic content analysis for qualitative data. Descriptive statistics and correlation was used to make meaning out of the data.
4. RESULTS AND DISCUSSIONS

4.1 Descriptive Findings

Data was collected to measure construction labour related risks and further analysis conducted using correlation and regression to establish the relationship between labour related risks and completion of construction projects. Labour related risks was measured using a 7-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 I.

The study found that some employees and experts assigned specific tasks failed to complete their assignment thus affected completion (Mean = 4.00±1.15) as the respondents generally agreed. This was higher than the composite mean (Mean = 3.777 ± 0.373) indicating that delay in completion of tasks was prevalent thus labour aspects affecting timelines of activities. On the contrary, Abdul Kadir et al., (2005) identified among other factors, material shortage, slow response of the consultant’s site staff, site congestion, claim certificate, late issuance of progress payment by client to contractor, equipment shortage, and poor weather conditions as factors of affecting labour productivity.

Site injuries and deaths occurred during the project which necessitated payouts and compensations to workers (Mean = 4.15 ± 1.01) where the mean was significantly higher than the composite (Mean = 3.777 ± 0.373). This shows that site injuries and deaths were frequent thus noticed by the participants. However, the study found that there was a divided opinion as to whether there was poor work organization in assigning specific responsibilities which affected the project completion as the item mean (Mean = 3.05±1.47) was neutral compared to the composite mean (Mean = 3.777 ± 0.373). This shows that poor work organization in assigning specific responsibilities was not a major labour related risk in the construction of Sondu – Miriu Hydropower project thus did not affect the completion of the project. Further, despite work organization and assigning of specific responsibilities was witnessed in some areas of the construction project, it was not greatly significant to affect the project completion.

The study also found that overtime work aimed at achieving timelines affected the productivity of the labourers thus project quality although to a moderate extent (Mean = 3.56±1.17). This shows that the item mean was slightly lower that the composite mean for the scale on labour related risks ((Mean = 3.777 ± 0.373). The overtime work resulted into fatigue, monotony and lack focus and keenness in the task requirements thus affecting quality of work and hence the completion of the project. This indicates that the problem of overtime work affecting productivity and quality of work was not experienced in some areas of the project. Similar findings were arrived at by Olabosipo et al., (2011) who found that unfair wages (RI = 0.89), negative influencing factors (RI = 0.85) and lack of motivation (RI = 0.79) were ranked high.
Similarly, the study found that assigning tasks to inexperienced supervisors affected the delivery of the project as indicated by majority of the respondents 17(43.6%) who strongly agreed with the statement as another 12(30.8%) agreed (Mean = 4.03±1.14). The item mean was higher than the composite mean (Mean = 3.777 ± 0.373) showing that this challenge was highly experienced during the project implementation. This risk of inexperienced personnel ultimately affects completion of the project as envisaged. Similarly, Wijekoon (2006) found that labour crew performance, availability of skilled labour, project supervision, design details, constructability, accuracy of the estimates, and construction difficulty have postulated as factors affecting completion of construction PPPs.

Another labour related risk identified and confirmed by the study findings was that changing labour demands during the project execution led to increased wages (Mean = 3.77±1.09) with the item mean being almost equal to composite mean (Mean = 3.777 ± 0.373). Thus, changing labour laws did not have greater influence on completion of the project compared to other indicators of labour related risks. The changing labour demands were associated with the changes in design and variations in the design emerging during the construction project.

Similarly, the study found that there were cases of go slows and job boycotts due to issues of wages and compensation (Mean = 3.87±1.28). This occurrence significantly affected completion considering the composite on labour related risks (Mean = 3.777 ± 0.373) which was slightly lower than the item mean. The noted boycotts and go slows were naturally not anticipated in the project schedule thus affected the completion of the project in terms of quality, cost and timelines. The findings are consistent with those of Alinaitwe, Mwakali and Hansson (2007) that, it is imperative upon the sub-contractor to source for laborers and negotiate remuneration terms consistent with the amount of work done thus there focus is on speedy completion to save cost.

### 4.2 Correlation between labour related risks and completion of PPP projects

In order to determine the relationship between labour related risks and completion of Sondu-Miriu Hydropower project, a correlation analysis was conducted between the two variables. Since data for labour 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 performance of correlation analysis. Thus, summated scores for each respondent was obtained for each of the two scales such that, labour related risks scale had a minimum score of 7 and a maximum score of 35 for the 7 items while completion of construction project scale had a minimum of score of 6 and a maximum of 30 for the 6 items in the scale. See Table II.

The findings show that there is a strong negative correlation (R = -.729) between labour related risks and completion of construction projects which was statistically significant (p <.001; p < 0.05). This implies that as labour related risks increase, completion of construction projects through PPPs decline significantly. Thus construction labour related risks overrun affect completion of PPP projects. Similarly, Njogu (2015) ranked labour related risks as one of the major factors affecting completion of PPPs. Considering that labour is a major factor in actualizing construction projects, when risks associated with labour are dominant, completion of tasks are affected hence increasing in labour related risks results in decline the completion of the project. This emerges from go slows leading to delays, legal action associated with injuries and remuneration as well as poor workmanship affecting the quality of the project.
4.3 Regression of labour related risks and completion of PPP Projects
To determine the effect of labour related risks on completion of construction projects, regression analysis was conducted between the variables. Data collected was converted to continuous data by summat ing the individual item scores in each of the scale for each respondent. Thus, the minimum score on the labour related risks was 7 with the maximum being 35 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 III.

The study found that labour related risks explain up to 53.2% (R square = .532) of variance in the completion of construction project. The model was found to be statistically significant as F (1, 37) = 41.99 [p < .001; p < .05]. Thus, labour related risk account for 53.2% of variance in the completion of construction of PPPs.

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 labour related risks, \( X_1 \) is labour related risks and \( \varepsilon \) is error term. Thus, replacing the coefficients of regression the equation becomes;

\[ Y = 33.93 - 0.598X_1 \]

This shows that, when labour related risks increase by one positive unit, completion of construction project declines by 0.598. Thus, labour related risks negatively influence completion of construction of PPPs to a magnitude of 0.598 as indicated by the main effects. The findings are corroborated by those of Nworuh and Nwachukwu (2004) who found that risks of error in estimating, risks of delay caused by client and his representatives, nominated subcontractors/nominated supplier; risks due to inclement weather, risk of clients financial failure, risk associated with cash-flow problems and risk associated with industrial relation affect completion of construction projects. This is because as labourers take to industrial action, their affect project stability and service delivery as there are no labourers to offer services. Moreover, incompetent suppliers and sub-contractors will fail to provide the planned quality of work thus affecting the overall project quality.

4.4 Test for Hypothesis
The null hypothesis was stated as:
\[ H_0: \text{ Labour related risks does not significantly influence the completion of Public Private Partnership Project in Kenya} \]

Since there was a strong negative correlation between the variables, \( r (38) = -0.729 \) \( (p<.05) \) with regression showing that construction time overrun explained up to 53.2% \([R \text{ square} = .532, F (1, 37) = 41.99; p < .05]\). Therefore, labour related risks significantly influence completion of construction projects through PPPs. Therefore, we reject the null hypothesis.
5. CONCLUSIONS AND RECOMMENDATIONS

Labour related risks associated with the construction of Sondu – Miriu Hydropower project included failure by employees and experts to complete assigned tasks, injuries and deaths, poor work organizations, assignment of work to inexperienced sub-contractors and supervisors, changing labour demands during the project as well as cases of go slow. Construction labour related risks affected the cost, time and quality of work performed in the construction project. Specifically, the study concludes that changing labour demands during the project execution lead to increased wages while some employees and experts assigned specific tasks fail to complete their assignment whereas in some cases tasks are assigned to inexperienced supervisors. Further overtime work affects the productivity and quality of work. Overall, there is a strong negative correlation between labour related risks and completion of construction projects such that as labour related risks increase, completion of PPP projects decline.

To minimize on labour related risks and improve on completion of Hydropower PPPs, more focus should be placed on identification and recruitment of project staff as well task allocation. The stakeholders should participate in the recruitment of key staff to ensure that they have the required training and expertise for the project. The financier should ensure timely remittance of finances to prevent delays in payments and eliminate boycotts and go slows which hamper completion of construction.
REFERENCES


### TABLES

**Table I: Labour Related Risks**

<table>
<thead>
<tr>
<th>Statements</th>
<th>SD</th>
<th>D</th>
<th>N</th>
<th>A</th>
<th>SA</th>
<th>Mean ± SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Some employees and experts assigned specific tasks failed to complete their assignment thus affected completion</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>16</td>
<td>4.00±1.15</td>
</tr>
<tr>
<td>Site injuries and deaths occurred during the project which necessitated payouts and compensations to workers</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>16</td>
<td>17</td>
<td>4.15±1.01</td>
</tr>
<tr>
<td>There was poor work organization in assigning specific responsibilities which affected the project completion</td>
<td>7</td>
<td>9</td>
<td>8</td>
<td>5</td>
<td>10</td>
<td>3.05±1.47</td>
</tr>
<tr>
<td>Overtime work aimed at achieving timelines affected the productivity of the labourers thus project quality</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>21</td>
<td>6</td>
<td>3.56±1.17</td>
</tr>
<tr>
<td>Assigning tasks to inexperienced supervisors affected the delivery of the project</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>12</td>
<td>17</td>
<td>4.03±1.14</td>
</tr>
<tr>
<td>Changing labour demands during the project execution led to increased wages</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>19</td>
<td>9</td>
<td>3.77±1.09</td>
</tr>
<tr>
<td>There were cases of go slow and job boycotts due to issues of wages and compensation</td>
<td>7.7%</td>
<td>2.6%</td>
<td>17.9%</td>
<td>48.7%</td>
<td>23.1%</td>
<td>3.87±1.28</td>
</tr>
</tbody>
</table>

**Composite Mean ± Standard Deviation**

<table>
<thead>
<tr>
<th>Composite Mean ± Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.777 ± 0.373</td>
</tr>
</tbody>
</table>
### Table II: Correlation output for labour related risks and completion of PPP Projects

<table>
<thead>
<tr>
<th>Variables</th>
<th>Labour Related Risks</th>
<th>Completion of construction project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labour Related Risks</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>-0.729**</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>39</td>
</tr>
<tr>
<td>Completion of</td>
<td>Pearson Correlation</td>
<td>-0.729**</td>
</tr>
<tr>
<td>construction project</td>
<td>Sig. (2-tailed)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>39</td>
</tr>
</tbody>
</table>

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

### Table III: Regression output for labour related risks and completion of PPP Projects

#### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.729a</td>
<td>0.532</td>
<td>0.519</td>
<td>1.730</td>
</tr>
</tbody>
</table>

#### ANOVAa

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>1</td>
<td>125.6</td>
<td>41.990</td>
<td>0.000b</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>37</td>
<td>2.992</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Coefficientsa

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>33.93</td>
</tr>
<tr>
<td></td>
<td>Labour Related Risks</td>
<td>-0.598</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Completion of construction project
b. Predictors: (Constant), Labour Related Risks