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Evaluation of Sweetened Condensed Milk Project using PERT and Earn Value Management at PT. XYZ

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ABSTRACT: *The purpose of this study is to find out and evaluate the effectiveness of the project schedule and the efficiency of cost planning. The data source in this study consists of secondary data which is data from PT. XYZ and existing contractors. The technique analysis used in this study with the PERT method (Program Evaluation and Review Technique) and to evaluate the efficiency of this project using the Earn Value Management. The results of this study indicate that the effectiveness of this scheduling method has still not been achieved because the schedule can still be accelerated for 13 days at an additional cost of Rp.544,115,700 on the sachet machine and accelerate the schedule for 20 days on a can filling machine with an additional cost of Rp.1,285 .955.000 Then for the efficiency of this project with the EVM method obtained for this project Cost Performance Index (CPI) is 1.07 this means that CPI> 1 shows that the cost of completing work is higher than planned, For Schedule Performance Index (SPI) <1, meaning the project is too late, but Actual Cost (AC) < Plan Value (PV) until The main scope of the project shows that to achieve the expected output of this project actual costs are lower than Budget Cost Work Schedule (BCWS) in reaching the main scope, so that the achievement of this project target has been achieved because it has produced output as targeted. The PERT and EVM methods can be used as a reference for making project plans and budget monitoring to achive the effectiveness and efficiency.*

KEYWORDS: *Project Management, Program and Evaluation Review Technique (PERT),Earn Value Management*

I. INTRODUCTION

PT. XYZ is a company that produces various kinds of dairy products, for the products produced are Ultra High Temperature Milk and Sweetened Condensed Milk. Based on increasing market demand from sweetened condensed milk products, it requires additional capacity at the Sweetened Condensed Milk Factory. The expansion of the Sweetened Condensed Milk project is a project activity to increase the capacity of the Sweetened Condensed Milk Factory at PT. XYZ with the aim of meeting market demand based on Supply Chain Management planning). Problems that occur from project implementation at PT. XYZ is project delays and cost overruns caused by the absence of controls with the right methods to supervise existing projects so that it requires solutions to evaluate ongoing projects

II. STUDY OF THEORY AND METHOD

Project Management: Project According to Dennis Lock in his theory can be explained (Project Management, 2007) becomes a process to plan, coordinate, and control something complex and regulate a variety of change activities in the modern, commercial, and IT projects. The purpose of project management is to estimate or predict the number of hazards and possible problems and to plan, organize and control activities so that projects are successfully completed regardless of all the risks. This process must prepare well before any resources are carried out, and must continue until all work is completed. The main objective of the project manager is to obtain satisfactory results for the project sponsor or the buyer and all other key stakeholders in the term promised work time and without exceeding the budget and other resources than has been determined. Project management is planning, organizing, monitoring, managing all aspects of the project with motivation to achieve project goals in safe actions, based on an agreed schedule, budget and performance criteria that can be seen from the definition of project management, namely the focus of project performance, according to time period, quality and cost.

The Effective & Efficient Project Management: Popular scientific dictionaries define efficiency as the accuracy of use, results of use or support for purpose. Effectiveness is the main element to achieve the goals or targets that have been determined in each organization, activity or program. It is called effective if a goal or target is reached as determined. "Effectiveness is a measurement in terms of achieving predetermined goals. Effectiveness is viewed from the point of achievement of goals, where the success of an organization must consider not only the goals of the organization but also the mechanism of self-defense in pursuing goals. In other words, the assessment of effectiveness must be related to the goals and objectives. Effective Project Management is if the activity is carried out correctly and provides useful results. Measuring the effectiveness of project management requires measurements to measure timeliness performance so that costs do not occur. Of the various methods used in project management, the most common group of PERT methods (Program Evaluation and Review Technique). where efficiency is defined as meeting all internal requirements for costs, margins, asset utilization and other efficiency measures. To measure efficient Project Management, the Earned Value Management (EVM) method is used. Earned Value Management is called deviation analysis, is a project management technique to measure project performance and progress in an objectivity perspective.

Program Evaluation and Review Technique (PERT) : The PERT Method Dictionary understands each activity as a random variable and has several possible distributions. Empirically it was found that in practice they were best represented by distribution beta (Anna Horáčková, 2011). PERT method involves 3 time estimates for each activity, Fiala (2008) shows 1) Optimistic time (τo): the estimation of time required under optimum conditions 2) Most likely time (τm): the most probable amount of time required 3) Pessimistic time (τp): the estimation of the time required under the worst condition. The desired duration is τe, i.e. the average of three estimation durations: τe = (τo + 4τm + τp) / 6 Standard deviation: σe = (τp - τo). Variance (σe2) = ((τp - τo) / 6) 2 In analyzing complex problems, estimation is needed for completion of projects in certain time or also called Expected project duration (EPD) or which means completion of this project, including critical time in the project .EPD is defined: EPD = Σ τe. Variation of the sum of all critical path activities is defined: σ = Σ σe2 .Z, is the number of standard deviations of the normal distribution given based on the formula: Z = (TD –EPD) / σe. The Evaluation and Review Technique (PERT) program can be used to estimate the duration of the project. PERT applies the critical path method (CPM) in weighting the average duration.

Time-Cost Trade Off: To shorten the time, it starts with determining the starting point, which is the point that refers to the project's normal time and costs. The point generated from summing the normal costs of each project component component activity, while the normal project completion time is calculated by the CPM method. Direct costs, indirect costs and usability costs are the total project costs that determine the optimal project completion time. All three change according to the time and progress of the project. Even though it cannot be calculated using a certain formula, in general the longer the project runs, the higher the cumulative cost required. Based on the description above it can be concluded that the procedure shortens time as 1. Shorten the time for project completion, Slack identification with CPM, and use the normal time period. Determine the normal cost of each activity. Determine the accelerated costs of each activity. Calculate the cost slope for each cost component. Shorten the period of activity, starting from critical activities that have the lowest path. 6. Each time you have finished shortening the activity, there is a possibility that there is a Slack that may be used to extend the time of the activity concerned to minimize costs. If in the process of speeding up the time to hit a new graphical path, accelerate the activity of activities that have the lowest network combination. Calculate project indirect costs and draw them on graph paper. Add direct and indirect costs to find total costs before the desired period. 9. Check on the total cost graph to achieve efficient time, namely the lowest cost time period for project completion, can be seen in Figure 1

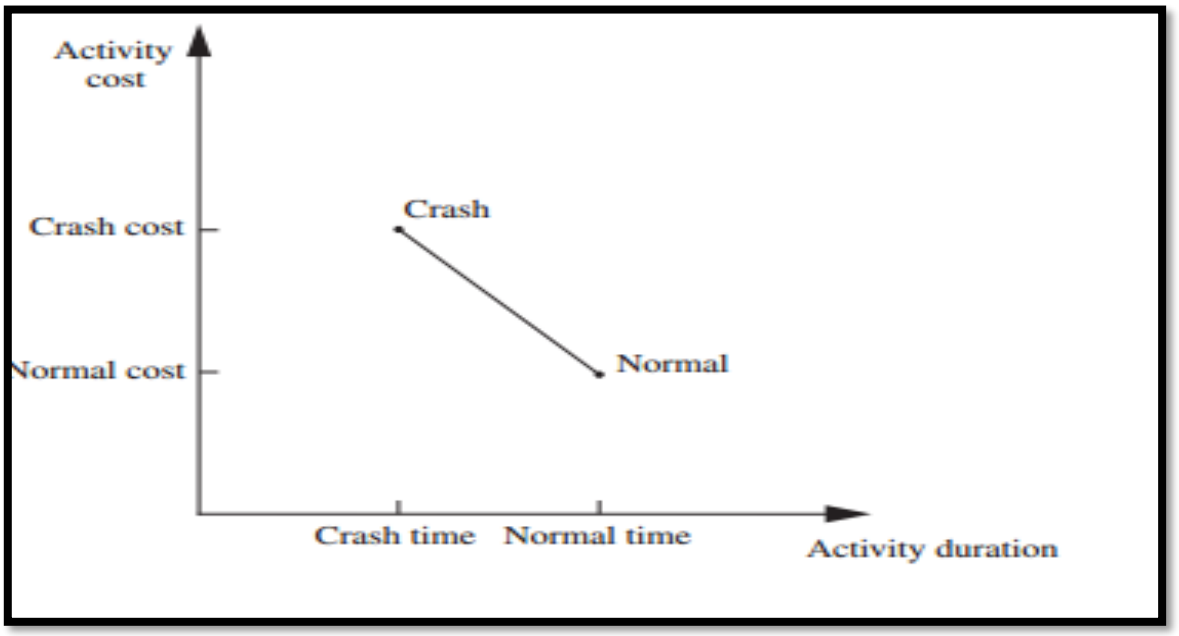


Figure 1. Typical time-cost (Hillier & Liberman,2010)

Indirect costs are costs that are not specifically associated with certain work items. Project costs include all costs needed to operate production activities and cannot be attributed to direct costs. When the trade-off of all activities is considered in the project, the relationship between the duration of the project and the total construction costs is developed. Direct costs are the sum of all construction activities and indirect costs are project overhead. Thus, the total construction cost of the project can be calculated by adding direct costs to indirect costs.

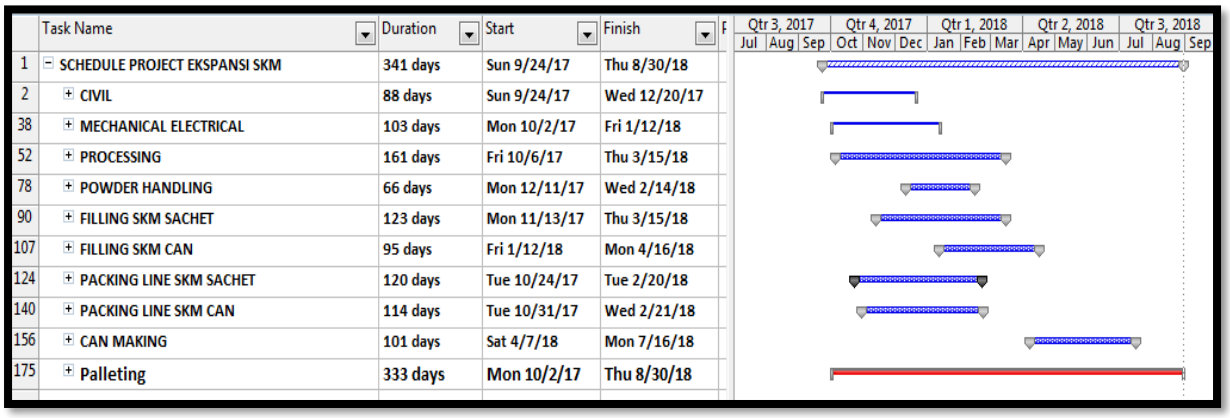
Earn Value Management (EVM) : arned Value Management (EVM) Method. Earned Value Management is called deviation analysis, is a project management technique for measuring project performance and progress in an objective perspective. There are three basic EV implementation parameters, including: 1) BCWS (budgeted cost for work scheduled) BCWS is defined as budgeted costs that are permitted to complete the project plan workload at a certain stage during project implementation. And that mainly reflects the regulatory workload of the plan, not the cost regulation. The calculation formula is: BCWS = Plan Workload × Quota Budget Price 2) ACWP (actual cost for work performed) (actual costs for work performed). ACWP is defined as actual costs at certain stages during project implementation. ACWP is mainly used to reflect the actual consumption value, 3) BCWP (budgeted cost for work performed). BCWP is defined as the cost of calculating work achievement and quota budget price, which can also be called EV (Earned Value / value received). And it can measure the achievement of the project, the formula used: BCWP = Accomplishment Workload × Quota Budget Price). Four elements Earned Value (EV): a). CV (Cost Variance / Cost Deviation). CV is defined as the difference between BCWP and ACWP in project inspection, and calculation methods are: CV = BCWP-ACWP. If CV <0, it means that the actual cost is higher than planned (bad); CV> 0, means that actual costs are less than planned and facilities under expenditure or high efficiency (good); CV = 0, meaning that actually the right cost is planned (good) b). SV (Schedule Variance / Schedule Deviation) SV is defined as the difference between BCWP and BCWS in project inspection, and the calculation formula is: SV = BCWP-BCWS.SV <0 , means that the project is ahead of schedule (good); SV> 0, means project schedule delay (bad); SV = 0, means that the actual schedule is planned (good), 4) CPI (cost performed index). CPI is defined as the ratio between BCWP and ACWP in the project, the calculation formula is: CPI = BCWP / ACWP. CPI <1, means that the cost of completing work is higher than planned (bad); CPI> 1, meaning that the cost of completing work is less than planned (good); CPI = 1, means the cost to complete the work is less than planned (good or sometimes bad), 5) SPI (Scheduled Performed Index) SPI is defined as the ratio between BCWP and BCWS in the project, the calculation formula is: SPI = BCWP / BCWS . SPI <1, meaning the project is late on schedule (bad); SPI> 1, means that the project is earlier than scheduled (good); SPI = 0, means that the actual schedule is planned (good).

Method: The research technique used in this study is descriptive. Where in the sense descriptive research is research that does not require administration and control of treatment. "Descriptive research is not intended to test

certain hypotheses, but only describes what it is about something variable, symptom or condition" (Arikunto, 2016: 234). According to Sugiyono (2005) states that the descriptive method is a method used to describe or analyze the results of research but not used to make broader conclusions. This research category is a study with quantitative data with qualitative analysis. (Sutawijaya, Ahmad. H and Eri Marlapa, 2016). The data used is secondary data from the company and the method is described descriptively

III. RESULTS AND DISCUSSION

RESULT: The master schedule is the basis for analyzing this scheduling method. The project schedule at Ms. Excel is processed into a work schedule that is processed through Microsoft. Project. The outline in the scheduling of the Sweetened Condensed Milk Expansion project is 1) Planning, 2) Procurement (Procurement), 3) Execution of the three items formulated and detailed in the Microsoft project. The description of the process sequence sequence of activities can be seen as follows Figure 2.



	Task Name	Duration	Start	Finish
1	SCHEDULE PROJECT EKSPANSI SKM	341 days	Sun 9/24/17	Thu 8/30/18
2	CIVIL	88 days	Sun 9/24/17	Wed 12/20/17
38	MECHANICAL ELECTRICAL	103 days	Mon 10/2/17	Fri 1/12/18
52	PROCESSING	161 days	Fri 10/6/17	Thu 3/15/18
78	POWDER HANDLING	66 days	Mon 12/11/17	Wed 2/14/18
90	FILLING SKM SACHET	123 days	Mon 11/13/17	Thu 3/15/18
107	FILLING SKM CAN	95 days	Fri 1/12/18	Mon 4/16/18
124	PACKING LINE SKM SACHET	120 days	Tue 10/24/17	Tue 2/20/18
140	PACKING LINE SKM CAN	114 days	Tue 10/31/17	Wed 2/21/18
156	CAN MAKING	101 days	Sat 4/7/18	Mon 7/16/18
175	Palleting	333 days	Mon 10/2/17	Thu 8/30/18

Figure 2. Time Schedule of PT.XYZ project ekspansion Sweet Condense Milk (PT.XYZ,2017)

From figure 2 the scheduled period of this project is 341 days. The items in this schedule refer to the execution schedule in the field so that the planning and procurement stages are not included, because the focus refers to the implementation stages in the field. The basis of budgeting for this cost is from the final offer from each vendor after being negotiated by the central procurement of the parent company PT. XYZ, which costs is Rp. 270,751,652,212.

Network Diagram & PERT with crashing : On This work network is made to find out the order of work along with its duration, from this work it is obtained how long the duration of this work can be achieved. For the description of the work itself in this place, the focus is on the output of the sachet and can products, so that the sequence steps besides the sachet and canned machines are ignored.

Table 1. Time schedule for Sachet Machine

	ptimistic time	Most Likely time	Pessimistic time	Prec 1	Prec 2	Prec 3	Prec 4
7.FAT	3	5	10				
9.Custom and Delivery	5	8	20				
10.Mechanical Instalasi	3	4	30	9.Custom and			
11.Electrical Instalasi	4	5	15	9.Custom and			
12.I/O Test	4	5	20	10.Mechanical	11.Electrical		
13.Test Product	1	2	30	12.I/O Test			
14.Commercial	5	10	20	10.Mechanical	11.Electrical	12.I/O Test	13.Test Product
15.Training	1	2	7	13.Test Product	14.Commercial		
16.Documentation	2	2	7	15.Training			
17.Hand over	1	1	7	14.Commercial	15.Training	16.Documentation	

From these data can be made of PERT method using the Quality Management (QM for Windows Software) to analyze the time schedule. And the result can be shown on the table below.

Tabel 2. PERT for Sachet Machine

	Activity time	Early Start	Early Finish	Late Start	Late Finish	Slack	Standard Deviation
Project	55.3333						8.2023
7.FAT	5.5	0.	5.5	0.	5.5	0.	1.1667
9.Custom and Delivery	9.5	5.5	15.	5.5	15.	0.	2.5
10.Mechanical	8.1667	15.	23.1667	15.	23.1667	0.	4.5
11.Electrical Instalasi	6.5	15.	21.5	16.6667	23.1667	1.6667	1.8333
12.I/O Test	7.3333	23.1667	30.5	23.1667	30.5	0.	2.6667
13.Test Product	6.5	30.5	37.	30.5	37.	0.	4.8333
14.Commercial	10.8333	37.	47.8333	37.	47.8333	0.	2.5
15.Training	2.6667	47.8333	50.5	47.8333	50.5	0.	1.
16.Documentation	2.8333	50.5	53.3333	50.5	53.3333	0.	0.8333
17.Hand over	2.	53.3333	55.3333	53.3333	55.3333	0.	1.

From table 2 it can be seen that slack = 0, which is critical at all points except in Electrical installations, so all points become focus By using QM-Windows you can display the job graph as follows. To calculation the cost to accelerate the project can use Trade-Off analysis / PERT with crashing as the shown on table below.

Table 3. Crash cost Sachet Machine

	Normal time	Crash time	Normal Cost	Crash Cost	Prec 1	Prec 2	Prec 3	Prec 4
7.FAT	5	3	72,855,260	170,000,000				
9.Custom and Delivery	8	5	0	0				
10.Mechanical Instalasi	4	3	104,115,700	240,000,000	9.Custom			
11.Electrical Instalasi	5	4	130,144,600	220,000,000	9.Custom			
12.I/O Test	5	4	130,144,600	220,000,000	0.Mechanical	11.Electrical		
13.Test Product	2	1	52,057,850	104,115,700	12.I/O Test			
14.Commercial	10	5	260,289,300	520,578,500	0.Mechanical	11.Electrical	12.I/O Test	13.Test
15.Training	2	1	52,057,850	104,115,700	13.Test	4.Commercial		
16.Documentation	2	2	0	0	15.Training			
17.Hand over	1	1	0	0	4.Commercial	15.Training	ocumentation	

After obtaining data from prices for crash costs, the solve can be done with this QM software, we should calculate for the cost for accelerate sachet machine project. This item can be shown on the figure 3. Below

Project Management (PERT/CPM) Results

Schedule Filling S Solution

	Normal time	Crash time	Normal Cost	Crash Cost	Crash cost/pd	Crash by	Crashing cost
Project	35.	23.					
7.FAT	5.	3.	72,855,260.	170,000,000.	48,572,370.	0.	0.
9.Custom and Delivery	8.	5.	0.	0.	0.	3.	0.
10.Mechanical	4.	3.	104,115,700.	240,000,000.	135,884,300.	0.	0.
11.Electrical Instalasi	5.	4.	130,144,600.	220,000,000.	89,855,400.	1.	89,855,400.
12.I/O Test	5.	4.	130,144,600.	220,000,000.	89,855,400.	1.	89,855,400.
13.Test Product	2.	1.	52,057,850.	104,115,700.	52,057,850.	1.	52,057,850.
14.Commercial	10.	5.	260,289,300.	520,578,500.	52,057,840.	5.	260,289,200.
15.Training	2.	1.	52,057,850.	104,115,700.	52,057,850.	1.	52,057,850.
16.Documentation	2.	2.	0.	0.	15.	0.	0.
17.Hand over	1.	1.	0.	0.	14.	0.	0.
TOTALS			801,665,200.				544,115,700.

Figure 3. PERT with crashing for Sachet Machine

From the figure 3, it can describe the data for normal time at 35 days, if it is accelerated to 23 days for its work, the crashing cost for 13 days is Rp.544,115,700. So it needs to be conveyed to management if to do this crashing cost, the costs borne by the contractor are Rp.544,115,700. Because this project is a lump sum price, it can be used that for an acceleration of 13 days it can save costs of Rp.544,115,700 million if previously negotiated. After the calculation of the sachet machine is obtained, the same method can be calculated for a can machine, which can be entered as follows Table 4.

Table. 4. Time Schedule for Can Filling Machine

	mistic time	Most Likely time	simistic time	Prec 1	Prec 2	Prec 3	Prec 4	Prec 5	Prec 6	Prec 7
8.Packing & Shipment	25	31	62							
9.Custom and Delivery	8	8	16	8.Packing &						
10.Mechanical Instalasi	4	6	12	9.Custom						
11.Electrical Instalasi	5	10	20	9.Custom						
12.I/O Test	2	4	8	0.Mechanical	11.Electrical					
13.Test Product	8	16	32	12.I/O Test						
14.Commercial	6	12	24	0.Mechanical	11.Electrical	12.I/O Test	13.Test			
15.Training	2	3	6	13.Test	4.Commercial					
16.Documentation	2	3	6	15.Training						
17.Hand over	1	1	4	4.Commercial	15.Training	ocumentation				

The Table 4 show about time estimation about schedule of the can filling machine can be complete. The table show 3 time estimate are Optimistic time, Normally time and Pesimistic time that can be review by experience and data previous project by Project Manager. For knowing how to accelerate the prohject can be used QM Software and will analyze how much cost what needed for accelerate Can Filling Machine, This item can be shown on Table 5. PERT with Crashing for Can Filling Machine.

Table 5. PERT with Crashing for Can Filling Machine.

	Activity time	Early Start	Early Finish	Late Start	Late Finish	Slack	Standard Deviation
Project	98.1667						8.5554
8.Packing & Shipment	35.1667	0.	35.1667	0.	35.1667	0.	6.1667
9.Custom and Delivery	9.3333	35.1667	44.5	35.1667	44.5	0.	1.3333
10.Mechanical	6.6667	44.5	51.1667	48.6667	55.3333	4.1667	1.3333
11.Electrical Instalasi	10.8333	44.5	55.3333	44.5	55.3333	0.	2.5
12.I/O Test	4.3333	55.3333	59.6667	55.3333	59.6667	0.	1.
13.Test Product	17.3333	59.6667	77.	59.6667	77.	0.	4.
14.Commercial	13.	77.	90.	77.	90.	0.	
15.Training	3.3333	90.	93.3333	90.	93.3333	0.	0.6667
16.Documentation	3.3333	93.3333	96.6667	93.3333	96.6667	0.	0.6667
17.Hand over	1.5	96.6667	98.1667	96.6667	98.1667	0.	0.5

After solving the solve with the QM method, it can be seen that only 10. Mechanical is not critical, the other is the critical path because slack = 0 that means Project Manager should deeply monitor about red color "0" that show in table 5. After obtaining the data, the solve is performed with the input on QM software to calculation of how much cost what needed for accelerate this project, check the table 6 below.

Table 6. Crash cost for Can Filling Machine.

	Normal time	Crash time	Normal Cost	Crash Cost	Prec 1	Prec 2	Prec 3	Prec 4	Prec 5
8.Packing & Shipment	31	31	0	0					
9.Custom and Delivery	8	8	0	0	8.Packing &				
10.Mechanical Instalasi	6	3	196,302,000	392,603,900	9.Custom				
11.Electrical Instalasi	10	5	327,169,900	654,339,800	9.Custom				
12.I/O Test	4	2	130,868,000	261,736,000		11.Electrical			
13.Test Product	16	8	523,471,900	,046,944,000	11.Electrical				
14.Commercial	12	6	392,603,900	785,207,800	0.Mechanical	11.Electrical	12.I/O Test	13.Test	
15.Training	3	2	98,150,980	140,000,000	13.Test	4.Commercial			
16.Documentation	3	3	0	0	15.Training				
17.Hand over	1	1	0	0	4.Commercial	15.Training	ocumentation		

To analyze the data, click the solve button on QM software so that the calculation from PERT with Crashing will appear how much cost that needed for accelerate this project.

Table 7. PERT with Crashing for Can Filling Machine.

Project Management (PERT/CPM) Results

Schedule Filling S Solution

	Normal time	Crash time	Normal Cost	Crash Cost	Crash cost/pd	Crash by	Crashing cost
Project	84.	64.					
8.Packing & Shipment	31.	31.	0.	0.	0.	0.	0.
9.Custom and Delivery	8.	8.	0.	0.	8.	0.	0.
10.Mechanical	6.	3.	196,302,000.	392,603,900.	5,433,970.	0.	0.
11.Electrical Instalasi	10.	5.	327,169,900.	654,339,800.	5,433,980.	5.	327,169,900.
12.I/O Test	4.	2.	130,868,000.	261,736,000.	5,434,000.	0.	0.
13.Test Product	16.	8.	523,471,900.	1,046,944,000.	5,434,010.	8.	523,472,100.
14.Commercial	12.	6.	392,603,900.	785,207,800.	5,433,980.	6.	392,603,900.
15.Training	3.	2.	98,150,980.	140,000,000.	1,849,020.	1.	41,849,020.
16.Documentation	3.	3.	0.	0.	15.	0.	0.
17.Hand over	1.	1.	0.	0.	14.	0.	0.
TOTALS			1,668,567,000.				1,285,095,000.

From the picture, it can be seen that the project to accelerate the duration of work from 84 days to 64 days which can be accelerated for 20 days of work requires an additional fee of Rp.1,285,095,000. This 20-day number is the maximum number that can be accelerated from the side of the work of this project. Can be taken into consideration for the next project to negotiate the best price for this item.

Earn Value Management: Calculations for Earn Value can be calculated by value Cumulative Earn value that can be seen from the table below.

Table. 8. Earn Value Progress

Earned Value and its use in Cost Control.						
Work Package	DESCRIPTION	BCWS	ACWP	%Progress	BCWP	Deviasi
		Planned Value	Actual Cost		Earned Value	
1	SIPIL	Rp 16,415,000,000.00	Rp 16,415,000,000.00	88%	Rp 14,445,200,000.00	Rp -
2	MECHANICAL	Rp 16,314,500,000.00	Rp 16,314,500,000.00	100%	Rp 16,314,500,000.00	Rp -
3	PROSES	Rp 50,769,585,000.00	Rp 42,307,987,500.00	100%	Rp 50,769,585,000.00	Rp 8,461,597,500.00
4	POWDER HANDLING	Rp 27,739,206,000.00	Rp 27,739,206,000.00	100%	Rp 27,739,206,000.00	Rp -
5	FILLING SACHET	Rp 34,762,280,000.00	Rp 34,762,280,000.00	100%	Rp 34,762,280,000.00	Rp -
6	PACKING LINE SACHET	Rp 27,771,687,600.00	Rp 27,771,687,600.00	100%	Rp 27,771,687,600.00	Rp -
7	FILLING CAN	Rp 26,994,300,000.00	Rp 26,994,300,000.00	100%	Rp 26,994,300,000.00	Rp -
8	PACKING LINE CAN	Rp 13,540,799,160.00	Rp 8,124,479,496.00	100%	Rp 13,540,799,160.00	Rp 5,416,319,664.00
9	CAN MAKING	Rp 46,578,400,000.00	Rp 38,815,333,333.33	100%	Rp 46,578,400,000.00	Rp 7,763,066,666.67
10	PALLETING	Rp 9,865,894,452.00	Rp 9,865,894,452.00	100%	Rp 9,865,894,452.00	Rp -
BAC		Rp 270,751,652,212.00	Rp 249,110,668,381.33	99%	Rp 268,781,852,212.00	Rp 21,640,983,830.67

From the table above can summarize as below :

ACWP : Actual Cost of Work Performed	
BCWP : Budgeted cost of Work Performed	
BAC : Budget At Completion	
BAC	Rp 270,751,652,212.00
PV	Rp 270,751,652,212.00
AC	Rp 249,110,668,381.33
EV	Rp 268,781,852,212.00
Cost Variance (CV = EV - AC)	Rp 19,671,183,830.67
Cost Performance Index (CPI = EV/AC)	1.078965642
Schedule Variance (SV = EV - PV)	(1,969,800,000.00)
Schedule Performance Index (SPI = EV/PV)	0.992724698

Figuere 4. Summary Earn Value Management

Using Mocrosoft Excel analyze the Earn Value Management as follows,

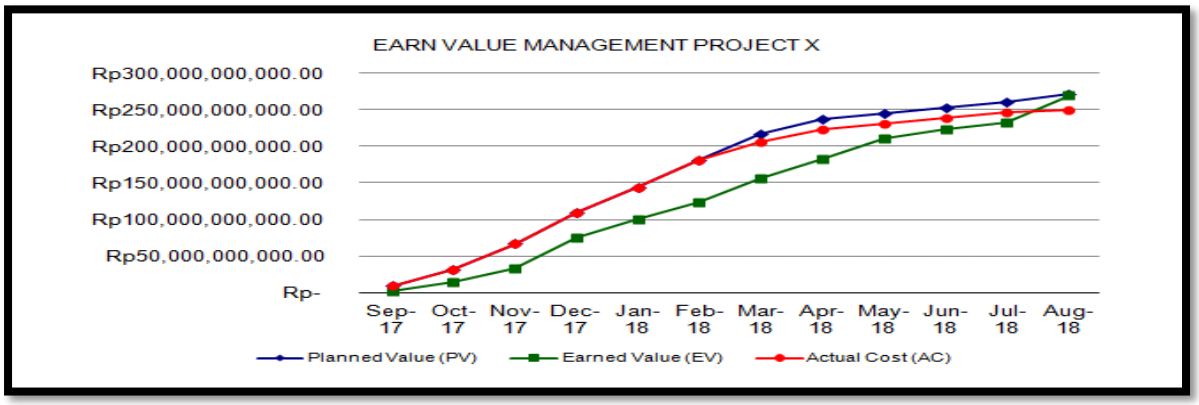


Figure 5. Grafik EVM

From the 3 lines in the graph, it can be seen that earn value, which is the achievement of the project target achieved at the job completed on time in August 2018, can be stated to produce output according to the engine target at the beginning, both for cans and sachets.

IV. DISCUSSION:

This Project on Machine Sachet can be accelerate 13 days and for Can filling sachet can accelerate 20 days. For CPI this project is 1.07 this means that CPI> 1 means that the cost of completing work is higher than planned. For SPI <1, it means that the project is late from the schedule, even though it is 12% late from Civil items but this part is not critical so the project is still on time. Variance's schedule is 1.9 billion. For a deviation of 21 billion due to work in the process, the can can and can make deviations arise as a result: Work has been completed but when the author works on this script there is still a discussion stage regarding renegotiation regarding the scope of this work, so the main scope is complete but there is scope that is not done which is still a discussion by the team and management from the vendor and PT. XYZ.

V. CONCLUTION.

The use of the PERT with crashing method can be a clear reference in project supervision, so that stages can be seen that can be accelerated so that the project runs effectively in terms of target on schedule. To monitor costs, Earn Value Management methods can be used so that the use of costs can be more efficient. After an evaluation with the PERT with crashing method, the expansion of sweetened condensed milk at PT. XYZ can be accelerated with additional costs. For the efficiency of this project in terms of costs for Actual Cost> BCWS, this can be said to produce lower output costs than planned so that the project is efficient but not effective.

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