Acceleration for the Administration Process of Project Contract in Power Plant Service Company using DMAIC

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Abstract. Indonesian Government has committed to provide electricity to its citizen throughout Indonesia. Thus, PT Perusahaan Listrik Negara (PT PLN), an Indonesian Government-owned company, issued the Electricity procurement business plan (RUPTL) every year that shows the increasing demand of electricity of people. As a result, both increasing electrical capacity and the number of development of power plant in Indonesia must be arranged. Those facts can be opportunities for Power Plant Service Companies. The more power plants will be built, the more chances for company to get the project of power plant development. On the other side, Power Plant Service Companies often have an administrative issue, which contract documents takes overlong to be completed. This research aims to speed up the administrative process of document contract completion for Power Plant Service Companies. Define, Measure, Analyze, Improve, and Control (DMAIC) method has been chosen to be implemented in a Power Plant Service Companies. The result shows that lead time of document completion has been increase for 52.87 percent.

1. Introduction

RUPTL is an annually document plan for PT PLN, the state-owned electricity company in Indonesia. The aim of RUPTL is as a guideline for that company to obtain electricity from Independent Power Producers (IPPs) [1] to fulfill the people’s necessity. RUPTL 2016-2025 estimates that the demand of electricity reaches approximately 8.6 percent each year. Based on that estimation, power plant total capacity must be increased to 80.5 GW by 2025 [2]. Furthermore, to reach 100 percent electrification ratio, RUPTL states that power plant development project should be increase throughout Indonesia, especially with new and renewable energy as a source of power plant (25 percent) [3].

Currently, installed capacity of power plant in Indonesia still 55 GW, which 76 percent owned by PT PLN, and the rest is IPPs’.

This is a promising opportunity for power plant service companies. The services offered include power plant development projects, power plant capacity building, and operation and maintenance for power plant. The company must improve the quality of its work so that the power plant can be completed on time and work optimally.

2. Administration Problem Of Power Plant Service Company

Challenge which often faced by power plant service companies is the lengthy process of service contract documents completion. One of the causes is the number of unplanned projects in the work plan and budget of the company at the beginning of the fiscal year. So the process of completion of these contracts
becomes too long. This has resulted in an increase in gross billing of customers which caused the disbursement of the company's cash funds. The company's cash constraints affected in the company's refusal for other potential upcoming power plant service projects, decreased quality of service to customers, and risk the inability of the company to pay its obligations to employees and others.

3. DMAIC
A research is needed to solve the problem mentioned above. Six Sigma is one of the best methodologies in the field of process improvement. Six Sigma is statistically scientific and systematic approach for improve the quality [4]. Most of the problems solved by the Six Sigma Method use a process improvement approach that is synchronized to DMAIC [5][6].

DMAIC is a common problem-solving methodology for Six Sigma for improvement, continuous improvement, and understanding for all [7]. The Six Sigma method with the DMAIC methodology will be used to determine the root cause and recommended improvements that can have a significant impact.

This research aims to solve the problem of service contract completion. Hence, it can affect the smooth operation of the power plant service company in fulfilling customer requirement. Thus, indirectly the government's initial objective to increase the electrification ratio in Indonesia through the increase of power capacity and the construction of power plants can be more quickly achieved.

4. Research Design
Research has been conducted in a power plant service company in Indonesia. The research consists of five phase. First is Define, followed by Measure, Analyze, and Improve, and last but not least Control. The step-by-step the first three phases of DMAIC method has been represented in Fig. 1.

Define phase aim to design project charter that consists of problem statement, project scope, key metric, business impact, project time schedule, and also person in charge (project team). The team can discuss to the stakeholder to design table that consists of work flow of document completion alongside with identification of Supplier, Input, Process, Output, and Customer (SIPOC). Afterwards, swim lane mapping diagram can be generated.
Measure phase must be conducted to measure the critical-to-quality (CTQ) [6]. In this case, the CTQ is the lead time of each process of document completion.

After Define and Measure, Analyze phase was held to identify the root cause of CTQ [6]. This research used a fishbone diagram, whys analysis, and root cause analysis.

Improve phase conducted to fix the problem that has been identified in the analyze phase. This research designs new service level agreement (SLA), standard operation procedure (SOP), and risk assessment.

Control phase consists of doing the upcoming contract which controlled by SLA and SOP. Finally, the result of the controlled document completion can be compared with previous document completion (before DMAIC implemented).

The Analyze and Improve phases of DMAIC method has been represented in Fig. 2.
5. Results
For define phase, project charter has been initiated. The problem is the slow completion of the work contract process from the assignment letter stage to the completion of the employment contract. Project scope is only in X Company as a power plant service company from 2016-2017. Then, SIPOC table and swim lane mapping has been generated.
Tabel 1. SIPOC for Contract Document Completion

| No | Supplier                 | Input                                      | Process                  | Output                                      | Customer                |
|----|--------------------------|--------------------------------------------|--------------------------|---------------------------------------------|-------------------------|
| 1. | Customer                 | 1) Letter of assignment                    | Survey                   | 1) Budget                                   | Commercial Department   |
|    |                          | 2) Work plan and condition’ document      |                          | 2) Human Resource’demand                    |                         |
|    |                          |                                            |                          |                                             |                         |
| 2. | 1) Project               | 1) Budget                                 | Make a Pricing           | Pricing contract Draft                       | Marketing Department    |
|    | 2) Services Unit         |                                           |                          |                                             |                         |
|    | 3) Finance Department    | 2) Human Resource’demand                  |                          |                                             |                         |
|    | 4) Commercial Department |                                            |                          |                                             |                         |
| 3. | Commercial Department    | Pricing contract                          | Drafting of Bid Contract | Negotiation Report                          | Customer                |
| 4. | 1) Customer              | Draft                                      |                          |                                             |                         |
|    | 2) Legal Department      | Draft of Contract                          | Final Contract           |                                             |                         |

In the measure phase, the lead time as the CTQ of 14 documents as observation has been measured. The average lead time is 87 days. Analyze has been done by brainstorming to decision maker and stakeholders.

Figure 3. Fishbone Analysis

For Improve phase, SLA and SOP has been formulated. Afterwards, the Control phase has been tested for a document completion. The result shows that the lead time can be 46 days. It means that the document completion decrease for 52.87 percent

6. Results
The problem faced by that power plant service company is the lengthy completion contract administration. This is causing the decreasing of service quality to the customer, and at risk of the company's inability to pay its obligation to employees and other parties.
The root cause of the problem is long bureaucracy, non-standard price tariffs, changes in scope at work, and availability of competent resources.

DMAIC method can help to identify the root causes of the lengthy document completion. The lead time of document contract completion can successfully decreased approximately 52.87 percent.

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References

[1] F. S. Suryandari, “PLN to defer power plant projects totaling 9 GW,” The Jakarta Post, Jakarta, 11-Apr2017.
[2] Kementerian Energi dan Sumber Daya Mineral, “Rencana Usaha Penyediaan Tenaga Listrik PT Perusahaan Listrik Negara Tahun 2016 S.D.2025.” 2016.
[3] Kementerian Energi dan Sumber Daya Mineral, Keputusan Menteri Energi dan Sumber Daya Mineral Republik Indonesia Nomor 5899 K/20/MEM/2016 tentang Pengesahan Rencana Usaha Penyediaan Tenaga Listrik PT Perusahaan Listrik Negara (Persero) Tahun 2016 s.d. 2025. Indonesia, 2016.
[4] S. Raju and T. Sowdaminit, “Six Sigma Approach for Productivity Enhancement,” Productivity, vol. 56, no. 2, pp. 197–204, 2015.
[5] P. Harmon, “Incremental Improvement with Lean and Six Sigma,” in Business Process Change: A Business Process Management Guide for Managers and Process Professionals, 3rd ed., 2014, pp. 293–325.
[6] J. De Mast and J. Lokkerbol, “An analysis of the Six Sigma DMAIC method from the perspective of problem solving,” Int. J. Prod. Econ., vol. 139, no. 2, pp. 604–614, 2012.
[7] R. D. Snee, “When Worlds Collide: Lean and Six Sigma,” Qual. Prog., vol. 38, no. 9, pp. 63–65, 2005.