PROPOSED ACTIONS FOR THE COMPLETION OF PLTU LAMPUKG/TARAHAN BARU PROJECT EFFECTIVELY

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Abstract—PLTU Lampung/Tarahan Baru is one of the projects that was included in this 10,000 MW mega project and is planned to distribute electricity with the capacity of 2 x 100 MW. The evaluation results of PLTU Lampung/Tarahan Baru indicate a delay in the project completion time for at least 20 months from the original plan. Using the fishbone diagram, it was found that the loans problems, employee payroll, material delivery schedules, permits, engineering drawings, and contractors who do not work well is the cause of the delay in completion of this project. An analysis using Analytical Hierarchy Process (AHP) produces three main priorities to be done which are to extend the loan, to update the material distribution licenses, and to give penalties to the contractors that late in paying their employees. Sixteen proposed actions were analyzed using the 7S McKinsey framework and then being implemented using the PDCA (Plan Do Check Act) format.

Keywords: Pembangkit Listrik Tenaga Uap (PLTU), project management, Analytical Hierarchy Process (AHP), 7S McKinsey, Plan Do Check Act (PDCA)

I. INTRODUCTION

PLN is currently carrying out the fast track construction of 10,000 MW power plants. The government assigns PLN to build a coal fuel steam power plants in 42 locations in Indonesia. The assignment consists of 10 power plants with the total capacity of 6,900 MW in Java – Bali and 26 power plants with the total capacity of 2,252 MW outside Java – Bali, which will operate between 2010 and 2014.

Pembangkit Listrik Tenaga Uap (PLTU) Lampung/Tarahan Baru is one power plant that was included in the 10,000 MW project. This power plant is located in the Sebalang Hamlet, Tarahan Village, Katubung District, South Lampung Regency, and Lampung Province. The constructions have started on October 30, 2007, and is planned to distribute electricity with the capacity of 2 x 100 MW in Lampung and the surrounding area. The project planned to be completed by February 12, 2013.

The construction of PLTU Lampung/Tarahan Baru was led by PT. Adhi Karya (Persero) as the prime contractor, while the civil, mechanical, and electrical work being sub contracted to other parties, as follows:

- Civil : Tunas Subur and Puja Perkasa
- Mechanical : GAKA, Doshion, and Envitec
- Electrical : Indokomias, PSP, and CCE

PT. PLN (Persero) is led by a president director who was pointed by the Minister of BUMN with the approval of the President of Indonesia. Nowadays, Mr. Nur Panudji is the president director of PT. PLN (Persero) which was chosen in the end of 2011. The daily operational of PT. PLN (Persero) was divided into three areas in Indonesia, which were West Indonesia, Java - Bali, and Eastern Indonesia.

At the project site, each project will be conducted by a General Manager. And each General Manager has its own Unit Pelaksana Konstruksi (UPK) in its project site.

PT. PLN (Persero) work plan that was arranged for 2011 to 2020 nationally is to meet the needs of capacity and electric energy, improve efficiency and performance of the electrical system from the planning stage. To meet the needs of the national electric, PT PLN (Persero) is committed to produced quality products and services with competitive prices. Therefore, to achieve those things, the company has to operate effectively and efficiently both in terms of cost, performance, and time.
II. BUSINESS ISSUE EXPLORATION

2.1. Conceptual Framework

The causes of schedule slips, cost overruns, and quality problems are often viewed differently by different parties. These different opinions could come from one main problem. In order to search for the root problem, we could start by developing some actual problems that happened in the project sites. These problems can be obtained by taking into account the existing business situation at the project site. By continue analyzing all the problems that occur in the project, we can obtain the tip of the problem that becomes the root of the other problems.

With the root problem developed, we then could organize some alternative solutions to it. These solution will be better if we could identify the critical tasks and capabilities required so that in the implementation stage, we could work the most critical first than others. One important point in the implementation stage was also to design measurement to track those tasks and capabilities in order to control them on the line. This project framework was done to get a better goal for the developing project.

![Fishbone Diagram](image)

Figure 2. Fishbone Diagram

2.2. Data Collection

The data that were given in this paper the writer got from several locations, namely through:
- Direct interview to the Head of Construction Division of the Western Indonesia PT. PLN (Persero) and to the Senior Manager of Construction Administration PT. PLN (Persero)
- Progress project report for Western Indonesia projects
- References from previous project experience

The problems that arise will then be analyzed by using Analytical Hierarchy Process (AHP) and 7S McKinsey framework.

III. DATA AND ANALYSIS

a. Project Schedule

PLTU Lampung/Tarahan Baru is currently still under the construction process. The construction work itself was divided into three aspects: engineering, procurement, and construction. The construction process is effective from October 30, 2007, and is scheduled for completion in 2.5 years. However, the execution progress deteriorated quite a lot so they invented a new schedule in accordance with the current conditions. The new schedule makes the project is planned to be completed in 5.4 years since its effective construction date.

b. Project Cost

The cost of PLTU Lampung/Tarahan Baru project is Rp. 595,100,000,000,00 and USD 154,273,163,00. The fund for PT. PLN (Persero) projects can be derived from three sources of finance;

- Internal Funding,
- Government Loans Funding (G2G Loan), and
- Bank Loans Funding.

At the PLTU Lampung/Tarahan Baru project, the financing come from the loans of banks in Indonesia. Among them are Bank Mega, Bank Mandiri, Bank Rakyat Indonesia (BRI), and Bank Negara Indonesia (BNI).

c. SWOT Analysis

One way that can also be used to determine the condition of a company or project is by using a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis.

![SWOT Diagram](image)

Figure 3. PLTU Lampung/Tarahan Baru SWOT Analysis

d. Root of Problem

The Ishikawa diagram (or commonly referred to as the fishbone diagram) is a graphical method for finding the most likely to cause unwanted effects. By using a fishbone diagram, we can keep thinking to guide us to discover the main causes of a problem. From the fish bone diagram, six business issue factors arised, which summarized in the following table:

<table>
<thead>
<tr>
<th>No</th>
<th>Factor</th>
<th>Business Issue</th>
<th>Caused By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manpower</td>
<td>Manpower Quality</td>
<td>Lack of human resource development at the project site</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The recruitment of site workers are not addressed by PT. PLN (Persero)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contractor did not have IMTA</td>
</tr>
</tbody>
</table>
planning, organizing, and controlling. Points have a root cause of issues in the areas of schedule, licensing, engineering design, and unperformed contractor. This six business issues that most affected the PLTU Lampung/Tarahan Baru project are loan, payroll, material delivery, insurance, and unperformed contractor. This six business issues points have a root cause of issues in the areas of planning, organizing, and controlling.

IV. BUSINESS SOLUTION

4.1. Alternative of Business Solution

Table below will explain the business issues with the caused and the alternative action that could be done to minimalism the loss that happen.

Table 2. Alternative Solutions

<table>
<thead>
<tr>
<th>No.</th>
<th>Business Issues</th>
<th>Alternative Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Granting and renewal of bank loans</td>
<td>• Eliminate irregularities in the availability period</td>
</tr>
<tr>
<td></td>
<td>Cause:</td>
<td>• Find alternative sources of funding</td>
</tr>
<tr>
<td></td>
<td>• Some bank that does not approve an extension of the loan</td>
<td>• Do not single source</td>
</tr>
<tr>
<td>2.</td>
<td>The payroll of contractor and sub contractors</td>
<td>• Direct the contractor to pay the payroll immediately</td>
</tr>
<tr>
<td></td>
<td>• Workers did not have visa</td>
<td>• Give direct salary from PT. PLN (Persero) to the sub contractors</td>
</tr>
</tbody>
</table>

Of the eleven existing business issues, business issues that most affected the PLTU Lampung/Tarahan Baru project are loan, payroll, material delivery schedule, licensing, engineering design, and unperformed contractor. This six business issues points have a root cause of issues in the areas of planning, organizing, and controlling.

The implementation of this 16 alternative then will be ordered in accordance with the level of importance of each. Ordering will be done by using Analytical Hierarchy Process (AHP). To make a
decision in an organized way, AHP should be done into the following steps:

a. Define the problem
b. Make the hierarchy structure
c. Construct a set of pair wise comparison matrices
d. Weight the values and obtain its overall or global priority.

To make comparisons, we need a scale of numbers that indicates how many times more important or dominant one element is over another element with respect to the criterion or property with respect to which they are compared.

Table 3. AHP Rank Scale

<table>
<thead>
<tr>
<th>Intensity of Importance</th>
<th>Definition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equal importance</td>
<td>Two activities contribute equally to the objective</td>
</tr>
<tr>
<td>2</td>
<td>Weak or slight</td>
<td>Experience and judgment slightly favor one activity over another</td>
</tr>
<tr>
<td>3</td>
<td>Moderate importance</td>
<td>Experience and judgment moderately favor one activity over another</td>
</tr>
<tr>
<td>4</td>
<td>Moderate plus</td>
<td>An activity is favored very strongly over another; its dominance demonstrated in practice</td>
</tr>
<tr>
<td>5</td>
<td>Strong importance</td>
<td>A very strong or demonstrated importance to another is of the highest possible order of affirmation</td>
</tr>
<tr>
<td>6</td>
<td>Strong plus</td>
<td>Equal importance</td>
</tr>
<tr>
<td>7</td>
<td>Very strong or demonstrated importance</td>
<td>Very strong or demonstrated importance</td>
</tr>
<tr>
<td>8</td>
<td>Very, very strong</td>
<td>Very, very strong</td>
</tr>
<tr>
<td>9</td>
<td>Extreme importance</td>
<td>The evidence favoring one activity over another is of the highest possible order of affirmation</td>
</tr>
</tbody>
</table>

Below is the factors comparison calculation to find new sources of funding for PLTU Lampung/Tarahan Baru.

Table 4. Pair-Wise Comparison Considerations

<table>
<thead>
<tr>
<th>Factor 1</th>
<th>Score</th>
<th>Factor 2</th>
<th>Score</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend Availability Period</td>
<td>9</td>
<td>New Sources</td>
<td>1</td>
<td>Extend availability resources is easier that finding a new source of funding that need additional time. (Extend Availability Period is extremely important)</td>
</tr>
<tr>
<td>Extend Availability Period</td>
<td>3</td>
<td>More than 1 Source</td>
<td>1</td>
<td>Extend availability period goes together with finding more than one funding source. But the most urgent is how to extend the availability period first. (Extend availability period is moderately important)</td>
</tr>
<tr>
<td>New Sources</td>
<td>3</td>
<td>More than 1 Source</td>
<td>1</td>
<td>Finding new sources should be done first than finding more than one fund sources. (New sources is moderately important)</td>
</tr>
</tbody>
</table>

The result of above consideration is stated in the table below.

Table 5. Planning – Loan Comparison

<table>
<thead>
<tr>
<th>Planning - Loan</th>
<th>Extend Av. Period</th>
<th>New Sources</th>
<th>&gt; 1 Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend Av. Period</td>
<td>1</td>
<td>9.0</td>
<td>3.0</td>
</tr>
<tr>
<td>New Sources</td>
<td>0.111</td>
<td>1</td>
<td>3.0</td>
</tr>
</tbody>
</table>

From the total per column that has been calculated above, we then calculate the ratio of every cell. The ratio equation is:

$$\text{Cell Ratio} = \frac{\text{Cell Amount}}{\text{Total Amount from the Calculated Cell}}$$

Table 6. Cell Ratio Calculation

<table>
<thead>
<tr>
<th>Planning - Loan</th>
<th>Extend Av. Period</th>
<th>New Sources</th>
<th>&gt; 1 Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend Av. Period</td>
<td>0.692</td>
<td>0.871</td>
<td>0.429</td>
</tr>
<tr>
<td>New Sources</td>
<td>0.077</td>
<td>0.097</td>
<td>0.429</td>
</tr>
<tr>
<td>&gt; 1 Source</td>
<td>0.231</td>
<td>0.032</td>
<td>0.143</td>
</tr>
</tbody>
</table>

Last, specify the priority by calculating the average from the line of each factors.

Table 7. Priority Calculation

<table>
<thead>
<tr>
<th>Planning - Loan</th>
<th>Calculation</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extend Av. Period</td>
<td>(0.692 + 0.871 + 0.429) / 3 = 0.664</td>
<td></td>
</tr>
<tr>
<td>New Sources</td>
<td>(0.077 + 0.097 + 0.429) / 3 = 0.201</td>
<td></td>
</tr>
<tr>
<td>&gt; 1 Source</td>
<td>(0.231 + 0.032 + 0.143) / 3 = 0.135</td>
<td></td>
</tr>
</tbody>
</table>

The overall result of AHP priority calculation for the PLTU Lampung/Tarahan Baru could be seen in the table below.

Table 8. AHP Calculation Results

From the priority calculation that have been done, in the alternative stage could be noted that cost was the alternative that has the majority of priority. Because of that, PT. PLN (Persero) will better concentrate in the cost that will be released to overcome the lateness of PLTU Lampung/Tarahan Baru project. The top three priorities that could be done by PT. PLN (Persero) in overcoming the problems of late PLTU Lampung/Tarahan Baru accomplishment could be summarized as follows:

- Planning stage → Extend availability of loan from the banks → Try to negotiate additional time for bank loan
- Organizing stage → The settlement of material (coal) distribution license → By coordinate with related institution
- Controlling stage → The lateness of giving reward (payroll) to the contractor employee → Give
sanction to the contractor that late pay the employee

4.2. Analysis of Business Solution

The 7S McKinsey framework was a function that consists of at least seven variables.

a. Strategy

All organizations have strategy. They are all trying to get to their goal. It may or may not be effective. And, in most cases it is not consciously laid out. Gordon Pearson stated the purpose of strategy is to achieve the following four elements:

- Setting direction
- Concentrating resources
- Maintaining consistency
- Retaining flexibility

Strategy that recommended is by having hedging. PLTU Tarahan Baru project contract was Rp 595.100.000.000,00 and USD 154.273.163,00. The loan that was in the currency of US Dollar (USD) and the machinery needed that will be bought using Chinese currency, Renminbi (RMB), make hedging as an alternative when there is a decrease or an increase in the exchange rate.

There are four banks that agreed to lend their funds for the PLTU Lampung/Tarahan Baru project. Among them are Bank Mega, Bank Mandiri, BRI, and BNI. Due to a decline completion of the project, the existing loans need to be extended. Time extension of the loan, the amount of interest, and the payback time is a few things to keep in renegotiated. A good relationship between the parties can have a positive effect on this funding strategy.

Revenue from electricity sales in 2010 rose 14,2% from 2009’s to Rp 102.973,5 billion. This increase was the result of higher number of customers, more customer connections and the application of new electricity tariff since July 2010. The electricity that being sold to the customer will be calculated by: \[ \text{Jam Nyala} \times \text{Tarif Biaya Pemakaian (Rp/kWh)} \].

Intangible advantages could be shown in the form of corporate cultural changes such as increasing desire to reduce the cost / budget without reducing the benefits gained, the increasing perception approach to business / commercial in the settlement of problems in the field, and the growing spirit of innovation and competition in contributing to the company.

b. Structure

At the project level, Hobbs and Menard identify seven factors that should influence the choice of project management structure, which were:

- Size of project
- Strategic importance
- Novelty and need for innovation
- Need for integration (number of departments involved)
- Environmental complexity (number of external interfaces)
- Budget and time constraints
- Stability of resource requirements

c. System

According to Clifford and Erik, there were some system or method that could effectively done to run several specific project activities when the resources are limited, some of them that could be applied in this power plant project are:

- Adding resources
- Outsourcing project work
- Scheduling overtime
- Establish a core project team
- Do it twice – Fast and correctly

d. Style

There is no one management style or formula for being an effective project manager. The world of project management is too complicated for formulas. Successful project managers have a knack for adapting styles to specific circumstances of the situation. According to Clifford and Erik, there were some main feature and skills that could be developed to make a success project manager, some of them are:

- System thinker
- Personal integrity
- Proactive
- High tolerance of stress
- General business perspective
- Good communicator
- Effective time management
- Skillful politician
- Optimist

e. Staff

The process of selecting and recruiting project members will vary across organizations. Two important factors affecting recruitment are the importance of the project and the management structure being used to complete the project. When selecting and recruiting team members, project managers naturally look for individuals with the necessary experience and knowledge / technical skills critical for project completion. At the same time, there are less obvious considerations that need to be factored into the recruitment process:

- Problem-solving ability
- Availability
- Technological expertise
- Credibility
- Political connections
- Ambition, initiative, and energy

f. Skill

Demands for mastering the knowledge and project management skills for managers will increase in the future. To that end, project managers’ needs to understand and anticipate the role of what will be done in the future. Training and seminars for both managers and employees also need to be done.

Human resources from the contractor will have to have adequate skills that suit to the power plant project. The contract between the contractor and the subcontractor will have to identify what skills that were needed in the project site and what are the minimum requirements to get the job. PT. PLN (Persero) should also control the skills that the worker have, and gave minimum requirement of the workers.

g. Shared Values

Unlike project scope statements, which include specific cost, completion dates, and performance
requirement, a value involves the less tangible aspects of project performance. It refers to an image a project team holds in common about how the project will look upon completion, how they will work together, and/or how customers will accept the project.

Organizational culture refers to a system of shared norms, beliefs, values, and assumptions which binds people together, thereby creating shared meanings. This system is manifested by customs, norms, and habits that exemplify the values and beliefs of the organization.

V. CONCLUSION AND IMPLEMENTATION PLAN

5.1. Implementing Plan

Plan, Do, Check, and Act (PDCA) is a process of four common iterative step to solve problem that commonly used to quality controlling. This method was popularized by W. Edwards Deming, which often be considered as the father of modern quality control, so that often called the Deming Cycle.

The example of PDCA method application could be seen in the chart below.

Table 9. PDCA method application could be seen in the chart below.

<table>
<thead>
<tr>
<th>No.</th>
<th>Activities</th>
<th>W2</th>
<th>W4</th>
<th>W6</th>
<th>W8</th>
<th>W10</th>
<th>W12</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Plan:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Held brainstorming in meetings</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Formulate actions for business solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Dividing responsibilities and authorities</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Do:</td>
<td></td>
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<tr>
<td></td>
<td>• Issue the possible solutions</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Choose the best solutions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Implementing temporary solutions for trial</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Check:</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>• Measure solutions effectiveness</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Collecting informations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Make solutions to be better</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Act:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Implementing overall solutions</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

5.2. Requirement of Resources

Human resources is the key factor in implementing business solutions to solve work problems and control work process. In the application of business solutions that will be conducted in the project, human resource act as the subject or the perpetrators. So, to determine whether the alternative solution will be success or not is the project team itself. Special training or additional training should be given to the staff that is not too expert, alternatively outside their normal working hours.

Other resources that are needed is financial resources. In the application of good business solutions from the work process problems or the controlling of work process requires additional funds to be executed in field. As an example, the additional funding for regular meetings that being held weekly both by the internal team with the headquarters that also might involved other parties. The fund that was needed will then be covers of the transportation cost if the meetings was held in the headquarters and the project managers and its team members had to go to the headquarters and vice versa.

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