Cost Performance Study on EPC Projects in Banten Province (Case Study: Substation and Transmission lines 150 kV EPC Project)

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Abstract. Engineering. Procurement. and Construction projects (EPC) were involved with many people and used a lot of resources faced a lot of uncertainly and risk which were happened would be impact the performance of the project. Cost is a resource that plays an important role in supporting a project construction. Cost planning can be done through a costs scheduling in order to obtain the required amount of cost based on the time of project implementation. This study aims to assess the cost performance of the Substation and Transmission lines 150 kV EPC project in Banten Province. The study methodology includes identifying cost performance indicators derived from various issues by means of literature studies and portrait studies of substation and transmission lines 150 kV EPC projects in Banten Province. This research is expected to be able to provide a picture of the cost performance that is part of the Management Cost and Control System (MCCS) both in the planning process and during implementation. In the end, this study is expected to be able to provide positive recommendations for the contractor to produce the project with the best project funding. The impact of this study, will also provide a positive thing for the smooth running of the EPC Project, especially the construction of the Substation and Transmission lines 150 kV. Key word : management, project cost, cost performance, EPC

1. Introduction
Electricity system development planning in Banten Province is prepared by optimizing natural resources that are spread in the Java-Sumatra region. The development of the generating system is intended to offset and pursue the high growth of electricity demand in the Java-Sumatra region. We have to see the type of soil at the location to be built, such as swampy soil, rock, water or even consisting of sand before design planning process. This is the first step in the construction of a substation and transmission lines 150 kV. Basically, the carrying capacity and strength of the soil affect the type and depth of the foundation to be used. In every project implementation there are many things that affect the smoothness and success of a project, one of which is the cost management of project implementation of efficient work, in order to optimize the use of costs in accordance with the planning budget. In the initial project work, a study of resources, cost estimates, budgeting and cost control is likely to result in swelling in project costs, causing losses to the project owner and contractor. For this reason, this study aims to measure the cost performance of substation and transmission lines 150 kV. Things that must be considered are changes in the budget, cost estimates, availability of resources and cost control methods. If the cost performance study in the construction process can be identified and assessed with appropriate techniques and methods, then responded to and treated with appropriate preventive and corrective action, not only will reduce the risk but also can increase the cost performance of project implementation.
1.1. Research Question
From the background that has been described previously, the formulation of the problem that will be answered in this study are:
1. what is the meaning of cost performance?
2. What are the cost performance indicators for substation and transmission lines 150 kV EPC projects?

1.2. Construction Project Financing Management
The process of implementing a construction project starts with the owner's idea being translated by the designer in the form of a construction design. The construction design is then made by observing and considering many things such as materials, mobilization, and technical development. Construction work has 4 constraints namely cost (money), quality (quality), time (time) and scope of work (scope). In carrying out construction work involves many parties such as owners (service users), consultants or contractors (service providers). The relationship between users and service providers is regulated legally so that each party is disciplined in carrying out their rights and obligations so that the construction can run well.

The purpose of construction management is to manage management functions or manage the development of development in such a way that optimal results are obtained in accordance with the requirements (specifications) for the purpose of achieving goals. It should also be noted about the quality of the building, the costs used and the time of implementation. In order to achieve results, efforts are always made to carry out quality control (Cost Control), cost control and time control which is controlled by the project control team (Project Control). The stages of these activities are generally divided into four parts, namely:
1. Planning
   Planning is a process that tries to lay the foundation of goals and objectives including preparing all resources for their achievement.
2. Organizing
   The organization is a vital tool in controlling and implementing projects. Project organization is said to be successful if it is able to control 3 (three) main things, namely the quality of time and cost. An organization has the characteristics of a group of people who work together on the basis of their respective rights, obligations and responsibilities.
3. Execution
   Implementation activities include work in the field in order to realize the building structure that involves some workers either taken from one company or carry out new work contracts with the construction team (Construction).
4. Controlling
   Supervision activities carried out with the aim that the results of the implementation of building structure work in accordance with quality and based on the calculated specifications.

2. Research Methodology
This research is the result of descriptive identification sourced from various issues, literature studies, portrait studies of substation and transmission lines 150 kV projects in Banten Province. In this study using indicators - indicators in determining cost performance such as owner conditions that are less supportive, project management, condition of the process of design during design, financing conditions of the owner, company conditions, weaknesses in management systems, internal processes, project financial conditions, project implementation conditions, technology and construction methods regarding the impact of risks on improving
2.1. Research Process
The study was conducted after the researchers saw the issue of the problem of the EPC project cost performance studies specifically the construction of the substation and transmission lines 150 kV Banten Province. The study process can be seen from the flow chart below:

![Flow Chart](image)

**Picture 1.** Research process

3. Results and Discussion
Portrait of the Project Under Research:

![Project Image](image)

**Picture 2.** Substation and transmission lines 150 kV

3.1. Discussion
Cost performance is part of the Management Cost and Control System (MCCS) which is a process in two periods, namely: during the planning period and at the time of implementation. In project finance management, there are indicators that affect cost performance in 150 kV substation and transmission construction projects, namely:

1. Resource Planning
Resource Planning determines what resources (people, equipment, materials) and how much each must be used to carry out project activities. The nature of a project or organization will affect resource planning. This resource planning in principle makes a plan needs of various resources (especially material, human resources, costs, etc.) based on work activities in a project. This process is very closely related to the cost estimation process.

2. Estimated cost
Prepare estimates of the costs and resources needed to complete project activities. If the project is carried out through a contract, it is necessary to distinguish between the estimated cost and the contract value. Cost estimation involves a quantitative calculation of the costs incurred to complete the project. While the contract value is a business decision where the estimated cost obtained from the estimation process is one of the considerations of the decision taken. One of the most important outputs of project cost management is an estimate (estimate) of costs. There are several types of cost estimates and tools and techniques that can be used to help develop cost estimates. It is also important to develop a cost management plan that outlines how variations in cost management for a project.

3. Cost budget
Make an overall allocation of estimated costs into job details to establish a baseline as a measure of performance. From this process a cost baseline is obtained which is used to assess project performance. Cost baseline (cost baseline), i.e. the budget stated according to the planned time of use is compiled by adding up all estimated costs to be used in a period of time. In preparing a budget, what should be considered is in the form of:
- Statement of project coverage
- WBS and its explanation
- Estimated activity costs and supporting details
- Project schedule: used to aggregate costs for each period
- Resource calendar
- Contract: Relates to what products or results have been purchased, and how much it costs

4. Cost control
Control changes in the project budget. All causes of cost deviations must be well documented so that corrective steps can be taken. The process of controlling costs includes monitoring financial performance, ensuring that only appropriate changes are included in the revised cost baseline and providing information to stakeholders that changes can result in changes in costs as well.

4. Conclusion
This study concludes several key points according to the research question:
- Cost performance is part of the Management Cost and Control System (MCCS) which is a process in two periods, namely: during the planning period and during implementation. In general, cost performance is carried out at the time of implementation. The failure of the cost performance system to accurately describe the conditions of a project is not directly. Cost performance will only be as good as initial planning compared to measured performance. Therefore, determining the planning system greatly influences cost performance.
ii. Cost performance indicators on the EPC project especially on substation and transmission lines 150 kV include resource planning, cost estimation, cost budgeting and cost control.

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