

Analysis of Cost Control Process in PT. S' Project Management on a 2018's Work Package: Constructing a 100-Tonne-Capacity Integrated Cold Storage Facility in Kampar District

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ABSTRACT

Integrated Cold Storage facilities are much needed by the Indonesian Marine and Fisheries Ministry. The construction of ICS facility in Kampar District by PT. S in the fiscal year 2018 proved that effective project management (PM) must be implemented. One way to measure the performance of PT. S' PM is by examining the control cost process throughout the project. Control costs is the process of monitoring the status of the project to update the project costs and managing changes to the cost baseline. Control cost process was analyzed using Earned Value Analysis. The results showed that PT. S' PM faced many challenges in maintaining planned values. The result of this case study was presented to the company as an improvement tool for later projects.

Keywords: *cost control process, Kampar.*

1. INTRODUCTION

According to the survey done by PDSPKP, *Patin* fish is a hot commodity wanted by European and American market. *Patin* fish is very healthy and delicious due to its delicate white meat that is very similar to *Dory* fish [1]. However, *Patin* fish is significantly cheaper, so it is going to be more affordable, thus easier to sell to many types of domestic and international markets. Since Vietnam is no longer supporting it [2], Indonesia wants to step up and fill the market demand. In Kampar, Riau, there are lots of *Patin* (or *Pangasius*) farmers wanting to share their products [3].

In order to do this, the Marine and Fisheries Ministry (KKP) has to arrange various types of bids to fulfill their goals [3], one of them is to store the fish to be used later. KKP has opened a series of tender bids on ICS Constructions on Fiscal Year 2018.

Integrated Cold Storage Facilities were spread across Indonesia and PT. S won the bid of which the facility was located on Kampar district, Riau. ICS construction bids were held for two locations in the financial year 2018, in Sibolga (North Sumatra) and

Kampar (Riau Province). After exhausting efforts that cost time and money, PT. S was able to finish on time and given the appreciation and acknowledgment by KKP.

The optimization of resources was of primary concern to PT. S due to its limited budget. The deviation of the budget is common in construction projects, and some findings supported that deviation [4]. Although PT. S was able to finish on time, it is believed that if PT. S had implemented good control cost process, it would have been able to stay on budgets by making fewer mistakes.

A project may be defined as "a temporary endeavor undertaken to create a unique product, service or result" [5]. In discussions of project management, it is sometimes useful to make a distinction between terms such as project, program, task and work packages [6]. Project management is commonly defined as the process of accomplishing a particular task. In order to achieve the goal of the project, specific tools and techniques (such as CPM and matrix organization) could be used. Considering the project task, this is usually viewed as having the features of being unique, complicated, and has to be completed during certain time scale, within the

control of time, cost and quality and need to be supervised closely so the result should be optimized [7].

For a project, cost management is a critical element of project management to run it successfully. The management of costs is commonly reflected in a company's strategic goals, mission statements and business plans of a project organization in many ways [8]. Control costs is the process of monitoring the status of the project to update the project costs and managing changes to the cost baseline. The key benefit of this process is that the cost baseline is maintained throughout the project. This process is performed throughout the project [9].

Earned value analysis compares the performance measurement baseline to the actual schedule and cost performance [10]. EVM integrates the scope baseline with the cost baseline and schedule baseline to form the performance measurement baseline [11]. EVM develops and monitors three key dimensions for each work package and control account: Planned value. Planned value (PV) is the authorized budget assigned to scheduled work. It is the authorized budget planned for the work to be accomplished for an activity or work breakdown structure (WBS) component, not including management reserve. This budget is allocated by phase over the life of the project, but at a given point in time, planned value defines the physical work that should have been accomplished [12]. The total of the PV is sometimes referred to as the performance measurement baseline (PMB). The total planned value for the project is also known as the budget at completion (BAC) [8].

Earned value (EV) is a measurement of work performed expressed in terms of the budget authorized for that work. It is the budget associated with the authorized work that has been completed [10]. Progress measurement criteria should be established for each WBS component to measure work in progress. Project managers monitor EV, both incrementally to determine current status and cumulatively to determine the long-term performance trends [13].

Actual cost (AC) is the realized cost incurred for the work performed on an activity during a specific period. It is the total cost incurred in accomplishing the work that the EV measured. The AC needs to correspond in definition to what is budgeted in the PV and measured in the EV (e.g., direct hours only, direct costs only, or all costs including indirect costs). The AC will have no upper limit; whatever is spent to achieve the EV will be measured [14].

2. METHODS

2.1. Determining Research's Method and Phases

This research was done to improve the control cost process on project execution in PT. S. The control cost process was expected to advance the project monitoring and control process, so management will have this as a guideline for future projects.

The data in this research was in a historical quantitative data. The data was obtained straight from its source which was PT. S. In this research, the methodology employed was a quantitative method used to map the obtained data into a matrix and was evaluated by earned value method, followed by mathematical-based analysis to depict a comprehensive picture on an actual phenomenon.

2.2. Research Instrument and Variables

The instrument used in this researched was Earned Value Method to measure the project's performance in schedule and cost. The use of this instrument was expected to verify the result of the research, so its field implementation has an argumentative basis to be held as responsible.

Research variables were attributes of a collection of objects, which were the data to be analyzed. The data here were varied with one another. In this research, the variables involved were the primary costs from project budget assembled by PT. S' management; actual costs; scheduled project completion and the time period of actual project completion. Those primary costs with scheduled time period were translated into project performance indicators. Furthermore, it was set as a model on how control cost process should be executed in the future.

2.3. Data Collection

The data used in this research was comprised of primary data and secondary data. Primary data is the data that is obtained directly from its source via face-to-face interview. The primary data in this research was used to assemble the description of project management done by the management. The actual description of the project management then later was compared with the quantitative analysis using the instruments. The comparison result of actual project management with the quantitative analysis used as the foundation of factors that lead to cost overrun and time delay.

Secondary data is the data in the form of notes, structured summaries of actual event that is obtained from the company during the life of the project. The data was also obtained from reference books, journals

and other literatures that are relatively linked to this research. Secondary data is information that is obtained in its ready form; meaning the data is already processed by someone and presented ready to the public. In this research, secondary data were collected first with the intention to determine the elements that from an event that later became the foundation of the hypothesis regarding that event.

2.4. Analysis using Earned Value Method

In predicting the time period needed until the project reach completion stage along with its total incurred total cost, a first-stage analysis on basic forecasting assumption is needed. Basic assumptions are:

2.4.1 Archive Records

Computerized archive records were used in emphasizing evidence for the research. The archived records were in the form of toll road recordings during road repairs, organizational records, maps and geographical charts of BRR Toll Roads, traffic survey data that crosses the BRR Toll Road, and personal records [11].

- Assumption that efficiency and inefficiency that influence the project performance in the past will not happen in the future, thus past performance is not considered as an appropriate predictor to analyze the future performance. To accommodate this assumption, the forecast on Estimate Cost at Completion is calculated using (1).

$$EAC_{(cost)} = BAC - CV \quad (1)$$

While Estimated Time at Completion is calculated using (2).

$$EAC_{(time)} = SAC - SV \quad (2)$$

- Assumption that efficiency and inefficiency in the past influences the project performance will happen in the future, so the past performance is considered as a correct predictor to analyze future performance. The forecasting calculation needs to include index performance factors. With that being said, forecasting using the value of Estimated Cost at Completion is calculated using (3).

$$EAC_{(cost)} = BAC/CPI \quad (3)$$

While Estimated Time at Completion is calculated using (4)

$$EAC_{(time)} = SAC/SPI \quad (4)$$

3. RESULTS AND DISCUSSION

3.1. PT. S' Company Profile

PT. S, a small-sized company, was established in Jakarta in 1993. PT. S focuses itself on doing business with Indonesian government, namely Ministry of Marine and Fisheries and Ministry of Energy and Mineral Resources. PT. S mainly deals in procurement projects but for the last 8 years, they have constructed a cold storage facility each year.

PT. S has been KKP's partner since 2009 and has gained a positive reputation for always completing their project on time. PT. S uses 'Flag-borrowing' method that lets them use their business partner's companies to work on another project as well. This is done because government-based projects usually set limitations on the quantity of projects won each financial year. Due to this method, PT. S does not have a very broad work references. However, the good reputation is shouldered in its CEO. PT. S only has 10 employees (including its owner/CEO) and its employees' job descriptions include being in a Project Team and doing their day-to-day work. On doing its core business, PT. S has several divisions working simultaneously on several projects:

- Administrative staffs
- Procurement staffs
- Logistics and Site Handling staffs

3.2. Project Delivery Method in PT. S

PT. S starts their work by retrieving upcoming bidding documents in LPSE/SPSE website. For PT. S has done numerous government-based projects, their methods are always the same.

Procurement Projects

Once PT. S wins the project, the company will wait to have their SPPBJ (Letter of Appointment of Goods and Services Provider/Surat Penunjukan Penyedia Barang dan Jasa) handed to them before they start purchasing the goods. PT. S does its purchasing work and drafts their down payment invoice simultaneously in order to get a fast track to complete their project. This has been done for years and is supported by the CEO's ability to manage their cashflow. PT. S does not have a financial division so the purchasing staff keeps track on the projects' cashflow.

Construction Projects

Once PT.S enters the project's bidding process in LPSE/SPSE, the company will assemble their subcontractors' CV and will start their own bidding

process. Before the submission deadline approaches, PT. S usually has already decided their choice on subcontractors. Once PT. S wins the bid, the Purchasing staff goes to the construction site and starts building partnerships with local material stores and other big distributors that can give lowest prices. Furthermore, the subcontractor will propose an order request on materials and resources from PT. S chosen vendors and the purchasing staff (in Jakarta) will do a crosscheck on whether the order matches the activity the contractor is currently on. PT. S also sends a site handling staff as their representative there. He/she will report back to PT. S regarding any executive decisions. PT. S is also accompanied by a Supervising Consultant that is also hired by the owner of the project through bidding process. The consultant will give weekly progress report to the owner of the project. The consultant also acts as the executive decision maker regarding technical stuffs.

3.3. 100-Tonne Capacity Integrated Cold Storage in Kampar

According to the Terms of Reference drafted by the authorities in Ministry of Marine and Fisheries, ICS /UPI (*Unit Pengolahan Ikan*) or Fish Processing Unit is a place to conduct fish processing activity. It is completed with a freezing unit in order to improve added value on fisheries product. ICS/UPI constructed is going to be utilized to produce processed goods from frozen and/or fresh fish. Therefore, it needs to be built with processing facility, freezing facility, and cold storage facility with room temperature no higher than - 25°C (or lower). This is done to maintain quality and condition of frozen products. ICS/UPI which handles fresh products needs to have freezing facility that has the ability to maintain the products' temperature on an ice melting point.

Executing Contractor will build the ICS by focusing on quality, time, cost, and contractual administrative. Contractually, executing contractor is liable to PPK (*Pejabat Pembuat Komitmen*). In its operational activities, the executing contractors will get supervision from PPK's staffs that are comprised of administrative, financial, and technical managers who are appointed and are held responsible to PPK.

3.4. Analysis of Control Cost Performance using Earned Value Method

Week 1

In week 1, PT. S hadn't made any purchase yet and there was a 0,15% of actual field progress. From the interview with Finance and the Project Manager, the work in week 1 came from the owner of the project, KKP. It was their initiative to dig the structure foundation that led to introductory work. Due to the non-existent fund invested in week 1, it is

understandable that PT. S was behind on the Accumulated Planned Value of 0,30%.

Week 3 – Week 4

Week 3 marked the beginning of Structure work. With the influx of 1,05% field progress in Week 3, PT. S only made tiny improvement to the Earned Value. By the end of Week 3, they settled in Rp 186.384.685 in Earned Value and minus 3,41% from the accumulated PV. Project Manager mentioned how he did not worry too much about the slow progress in the first few weeks because once the heavy materials came to the site, the progress would surely rise. The digging and piling of soil/dirt work (II.1.A) also started in week 3 and they steadily added 0,149 of value each week. In week 4, PT. S started paying down payments for concrete, metal, and other heavy materials and half of them were shipped to Kampar. Actual field progress in Week 4 was 2,14% when it should have been 8,85%. They still faced difficulties pacing up to the Planned Value since the materials needed were not on site yet.

Week 9-12

Week 9 marked the end of digging and piling soil work (II.1.A) and the beginning of Insulated Panel installation (V.A) which contributed about 0,686% to the ongoing progress. By the end of week 9, PT. S reached 18,04% of actual field progress where it should have gotten 36,67% in accumulated PV progress.

By week 10, several works namely installation and plastering (II.2.A), ICS Building plumbing work (III.A.1), ICS Building Electrical installation (III.B.1) and Refrigerated ammoniac system installation (V.C) began and contributed to the accumulated field progress of 23,20%. Nevertheless, the accumulated PV progress was 43,73%. PT. S was short of roughly 20% worth of progress owed to the owner of the project, KKP.

According to the project manager and construction manager, the lack of skills in the field workers and the inconsistency of weather were to blame. Due to the lack of proper skill and differences in work methods, wasteful resources could be found around the ICS Kampar facility. In week 11, they only contributed roughly 7% to the accumulated field progress that amounted to 30,12%.

In week 12, several other works also began their construction, such as spandex wall and spandril plafond work (II.2.B), water way from processing room and stainless steel topping off (II.2.F), drainage (IV.A), rain water control tank (IV.B), intra site paving (IV.C) and security post work (IV.G) contributed to the actual field progress for about 1,302%. PT. S deviated about 5,780% from the schedule, amounting to only 31,42% of accumulated actual field progress and getting further away from the accumulated PV progress in 58, 86%.

With the shortage of 27,44% of progress, PT. S was faced with consequences and they had to calculate their moves to able to reach the planned progress.

In Week 12, Cost Performance Index can be calculated to measure the performance of their budget control performance and also Schedule Performance Index to calculate the performance of project duration.

$$\text{CPI: } \frac{BCWP}{ACWP} \text{ or } \frac{EV}{AC} = \frac{5.561.980.980}{6.772.647.502} = 0,82$$

$$\text{SPI: } \frac{BCWP}{BCWS} \text{ or } \frac{EV}{PV} = \frac{5.561.980.980}{10.418.426.010} = 0,53$$

With CPI and SPI calculated, assuming that efficiency and inefficiency in the past influence the future project performance, Estimate at Completion (EAC) on the total cost or total duration until the completion of the project can be calculated as such:

$$\text{EAC}_{(\text{Cost})}: \frac{BAC}{CPI} = \frac{5.561.980.980}{0,82} = \text{Rp } 6,782,903,634$$

$$\text{EAC}_{(\text{Time})}: \frac{SAC}{CPI} = \frac{12}{0,53} = 23 \text{ weeks}$$

The EAC indicates that if the project continues with this efficiency level, there will be budget overrun amounting to Rp 3,635,522,376 ($\text{EAC}_{\text{cost}} - \text{Accumulated PV} = 6,782,903,634 - 10,418,426,010$). Furthermore, there will be a delay at project completion for about 9 weeks (23 weeks – 12 weeks).

4. CONCLUSION

4.1. Conclusions

Based on the research that has been done, there are few conclusions to be acknowledged:

The main factor that led to budget overrun and progress delay were the inconsistency of weather and the lack of field worker's skill. Those points made the progress went slower than expected regardless of the money spent to accelerate the project.

The evaluation of PT. S Project Performance showed the project resource management, time management, and control cost management did not quite meet the expectation.

4.2. Recommendations

The difference or gap that came from the budgeted cost and the planned project duration against the actual condition indicated that project management done by PT. S had not been enough to ensure the performance balance measured by three main dimensions: time, cost and scope of project completion.

To eliminate that gap, the project management has to run the evaluation function through consistent project audit activities. Project audit is an effort to check all the

aspects related with the progress of a project [12] that can help the project management to recognize a problem as early as possible, to conduct a repair and to avoid such problem to occur in the future. With that being said, the performance and all field dynamics monitoring concept and the monitoring on changes and risk mitigation should be fully implemented. Audit needs to be done by checking thoroughly all the project governance method and the current project results.

4.3. Managerial Implication

The consequences of implementing EVM method is that project management has to ensure that project charter has to be assembled comprehensively and to bind the stakeholders' commitment whose influence matter on the implementation of project governance. Then this project charter has to be broken down into a work breakdown structure, work package, time schedule and everything else that is executable and manageable.

Something that should be taken into account by implementing EVM in project governance is that management has to implement an administrative-friendly working method. The actual field cost needs to be in line with the progress and it needs to be recorded.

REFERENCES

- [1] M. C. Monfort, "Carrefour also stops selling pangasius in Spain," Fish Information & Services, 2017.
- [2] T. Dao, "Whitefish wars driving vietnam's pangasius away from EU, US," Seafood Source News, 2018. .
- [3] P. R. KKP, "Industri patin Indonesia rebut pasar global," 2018. .
- [4] G. G. . Ward, *Effective Project Management: Guidance and Checklists for Engineering and Construction*. Hoboken: John Wiley & Sons, Inc., Hoboken, New Jersey, 2018.
- [5] S. Mubarak, *Construction Project Scheduling and Control*, 3rd editio. John Wiley & Sons, Inc., Hoboken, New Jersey, 2015.
- [6] Project Management Institute, "A guide to the project management body of knowledge (PMBOK guide)" 2017.
- [7] R. H. Sears, S. Keoki; Sears, Glenn A; Clough, *Construction Project: A Practical Guide to Field Construction Management*. 2008.
- [8] P. Smith, "Project Cost Management – Global Issues and Challenges," *Procedia - Soc. Behav. Sci.*, vol. 119, pp. 485–494, 2014.

- [9] F. Authors, "Project cost control : a new method to plan and control costs in large projects," 2016.
- [10] M. Gershon, "Using earned value analysis to manage projects," vol. 15, no. 1, pp. 11–15, 2013.
- [11] S. Sandhya and N. Ganapathy Ramasamy, "Analysis of project performance using earned value analysis," *Int. J. Sci. Eng. Technol. Res.*, vol. 4, no. 4, pp. 1080–1085, 2015.
- [12] F. Acebes, J. Pajares, J. M. Galán, and A. López-Paredes, "Beyond earned value management: A graphical framework for integrated cost, schedule and risk monitoring," *Procedia - Soc. Behav. Sci.*, vol. 74, pp. 181–189, 2013.
- [13] P. Smith, "Global professional standards for project cost management," *Procedia - Soc. Behav. Sci.*, vol. 226, no. October 2015, pp. 124–131, 2016.
- [14] PMI, *Construction Extension To The Pmbok® Guide*. Project Management Institute, Inc., 2016.