PROJECT MANAGEMENT INFORMATION SYSTEM BASED ON WEB AT CV. INTAN BAROKAH

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ABSTRACT

CV. Intan Barokah is one of the companies engaged in the field of construction services. Established in 2013, every CV. Intan Barokah usualy handle 5 to 7 projects, ranging from the construction of roads, bridges and others. Based on interviews with technical managers sometimes CV. Intan Barokah handle 2 to 3 projects at the same time it raises some problems. The first problem is the difficulty in monitoring the project for technical implementers have to go back and forth to a distant projects, causing delays. Furthermore, scheduling problems created using only rough estimates by the technical implementation that causes slipping of the project completion time when craftsmanship. The absence of risk management, so that the risks that arise can hinder the performance of the project. Then the lack of supervision system cost and time that sometimes during the project lasted beyond the cost and time of planning which leads to reduced corporate profits.

Some of the methods that can be applied to the project management process that is CPM, PIM and EVM. CPM is a network analysis technique used to predict project total duration of the project. PIM is one of the methods for risk management that uses two parameters: probability of occurrence of the risk and impact of the risk. EVM is a method that integrates the relationship between cost and time as well as provide an overview of the condition of the continuity of the project. To overcome some of the problems that occur in the CV. Intan Barokah the CPM method will be applied to address scheduling problems. PIM method shall be used for risk management, so that identified risk mitigation can be done immediately. EVM method will be used to monitor the cost and time of the project, so that the costs and time when the project can progress in line with planning.

The conclusion of this study is the management information system project built on the CV. Intan Barokah can help solve the problems that occur in the process of project management in the CV. Intan Barokah.

***Keywords** : Project, Construction, Critical Path Method, Probability Impact Matrix, Earned Value Method.*

1. INTRODUCTION

CV. Intan Barokah is a construction company located at kp. Kawungluwuk *village* linggamanik *district.* Cikelet kab. Garut. *Dating back to the year 2013 was founded by the Director a. SAEPUL HAYAT. Every year companies usually handle 5-7 projects, projects handled vary include road construction, retaining the road, making irrigation canals, making the sewers and others. From the experience of 3 years handling the project since the founding of the company, CV. Intan Barokah is trusted by the service of the Government to work on the project provided by the way appointed directly without going through the tender. The number of projects that earned the company sometimes occurs in one time. By 2016 the company at a time had to deal with 6 projects at once, this of course gives the advantage to the company, on the other hand the number of those projects led to the management process is not optimal. At the time of planning the project schedule is always done well, but in practice often not appropriate due to the process of monitoring and supervision of the project that cannot be done on a daily basis due to the limited number of field employees, supervision is also sometimes becomes difficult due to the location of the project that far apart.*

According to the results of the interview with the technical person in charge that in previous years the CV. Intan Barokah sometimes handles 2 to 3 projects that should be dikerjaan in the same time. It becomes an advantage for the company, but on the other hand it poses problems for the company. The problem is the difficulty in the process of project supervision, because technical implementers should back and forth to the place of the project regarding the location of the project that far with the project location. This causes a delay in completion of the project, since the project is not terawasi properly.

In addition to other problems occur because of a schedule that is made using only a rough estimate done technical implementers, which sometimes resulted in melesetnya the time of

completion of the work in the field by the time that had been previously thought. Director CV. INTAN Barokah also convey the obstacles the obstacles that occur when work projects such as workers who are unable to attend due to illness, delivery delays because the material was hampered in the way, and the disruption in the event of heavy rain which lasted long. These risks often appear when in the process of project work, certainly it hamper the work of the project.

In addition to the issues previously mentioned Director of CV. INTAN Barokah also convey that sometimes an error occurs in the mengestimasi project cost and time that result in the swelling costs that must be incurred by the company. It is therefore necessary for controlling costs and time to help the technical person in charge in order to estimate the cost and time can be in line with the actual project work in the field. Moreover, it also can control time and cost used to be a consideration in the decision whether the company should perform the addition of workers or the addition of a time when a work project work is not as had been scheduled.

On the basis of the problem which has been described previously then it can be inferred that the core problem is the delay and swelling costs that occurred during the execution of the project. It resulted in the decline in corporate profits due to the need to pay more to pay for the extra hours of work of employees. Therefore required a system that can help the person in charge of technical and technical implementers in the process of project management CV. Intan Barokah. The system will be Web-based, built, built to be accessible wherever the user is, besides facilitating technical implementers in the process of monitoring the project location the project site warn other projects. The system is also built to assist the technical person in charge in the making of a daily schedule to clarify the activities that should be carried out every day. This system can help the technical person in charge to manage the risks that may occur when the work of the project.

2. CONTENT OF RESEARCH

2.1 Scheduling Analysis

Scheduling is one of the elements of the planning results can provide information about the schedule of the plan and the progress of the project in terms of performance resources as well as the duration of the project and the progress of time for completion of the project. In this study the scheduling method using Critical Path Method (CPM).

2.1.1 Critical Path Method Analysis

Critical Path method (CPM) is a methods in planning project scheduling based on a network diagram that contains path-path activities during the conduct of the project took place.

Nomor	Uraian Pekerjaan	Kode	keg. pendahulu	Durasi (hari)
1.2	mobilisasi	A	-	1
2.1	galian unit selokan drainase dan saluran air	B	1.2	3
2.2	pasangan batu dengan mortar	C	1.2	5
3.1.1	galian biasa	D	1.2	5
3.2.1	timbunan biasa	E	2.1, 3.1.1	4
7.9	pasangan batu	F	2.2, 3.1.1	16
8.2	normalisasi saluran dan pekerjaan minor lainya	G	3.2.1, 7.9	1
8.4	pengecetan	H	8.2	1
Total Durasi				36

Figure 1. Activity* PBJ Kp. Sawah *Project

Based on a set of retaining project activities within the road kp. Rice fields in Figure 1 then produced a diagram of the network work like the network diagram in Figure 2 work

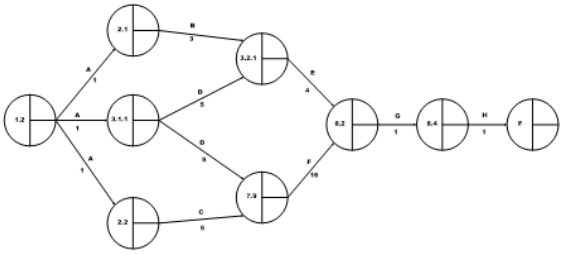


Figure 2. network Diagram

The calculation to determine the time of completion in the CPM method consists of two phases, namely calculation of forward and backward calculation. The following description of each of these stages.

1. ***Forward Calculation***

Forward calculations performed starting early network moving towards the end of the network by doing the calculations.
ES (Early Start)

$ES_{1.2\text{-}2.1} = 0$
$ES_{1.2\text{-}3.1.1} = 0$
$ES_{1.2\text{-}2.2} = 0$
$ES_{2.1\text{-}3.2.1} = 0+1 = 1$
$ES_{3.1.1\text{-}3.2.1} = 0+1 = 1$
$ES_{3.1.1\text{-}7.9} = 0+1 = 1$
$ES_{2.2\text{-}7.9} = 0+1 = 1$
$ES_{3.2.1\text{-}8.2} = 1+3 = 4$
$ES_{7.9\text{-}8.2} = 1+5 = 6$
$ES_{8.2\text{-}8.4} = 6+16 = 22$
$ES_{8.4\text{-}F} = 22+1 = 23$

and EF (Early Finish)
EF = EF $_{sebelum}$ ***+ D,***

$EF_{1.2\text{-}2.1} = ES_{1.2\text{-}2.1} + t_{1.2\text{-}2.1} = 0 + 1 = 1$
$EF_{1.2\text{-}3.1.1} = ES_{1.2\text{-}3.1.1} + t_{1.2\text{-}3.1.1} = 0 + 1 = 1$
$EF_{1.2\text{-}2.2} = ES_{1.2\text{-}2.2} + t_{1.2\text{-}2.2} = 0 + 1 = 1$
$EF_{2.1\text{-}3.2.1} = ES_{2.1\text{-}3.2.1} + t_{2.1\text{-}3.2.1} = 1 + 3 = 4$
$EF_{3.1.1\text{-}3.2.1} = ES_{3.1.1\text{-}3.2.1} + t_{3.1.1\text{-}3.2.1} = 1 + 5 = 6$
$EF_{3.1.1\text{-}7.9} = ES_{3.1.1\text{-}7.9} + t_{3.1.1\text{-}7.9} = 1 + 5 = 6$

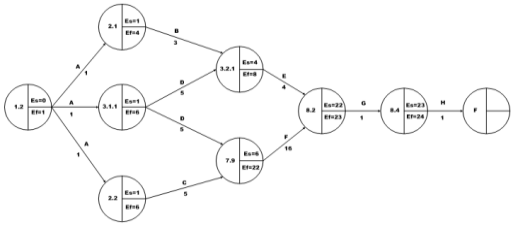
$EF_{2.2\text{-}7.9} = ES_{2.2\text{-}7.9} + t_{2.2\text{-}7.9} = 1 + 5 = 6$
$EF_{3.2.1\text{-}8.2} = ES_{3.2.1\text{-}8.2} + t_{3.2.1\text{-}8.2} = 4 + 4 = 8$
$EF_{7.9\text{-}8.2} = ES_{7.9\text{-}8.2} + t_{7.9\text{-}8.2} = 6 + 16 = 22$
$EF_{8.2\text{-}8.4} = ES_{8.2\text{-}8.4} + t_{8.2\text{-}8.4} = 22 + 1 = 23$
$EF_{8.4\text{-}F} = ES_{8.4\text{-}F} + t_{8.4\text{-}F} = 23 + 1 = 24$

as shown in Figure 3. calculation of ES and EF

No	Kode Kegiatan	Kegiatan		Waktu (t) dalam hari	Paling awal	
		i-node	j-node		Mulai(ES)	Selesai(EF)
1.2	A	1.2	2.1	1	0	1
1.2	A	1.2	3.1.1	1	0	1
1.2	A	1.2	2.2	1	0	1
2.1	B	2.1	3.2.1	3	1	4
2.2	C	2.2	7.9	5	1	6
3.1.1	D	3.1.1	3.2.1	5	1	6
3.1.1	D	3.1.1	7.9	5	1	6
3.2.1	E	3.2.1	8.2	4	4	8
7.9	F	7.9	8.2	16	6	22
8.2	G	8.2	8.4	1	22	23
8.4	H	8.4	F	1	23	24

Figure 3. Calculation of ES and EF

From Figure 3. Calculation of the ES and EF produces the picture diagram calculations forward as shown in Figure 4. Network of Forward Calculation



Gambar 2. Network of Forward Calculation

2. *Backward Calculation*

Backward calculations is used to calculate the slowest start time (LS) and the slowest completion time (LF) by performing the following calculation:

LS(i-j) = LF(i-j) – t

$LS_{8.4\text{-}F} = LF_{8.4\text{-}F} - t_{8.4\text{-}F} = 24 – 1 = 23$
$LS_{8.2\text{-}8.4} = LF_{8.2\text{-}8.4} - t_{8.2\text{-}8.4} = 23 – 1 = 22$
$LS_{7.9\text{-}8.2} = LF_{7.9\text{-}8.2} - t_{7.9\text{-}8.2} = 22 – 16 = 6$
$LS_{3.2.1\text{-}8.2} = LF_{3.2.1\text{-}8.2} - t_{3.2.1\text{-}8.2} = 22 – 4 = 18$
$LS_{2.2\text{-}7.9} = LF_{2.2\text{-}7.9} - t_{2.2\text{-}7.9} = 6 – 5 = 1$
$LS_{3.1.1\text{-}7.9} = LF_{3.1.1\text{-}7.9} - t_{3.1.1\text{-}7.9} = 6 – 5 = 1$
$LS_{3.1.1\text{-}3.2.1} = LF_{3.1.1\text{-}3.2.1} - t_{3.1.1\text{-}3.2.1} = 18 – 5 = 13$
$LS_{2.1\text{-}3.2.1} = LF_{2.1\text{-}3.2.1} - t_{2.1\text{-}3.2.1} = 18 – 3 = 15$
$LS_{1.2\text{-}2.1} = LF_{1.2\text{-}2.1} - t_{1.2\text{-}2.1} = 15 – 1 = 14$
$LS_{1.2\text{-}2.2} = LF_{1.2\text{-}2.2} - t_{1.2\text{-}2.2} = 1 – 1 = 0$
$LS_{1.2\text{-}3.1.1} = LF_{1.2\text{-}3.1.1} - t_{1.2\text{-}3.1.1} = 13 – 1 = 12$

also LF calculation
LF = LF – D

$LF_{8.4\text{-}F} = 24$
$LF_{8.2\text{-}8.4} = 24 – 1 = 23$
$LF_{7.9\text{-}8.2} = 23 – 1 = 22$
$LF_{3.2.1\text{-}8.2} = 23 – 1 = 22$
$LF_{2.2\text{-}7.9} = 22 – 16 = 6$
$LF_{3.1.1\text{-}7.9} = 22 – 16 = 6$
$LF_{3.1.1\text{-}3.2.1} = 22 – 4 = 18$
$LF_{2.1\text{-}3.2.1} = 22 – 4 = 18$
$LF_{1.2\text{-}2.1} = 18 – 3 = 15$
$LF_{1.2\text{-}2.2} = 6 – 5 = 1$
$LF_{1.2\text{-}3.1.1} = 18 – 5 = 13$

as shown in Figure 5. The image calculation of LS and LF

No	Kode Kegiatan	Kegiatan		Waktu (t) dalam hari	Paling awal	
		i-node	j-node		Mulai (LS)	Selesai (LF)
1.2	A	1.2	3.1.1	1	12	13
1.2	A	1.2	2.2	1	0	1
1.2	A	1.2	2.1	1	14	15
2.1	B	2.1	3.2.1	3	15	18
2.2	C	2.2	7.9	5	1	6
3.1.1	D	3.1.1	3.2.1	5	13	18
3.1.1	D	3.1.1	7.9	5	1	6
3.2.1	E	3.2.1	8.2	4	18	22
7.9	F	7.9	8.2	16	6	22

Figure 5. Calculation of LS an LF

From Figure 5. Calculation of LS and LF produces a picture diagram calculations forward as shown in Figure 6. Network of backward calculations.

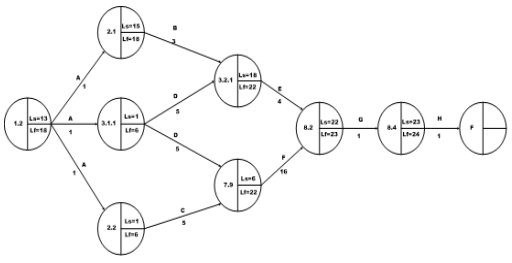


Figure 6. Network Of Backward Calculations.

3. *Total Float Calculation*

Slack or float is the time delay that is possible without affecting the total implementation time of the project. Total Float (TF) is the amount of time allowed an activity can be postponed, with the formula

TF = LF- EF,

as shown in Figure 7. The image calculation of TF.

No	Kegiatan		Waktu (t) dalam hari	Paling awal		Paling akhir		Total Float (TF)
	i-node	j-node		Mulai (ES)	Selesai (EF)	Mulai (LS)	Selesai (LF)	
1.2	1.2	2.1	1	0	1	14	15	14
1.2	1.2	3.1.1	1	0	1	12	13	12
1.2	1.2	2.2	1	0	1	0	1	0
2.1	2.1	3.2.1	3	1	4	15	18	14
2.2	2.2	7.9	5	1	6	1	6	0
3.1.1	3.1.1	3.2.1	5	1	6	13	18	12
3.1.1	3.1.1	7.9	5	1	6	1	6	0
3.2.1	3.2.1	8.2	4	4	8	18	22	14
7.9	7.9	8.2	16	6	22	6	22	0
8.2	8.2	8.4	1	22	23	22	23	0
8.4	8.4	F	1	23	24	23	24	0

Figure 7. Calculation Of TF

Based on Figure 7. calculation of TF obtained the conclusion that the track may have a float or delay is on line on the activity of 1.2 with a total maximum allowed delay is 14 days, activity 2.1 with a total maximum allowed delay is 14 days, and in the activity 3.1.1 with total maximum delay allowed is 12 days, and an activity 3.2.1 with the total delay is permitted is 14 days. forming network of Critical Path Method as shown in Figure 8. Network Critical Path Method.

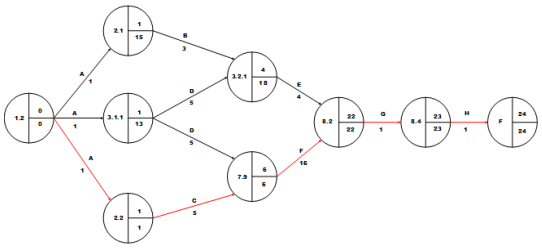


Figure 8. Network Critical Path Method

2.3 Project Risk Management Analysis

Project risk management is a very important activity to do when going to work on a project. Project risk management serves to identify the likelihood of the risk happening when the project progresses to later dealt so as not to lead to shortages or even failure of the project. The following are the stages for identifying risks and responses using the method of Probability Impact Matrix (PIM)

1. Risk Identification

The identification of risk, namely how to make a list of the usual risk occurs when project. This identification process is done using interviews with the person in charge and the Technical Director or project manager. Results of the analysis of the identification risks has been done can be seen in Figure 9 the identification of risks.

Kode Resiko	Deskripsi Resiko
R1	Jadwal perencanaan tidak sesuai dengan aktual di lapangan
R2	Biaya aktual di lapangan melebihi rencana anggaran
R3	Karyawan sakit akan menganggu pelaksanaan proyek
R4	Kemampuan SDM yang tidak sesuai standar
R5	Pengunduran diri karyawan lapangan
R6	Perbedaan persepsi hasil rancangan oleh karyawan lapangan dengan tenaga ahli
R7	Kecelakaan lalulintas
R8	Kecelakaan karena alat kerja
R9	Kecelakaan karena bahan material
R10	Kerusakan alat penunjang kontruksi

Kode Resiko	Deskripsi Resiko
R11	Kesulitan pekerjaan yang menghambat
R12	Terjadi bencana alam
R13	Keterlambatan pengiriman barang
R14	Gangguan Cuaca
R15	Hilang atau dicurinya barang kebutuhan kontruksi atau alat kerja

Figure 9 The Identification Of Risks

2. Analysis of the possibilities and consequences of Risks

At this stage based on the identification of the risks has been done in the previous stage, will be carried out on the occurrence probability of identifying risk and its impact may be incurred if the risk occurs, so that will be produced the importance of each risk. Risk assessment basically refers to two factors, namely the quantity of risk and quality risks. The quantity of risk associated with the value, or how much of an impact that is susceptible to the risks associated with risk of quality while the likelihood of risks appear. Using PIM risk will be given the scale of 0 to 1 with different risk levels as shown in Figure 10 below.

Skala	Nilai Resiko
0 – 0.30	Rendah
0.31 – 0.7	Sedang
0.71 – 1	Tinggi

Figure 10.skala of Risk

Furthermore each risk be rated scales with variable probability and its impact. After that calculated risk importance by way of multiplying the probability value with the value of the impacts. Seperting is shown in Figure 11 below.

Kode Resiko	Probabilitas	Dampak	Tingkat Kepentingan Resiko
R1	1	1	1
R2	1	1	1
R3	0.4	0.5	0.20
R4	0.4	0.4	0.16
R5	0.1	0.6	0.06
R6	0.2	0.2	0.04
R7	0.71	1	0.71
R8	0.7	1	0.7
R9	0.5	1	0.5
R10	0.2	0.8	0.16
R11	0.2	0.5	0.10
R12	0.5	0.8	0.40
R13	0.5	0.6	0.30
R14	0.71	0.5	0.355
R15	0.5	1	0.5

Figure 11. The calculation of interest rate

3. Risk Handling

From the results of the assessment of the significance of risk has been done before, then conducted risk mitigation action or handling of risk. As shown in Figure 12. Handling Risks.

Kode Resiko	Tingkat Resiko	Tindakan Pengendalian Resiko
R1	Tinggi	Menambah jam kerja karyawan
R2	Tinggi	Menyiapkan dana cadangan untuk menambah kekurangan biaya
R3	Rendah	Menambah jam kerja karyawan
R4	Rendah	Diawasi karyawan berpengalaman dan suruh mempelajari cara kerja karyawan
R5	Rendah	Menambah jam kerja karyawan dan segera merekrut karyawan baru
R6	Rendah	Dilakukan diskusi ulang antara tenaga ahli dan karyawan lapangan serta berkomunikasi penuh mengenai proyek yang sedang dikerjakan
R7	Tinggi	Menggunakan alat pengaman berkendara dan mematuhi rambu lalulintas
R8	Sedang	Menggunakan alat standar keselamatan kerja
R9	Sedang	Menggunakan alat standar keselamatan kerja
R10	Rendah	Sewa alat untuk sementara, lalu memperbaiki alat yang akan digunakan
R11	Rendah	Survei dilakukan dengan detail, bila dikata sulit harus mencari bantuan ahli yang dapat memecahkan masalahnya
R12	Sedang	Tetap mempertahankan kelangsungan proyek, dan segera mengejar keterlambatan dengan penambahan jam kerja karyawan

Figure 15. Handling Risks

2.2 Analysis Of Cost Control

Analysis of cost control, namely how to display progress information cost and schedule of the project. This indicator controls the position and inform the project progress within a certain period during the project progress using Earn Value Management (EVM).

2.2.1 Earn Value Management (EVM) Analysis

Calculation of EVM using weights planning then use actual weights are taken from the realization of the work that is done then the actual weights are calculated, and the actual costs incurred during the realization of the work.

As for the actual planning, weights along with the actual costs that occur during the project progress can be seen in Figure 13 and 14. The Results Of The Calculation Of The Earn Value Management

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari											
		1	2	3	4	5	6	7	8	9	10	11	12
Mobilisasi	1.67	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Galian Unit selokan drainase dan saluran air	0.47		0.157	0.32	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
pasangan batu dengan mortar	7.11		1.42	2.92	4.4	5.84	7.11	7.11	7.11	7.11	7.11	7.11	7.11
galian biasa	3.77								0.75	1.15	2.15	2.85	3.77
timbunan biasa	5.74												
pasangan batu	80.21						7.13	14.26	18.31	22.36	25.74	28.93	31.52
Normalisasi saluran dan Pekerjaan minor lainya	0.16												
Pengecatan	0.87												
Jumlah bobot	100	1.25	2.827	4.49	6.12	7.56	15.96	23.09	27.89	32.34	36.72	40.61	44.12

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari											
		13	14	15	16	17	18	19	20	21	22	23	24
Mobilisasi	1.67	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.67
Galian Unit selokan drainase dan saluran air	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
pasangan batu dengan mortar	7.11	7.11	7.11	7.11	7.11	7.11	7.11	7.11	7.11	7.11	7.11	7.11	7.11
galian biasa	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77
timbunan biasa	5.74									1.44	2.89	4.67	5.74
pasangan batu	80.21	34.28	36.45	39.32	42.44	44.53	47.82	51.36	54.66	58.64	68.12	74.54	80.21
Normalisasi saluran dan Pekerjaan minor lainya	0.16											0.16	0.16
Pengecatan	0.87												0.87
Jumlah bobot	100	46.88	49.05	51.92	55.04	57.13	60.42	63.96	67.26	72.68	83.61	91.97	100

Figure 13.Project Work Plan

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari				
		1	2	3	4	5
Mobilisasi	1.67	1.25	1.25	1.25	1.25	1.25
Galian Unit selokan drainase dan saluran air	0.47		0.157	0.32	0.47	0.47
pasangan batu dengan mortar	7.11		1.42	2.92	4.4	5.84
galian biasa	3.77			0.72	1.12	2.36
timbunan biasa	5.74					
pasangan batu	80.21					
Normalisasi saluran dan Pekerjaan minor lainya	0.16					
Pengecatan	0.87					
Jumlah bobot	100	1.25	2.827	5.21	7.24	9.92
AC		Rp 2,150,440	Rp 4,862,425	Rp 8,963,209	Rp 12,454,850	Rp 17,068,654

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari				
		6	7	8	9	10
Mobilisasi	1.67	1.25	1.25	1.25	1.25	1.25
Galian Unit selokan drainase dan saluran air	0.47	0.47	0.47	0.47	0.47	0.47
pasangan batu dengan mortar	7.11	7.11	7.11	7.11	7.11	7.11
galian biasa	3.77	2.87	3.77	3.77	3.77	3.77
timbunan biasa	5.74					
pasangan batu	80.21			3.82	7.64	11.28
Normalisasi saluran dan Pekerjaan minor lainya	0.16					
Pengecatan	0.87					
Jumlah bobot	100	11.7	12.6	16.42	20.24	23.88
AC		Rp 20,131,826	Rp 21,681,725	Rp 28,261,006	Rp 35,821,565	Rp 42,525,743

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari				
		11	12	13	14	15
Mobilisasi	1.67	1.25	1.25	1.25	1.25	1.25
Galian Unit selokan drainase dan saluran air	0.47	0.47	0.47	0.47	0.47	0.47
pasangan batu dengan mortar	7.11	7.11	7.11	7.11	7.11	7.11
galian biasa	3.77	3.77	3.77	3.77	3.77	3.77
timbunan biasa	5.74					
pasangan batu	80.21	15.27	18.55	22.39	26.74	29.44
Normalisasi saluran dan Pekerjaan minor lainya	0.16					
Pengecatan	0.87					
Jumlah bobot	100	27.87	31.15	34.99	39.34	42.04
AC		Rp 49,347,835	Rp 55,734,247	Rp 61,854,723	Rp 67,764,761	Rp 73,467,834

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari				
		16	17	18	19	20
Mobilisasi	1.67	1.25	1.25	1.25	1.25	1.25
Galian Unit selokan drainase dan saluran air	0.47	0.47	0.47	0.47	0.47	0.47
pasangan batu dengan mortar	7.11	7.11	7.11	7.11	7.11	7.11
galian biasa	3.77	3.77	3.77	3.77	3.77	3.77
timbunan biasa	5.74				1.43	1.98
pasangan batu	80.21	33.74	37.12	41.24	44.88	48.76
Normalisasi saluran dan Pekerjaan minor lainya	0.16					
Pengecatan	0.87					
Jumlah bobot	100	46.34	49.72	53.84	58.91	63.34
AC		Rp 80,121,475	Rp 87,300,576	Rp 94,358,723	Rp 101,584,230	Rp 111,798,254

Uraian Pekerjaan	Bobot %	pengerjaan (%) / hari				
		21	22	23	24	
Mobilisasi	1.67	1.25	1.25	1.25	1.67	
Galian Unit selokan drainase dan saluran air	0.47	0.47	0.47	0.47	0.47	
pasangan batu dengan mortar	7.11	7.11	7.11	7.11	7.11	
galian biasa	3.77	3.77	3.77	3.77	3.77	
timbunan biasa	5.74	2.87	5.74	5.74	5.74	
pasangan batu	80.21	53.48	64.11	71.35	80.21	
Normalisasi saluran dan Pekerjaan minor lainya	0.16			0.16	0.16	
Pengecatan	0.87				0.87	
Jumlah bobot	100	68.95	82.45	89.85	100	
AC		Rp 119,391,003	Rp 151,782,457	Rp 162,875,500	Rp 172,052,526	

Figure 14. Report On The Work Of The Project

From Figure 13 and Figure 14 then gained some variables which must be calculated in EVM namely planned value (PV), earned value (EV), schedule a Variant (SV), cost variance (CV), schedule performance index (SPI), cost performance index (CPI), estimate the actual cost (EAC) and the estimate time to complete (ETC).

1. ***Planned Value (PV) Calculation***

The calculation of planned value i.e. identify% weighting plan each day and the costs that would be incurred, planned value obtained from the% weighting plan each day of the planned budget multiplied by the actual cost (BAC), bac is the contract value that is already agreed upon, namely 172,052,526 calculations are performed as many as 24 days.

Perhitungan PV pada hari ke 1 :
PV = (%progress rencana) x BAC
= 1.25% x 172.052.526
= Rp. 2.150.657

Perhitungan PV pada hari ke 2 :
PV = (%progress rencana) x BAC
= 2.83% x 172.052.526
= Rp. 4.863.925

Perhitungan PV pada hari ke 3 :
PV = (%progress rencana) x BAC
= 4.49% x 172.052.526
= Rp. 7.725.158

2. ***Earned Value (EV) Calculation***

The calculation of earned value is identify the actual weights each week and costs that will be incurred, earned value obtained from the actual weights per week worked multiplied by the actual budget cost (BAC).

Perhitungan EV pada hari ke 1 :
EV = (%progress aktual) x BAC
= 1.25% x 172.052.526
= Rp. 2.150.657

Perhitungan EV pada hari ke 2 :
EV = (%progress aktual) x BAC
= 2.83% x 172.052.526
= Rp. 4.863.925

Perhitungan EV pada hari ke 3 :
EV = (%progress aktual) x BAC
= 5.21% x 172.052.526
= Rp. 8.963.937

3. ***Cost Variance (CV) Analysis and Schedule Variances (SV) Analysis***

Analysis of variants of cost or cost variant that is identifying costs that will be incurred if the time that is done will be in accordance with the contract, more efficient or even more than the value of the contract was already determined, the cv is calculated from the number of ev-air conditioning Analysis schedule or schedule Variant Variant (SV) that identify if the time that is done will be in accordance with the schedule, late or even faster than the schedule already determined , calculation of sv obtained from ev – pv.

CV dan SV pada hari ke 1
CV = EV – AC
= 2.150.657 – 2.150.440
= 217
SV = EV – PV
= 2.150.657 - 2.150.657
= 0

CV dan SV pada hari ke 2
CV = EV – AC
= 4.863.925 – 4.862.425
= 1500
SV = EV – PV
= 4.863.925 - 4.863.925
= 0

CV dan SV pada hari ke 3
CV = EV – AC
= 8.963.937 – 8.963.209
= 728
SV = EV – PV
= 8.963.937 – 7.725.158
= 1.238.778

4. ***Performance Index Analysis***

Analysis of performance index consists of 2 parts, namely cost performance index (CPI) and schedule performance index (SPI). the CPI shows the weighted values obtained against the costs were excluded, the cpi gained from ev/ac, the spi showed how much work that is able to be resolved against the planned work, the spi obtained from ev/pv.

CPI dan SPI pada hari ke 1
CPI = EV / AC
= 2.150.657 / 2.150.440
= 1.0001
SPI = EV / PV
= 2.150.657 / 2.150.657
= 1
CPI dan SPI pada hari ke 2
CPI = EV / AC

= 4.863.925 / 4.862.425
= 1.0001
SPI = EV / PV
= 4.863.925 / 4.863.925
= 1
CPI dan SPI pada hari ke 3
CPI = EV / AC
= 8.963.937 / 8.963.209
= 1.0001
SPI = EV / PV
= 8.963.937 / 7.725.158
= 1.1604

5. Estimate at Completion Analysis (EAC) Analysis and Estimated Time to Complete (ETC) Analysis.

Calculation of the eac, namely how to calculate cost estimates based on bac/contract value divided by the cost-performance (cpi), calculation of time etc contract agreed upon divided by the performance schedule (spi).

EAC dan ETC pada hari ke 1 :
EAC = BAC / CPI
= 172.052.526 / 1.0001
= Rp.172.035.200
ETC = OD / SPI
= 24 / 1
= 24 hari

EAC dan ETC pada hari ke 2 :
EAC = BAC / CPI
= 172.052.526 / 1.0003
= Rp.171.999.469
ETC = OD / SPI
= 24 / 1
= 24 hari

EAC dan ETC pada hari ke 3 :
EAC = BAC / CPI
= 172.052.526 / 1.0001
= Rp. 172.035.200
ETC = OD / SPI
= 24 / 1.1604
= 20,68 = 21 hari

6. Results Of The Analysis Methods Of EVM

Following are the results of the analysis methods of recap Earn Value Management (EVM) as shown in Figure 15. Results Of The EVM Analysis

Hari	Analisa Varian		Analisa Kerja		Analisa Estimasi	
	Waktu	Biaya	Waktu	Biaya	Waktu	Biaya
	SV (Rp)	CV (Rp)	SPI	CPI	ETC	EAC
1	0	217	1	1.0001	24	172,035,200
2	0	1500	1	1.0003	24	171,999,469
3	1238778	728	1.1604	1.0001	21	172,038,561
4	1926988	1753	1.183	1.0001	21	172,028,315
5	4060440	-1043	1.3122	0.9999	19	172,063,044
6	-7329438	-1680	0.7331	0.9999	33	172,066,889
7	-18048310	-3107	0.5457	0.9999	44	172,077,183
8	-19734425	-9981	0.5887	0.9996	41	172,113,313
9	-20818356	-998134	0.6259	0.9721	39	176,984,017
10	-22091544	-1439600	0.6503	0.9661	37	178,081,001
11	-21919492	-1396796	0.6863	0.9717	35	177,064,352
12	-22315213	-2139885	0.706	0.9616	34	178,922,141
13	-20457045	-1653544	0.7464	0.9733	33	176,778,288
14	-16706300	-79297	0.802	0.9988	30	172,254,095
15	-16998790	-1136952	0.8097	0.9845	30	174,756,979
16	-14968570	-392334	0.8419	0.9951	29	172,899,169
17	-12749092	-1756060	0.8703	0.9799	28	175,584,425
18	-11321056	-1725643	0.8911	0.9817	27	175,257,658
19	-8688653	-228087	0.921	0.9978	27	172,439,705
20	-6744459	-2820184	0.9417	0.9748	26	176,504,980
21	-6417559	-760786	0.9487	0.9936	26	173,155,914
22	-1995809	-9925149	0.9861	0.9346	25	184,090,306
23	-3647514	-8286305	0.9769	0.9491	25	181,274,903
24	0	0	1	1	24	172,052,526

Figure 15. Results Of The EVM Analysis

From the results of the analysis of the results of the analysis on the calculation of the recap to date to 24 can be taken the conclusions of the project goes according to plan because the value of the estimated time of completion (ETC) is 24 days and the cost is Rp 172,052,526, equal to the total budget (BAC) Rp 172,052,526, the value of spi = 1 shows the acceleration of the project compared to the planned schedule, the value of the cpi = 1 indicates the cost equal to the cost that is planned.

3. CLOSING

Results from research that has been done, the conclusion that the application of project management information system can help implementing technical in oversee project progress, helps in making the technical person in charge of the project schedule, help in dealing with possible risks arise when the project goes on, and keep an eye on costs and time in order for the actual cost and time in line with planning.

There are some suggestions that can be made for application development project management information systems, among other things:

1. *To further the development of this application is expected to be able to count the number of workers and material estimation is needed in every project.*

2. *Expected his fore this application can calculate the profit of the company at any level of the project.*

BIBLIOGRAPHY

[1] Susanto, "Sistem Informasi Manajemen Konsep dan Pengembanganya", 2004.

[2] Ladjamudin, Bin., "Analisis dan Desain Sistem Informasi", 2005.

[3] Jogianto., "Analisis Desain Sistem Informasi", 2001.

[4] Magaline, Ferdinand., "Jurnal Penjelasan Sistem Informasi".

[5] Tayntor, Christine B, Project Management System Tools And Techniques for Success, USA, 2013.

[6] Guide To The Project Management Body Of Knowlodge. (PMBOK@Guide) – Fifth Edition.

[7] Flemming, Q.W., Koppelman, J.M., "The Essence and Evolution of Earned Value", 1994.

[8] Akhirson Karaini, Armaini., Pengantar Manajemen Proyek.