MANAGEMENT PROJECT INFORMATION SYSTEM CV. BAHARI UTAMA

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ABSTRACT

CV. Bahari Utama is an experienced construction company, they doing a lot of construction projects. However, when the project runs its faces some obstacles in the process such as the schedule and the cost is not according to plan, one example is the Fencing Project SMAN 5 Garut. When Fencing Project SMAN 5 Garut execute the timeline is not in accordance with the planning, this occurs because of a calculation error cost estimates and time of the project and the lack of effective human resource handle as well as the absence of risk management.

Based on the problems, the company required scheduling analysis using Critical Path Method, analysis of the estimated project time and cost using the method of Earned Value Management (EVM) as well as the need of risk management to manage risks that may occur using methods Earn Monetary Value (EMV).

Based on the analysis of scheduling has been done, the project Fencing SMAN 5 Garut has an acceleration in the execution schedule of the project, the acceleration is accompanied by the costs were greater than planned, although the cost is higher, but at the time of completion of the project costs equal to contract value. Risks that may occur when the project running can be identified and quantified how much it costs to be incurred.

Keywords *: Project Management, Information System, Critical Path Method, Earned Value Management, Expected Monetary Value.*

1. INTRODUCTION

CV. BAHARI UTAMA is one of the providers of construction services. established on June 30 2014, annually the company handle 4-7 project. Projects handled include road construction, road construction environment, strengthening the road, construction of bridges, as well as other construction projects. This company is a construction company that is still developing so that project – project undertaken was the result of a direct appointment of the project providers, the company usually handles projects designated by the Government as Dinas Bina Marga , Dinas Pendidikan, Department Tata Ruang dab Pemukiman, and other service department.

The number of projects that earned the company sometimes occurs in one time. At 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.

Condition of the site at the time of the project will be implemented is often different from the survey locations previously done it makes the company must hire a smaller car to transport raw materials to the site of the project, the addition of this of course adds to budget costs must be issued to the company. The company was also at the time of planning has never had a daily work schedule, in practice the only company using the shortest estimates based on project – a project before, this is not very effective because the schedule is always misses the target from the target expected, makes the company should issue a work schedule additions as a result companies have to pay an additional fee as well as the addition of a schedule which should not exist.

The risks that occur during the project progress also often occur in field, such as employees who are sick have resulted in the company having to add employees, the addition of employees is not easy and takes time, so disrupting the schedule of the work that has already been made, the weather factor also affects the implementation of the project, when the weather is bad of course resulted in no passage work that day and had to add a daily schedule, risks – the risk will be arranged into risk management in order to produce a better project management for the company.

From exposure to that already described, these problems can be – problems in coping with the project management information system, this system

will facilitate the work of the company in making the schedule by using the Critical Path method (CPM) that will clarify the daily work that will be done and could see where that could work on accelerate, using Earned Value Management (EVM) for monitoring and supervision, surveillance will be made online due to the location of the project that are sometimes far apart so it will look how the project runs According to the schedule, do likewise with their charges, and using Expected Monetary Value (EMV) to calculate the total cost incurred for the risks that occur when projects are underway.

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.

No	Kegiatan	Kode Kegiatan	Kegiatan Pendahulu	Waktu (D)
1	Pekerjaan Persiapan	A	-	1 hari
2	Bongkaran dan Perapihan Pondasi *Existing*	B	A	4 hari
3	Galian Tanah Pondasi Batu Belah	C	A	4 hari
4	Pas. Batu Pondasi	D	A	7 hari
5	Pas. Suling - Suling	E	B,C,D	2 hari
6	Urugan Tanah Kembali	F	E	4 hari
7	Pas. Batu Kali	G	F	1 hari
8	Plesteran & Acian (1:3)	H	G	4 hari
9	Plesteran Siaran Pada Batu Kali	I	H	6 hari
10	Pek. Cor Beton Tumbuk	J	I	8 hari
11	Pek. Pagar Beton Pracetak 240x40x5	K	I	10 hari
12	Acian	L	J,K	4 hari
13	Pembersihan	M	L	2 hari

Figure 1. Activity Data Fencing Project SMAN 5 Garut

Based on an activitity data in the fencing project SMAN 5 GARUT in figure 1 then produced a diagram of the network work as in the figure 2 diagram of the network

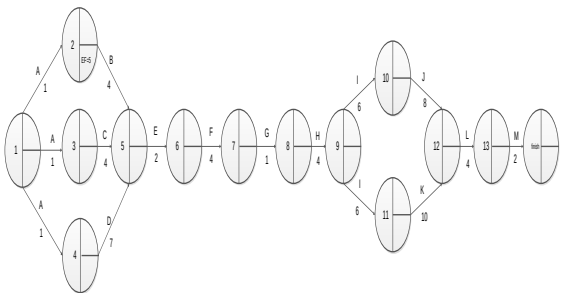


Figure 2. Network Diagram

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)

$$ES = ES + D$$

$ES_{1-2} = 0$
$ES_{1-3} = 0$
$ES_{1-4} = 0$
$ES_{2-5} = 0 + 1 = 1$
$ES_{3-5} = 0 + 1 = 1$
$ES_{4-5} = 0 + 1 = 1$
$ES_{5-6} = 1 + 7 = 8$
$ES_{6-7} = 8 + 2 = 10$
$ES_{7-8} = 10 + 4 = 14$
$ES_{8-9} = 14 + 1 = 15$
$ES_{9-10} = 15 + 4 = 19$
$ES_{9-11} = 15 + 4 = 19$
$ES_{10-12} = 19 + 6 = 25$
$ES_{11-12} = 19 + 6 = 25$
$ES_{12-13} = 25 + 10 = 35$
$ES_{13-14} = 35 + 4 = 39$

and EF (Early Finish)

$$EF = EF_{sebelum} + D,$$

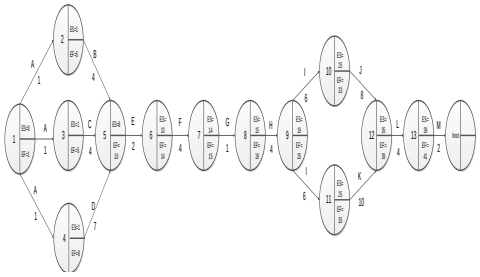
$EF_{1-2} = ES_{1-2} + D_{1-2} = 0 + 1 = 1$
$EF_{1-3} = ES_{1-3} + D_{1-3} = 0 + 1 = 1$
$EF_{1-4} = ES_{1-4} + D_{1-4} = 0 + 1 = 1$
$EF_{2-5} = ES_{2-5} + D_{2-5} = 1 + 4 = 5$
$EF_{3-5} = ES_{3-5} + D_{3-5} = 1 + 4 = 5$
$EF_{4-5} = ES_{4-5} + D_{4-5} = 1 + 7 = 8$
$EF_{5-6} = ES_{5-6} + D_{5-6} = 8 + 2 = 10$
$EF_{6-7} = ES_{6-7} + D_{6-7} = 10 + 4 = 14$
$EF_{7-8} = ES_{7-8} + D_{7-8} = 14 + 1 = 15$
$EF_{8-9} = ES_{8-9} + D_{8-9} = 15 + 4 = 19$
$EF_{9-10} = ES_{9-10} + D_{9-10} = 19 + 6 = 25$
$EF_{9-11} = ES_{9-11} + D_{9-11} = 19 + 6 = 25$
$EF_{10-12} = ES_{10-12} + D_{10-12} = 25 + 8 = 33$
$EF_{11-12} = ES_{11-12} + D_{11-12} = 25 + 10 = 35$
$EF_{12-13} = ES_{12-13} + D_{12-13} = 35 + 4 = 39$
$EF_{13-14} = ES_{13-14} + D_{13-14} = 39 + 2 = 41$

as shown in Figure 3. calculation of ES and EF

No	Kode Kegiatan	Kegiatan		Waktu (D) dalam hari	Paling Awal	
		i-node	j-node		Mulai (ES)	Selesai (EF)
1	A	-	-	1	0	1
2	B	1	2	4	1	5
3	C	1	3	4	1	5
4	D	1	4	7	1	8
5	E	4	5	2	8	10
6	F	5	6	4	10	14
7	G	6	7	1	14	15
8	H	7	8	4	15	19
9	I	8	9	6	19	25
10	J	9	10	8	25	33
11	K	9	11	10	25	35
12	L	11	12	4	35	39
13	M	12	13	2	39	41

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 3. 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) – D

$LS_{13-14}=LF_{13-14}-D_{13-14}=41-2=39$

$LS_{12-13}=LF_{12-13}-D_{12-13}=39-4-35$

$LS_{11-12}=LF_{11-12}-D_{12-13}=35-8=25$

$LS_{10-12}=LF_{10-12}-D_{10-12}=35-10=25$

$LS_{9-10}=LF_{9-10}-D_{9-10}=25-6=19$

$LS_{9-11}=LF_{9-11}-D_{9-11}=25-6=19$

$LS_{8-9}=LF_{8-9}-D_{8-9}=19-4=15$

$LS_{7-8}=LF_{7-8}-D_{7-8}=15-1=14$

$LS_{6-7}=LF_{6-7}-D_{6-7}=14-4=10$

$LS_{5-6}=LF_{5-6}-D_{5-6}=10-2=8$

$LS_{4-5}=LF_{4-5}-D_{4-5}=8-7=1$

$LS_{3-5}=LF_{3-5}-D_{3-5}=8-7=1$

$LS_{2-5}=LF_{2-5}-D_{2-5}=8-7=1$

$LS_{1-2}=LF_{1-2}-D_{1-2}=1-0=1$

$LS_{1-3}=LF_{1-3}-D_{1-3}=1-0=1$

$LS_{1-4}=LF_{1-4}-D_{1-4}=1-0=1$

also LF calculation

LF = LF – D

$LF_{13-14}=41$

$LF_{12-13}= 41-2=39$

$LF_{11-12}= 39-4=35$

$LF_{10-12}= 39-4=35$

$LF_{9-10}=35-10=25$

$LS_{9-11}= 35-10=25$

$LF_{8-9}=25-6=19$

$LF_{7-8}=19-4=15$

$LF_{6-7}=15-1=14$

$LF_{5-6}=14-4=10$

$LF_{4-5}=10-2=8$

$LF_{3-5}=10-2=8$

$LF_{2-5}=10-2=8$

$LF_{1-4}=1-0=1$

$LF_{1-3}=1-0=1$

$LF_{1-2}=1-0=1$

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

No	Kode Kegiatan	Kegiatan		Waktu (D) dalam hari	Paling Akhir	
		i-node	j-node		Mulai (LS)	Selesai (LF)
1	A	-	-	1	0	1
2	B	2	5	4	1	8
3	C	3	5	4	1	8
4	D	4	5	7	1	8
5	E	5	6	2	8	10
6	F	6	7	4	10	14
7	G	7	8	1	14	15
8	H	8	9	4	15	19
9	I	9	10	6	19	25
10	J	10	12	8	25	35
11	K	11	12	10	25	35
12	L	12	13	4	35	39
13	M	13	14	2	39	41

Figure 4. Calculation LS and LF

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

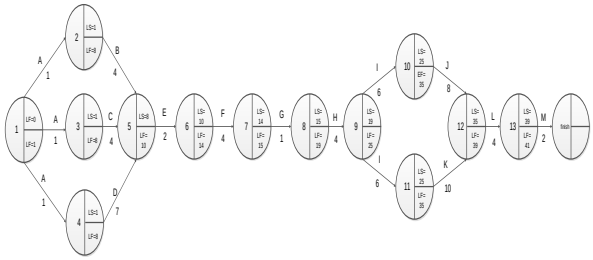


Figure 6. Network Of Backward Calculations.

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	1	2	1	0	1	1	1	0
2	1	3	1	0	1	1	1	0
3	1	4	1	0	1	1	1	0
4	2	5	4	1	5	1	8	3
5	3	5	4	1	5	1	8	3
6	4	5	7	1	8	1	8	0
7	5	6	2	8	10	8	10	0
8	6	7	4	10	14	10	14	0
9	7	8	1	14	15	14	15	0
10	8	9	4	15	19	15	19	0
11	9	10	6	19	25	19	25	0
12	9	11	6	25	25	25	25	0
13	10	12	8	25	35	25	35	2
14	11	12	10	35	35	35	35	0
15	12	13	4	35	39	35	39	0
16	13	14	2	39	41	39	41	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 4 activities with a total delay of maximum allowed is 3 days, with a total of 5 activities the maximum delay allowed is 3 days, and on the activities of 13 with a total delay of maximum permitted is 2 days, so forming a network of Critical Path Method as shown in Figure 8. Network Critical Path Method.

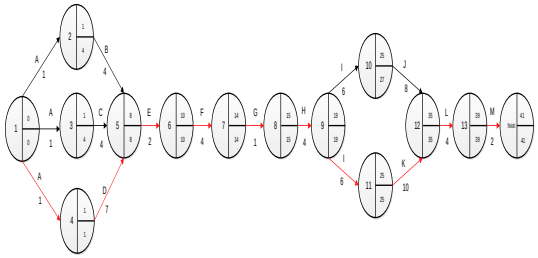


Figure 8. Network Critical Path Method

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 9 and 10. The Results Of The Calculation Of The Earn Value Management

No	Uraian Pekerjaan	Bobot	Bulan Ke-1				Bulan Ke-2			
			Minggu 1	Minggu 2	Minggu 3	Minggu 4	Minggu 5	Minggu 6	Minggu 7	Minggu 8
1	PEKERJAAN PERSIAPAN	1,3	0,16	0,16		0,16	0,16	0,16	0,16	
2	PEKERJAAN TANAH DAN PASIR	1,03		0,21	0,21	0,21	0,21	0,21		
3	PEKERJAAN PASANGAN	27,15			3,02	3,02	3,02	3,02	3,02	3,02
4	PEKERJAAN BETON	70,52		7,84	7,84	7,84	7,84	7,84	7,84	7,84
	RENCANA TOTAL MINGGUAN									
	Bobot Rencana (PV %)		0,16	8,2	11,06	11,22	11,22	11,22	11,01	10,85
	Bobot Rencana Kumulatif (PV %)		0,16	8,36	19,42	30,64	41,86	53,08	64,09	74,94
	Bobot Actual (AC %)		16,21	39,27	44,52					
	Bobot Actual Kumulatif (AC %)		16,21	55,48	100					
	Actual Cost		22.272.540	53.956.980	61.170.480					

Figure 9. The Results Of The Calculation Of The Earn Value Management

No	Uraian Pekerjaan		Bulan Ke-3				Rencana	EV minggu ke-3
			Minggu 9	Minggu 10	Minggu 11	Minggu 12		
1	PEKERJAAN PERSIAPAN				0,16	0,18	1,3	0,32
2	PEKERJAAN TANAH DAN PASIR						1,03	0,42
3	PEKERJAAN PASANGAN		3,02	3,02	3,02		27,15	3,02
4	PEKERJAAN BETON		7,84	7,80			70,52	15,68
							100	
	Bobot Rencana (PV %)		10,85	10,85	3,18	0,18		
	Bobot Rencana Kumulatif (PV %)		85,79	96,64	99,82	100		
	Bobot Actual (AC %)							
	Bobot Actual Kumulatif (AC %)							
	Actual Cost							

Figure 10. The Results Of The Calculation Of The Earn Value Management (continued)

From Figure 9 and Figure 10 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 week and costs that will be incurred, planned value obtained from the% weighting plan every week planned budget multiplied by the actual cost (BAC), bac is the contract value that is already agreed upon, namely 137,400,000.

   Calculation of PV in week 1:
   PV = (%progress rencana) x BAC
   = 0,16 x 137.400.000
   = 219.840

   Calculation of PV in week 2 :
   PV = (%progress rencana) x BAC
   = 8,2 x 137.400.000
   = 11.266.800

   Calculation of PV in week 3:
   PV = (%progress rencana) x BAC
   = 11,06 x 137.400.000
   = 15.196.440

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).

   Calculation of EV in week 1:
   EV = (%progress aktual) x BAC
   = 16,21 x 137.400.000
   = 22.272.540

   Calculation of EV in week 2:
   EV = (%progress aktual) x BAC
   = 39,27 x 137.400.000
   = 53.956.980

   Calculation of EV in week 3:
   EV = (%progress aktual) x BAC
   = 44,52 x 137.400.000
   = 61.170.480

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.

   Calculation of CV and SV in week 1:
   CV = EV - AC
   = 22.272.540 – 22.272.540
   = 0
   SV = EV – PV
   = 22.272.540 - 219.840
   = 22.052.700

   Calculation of CV and SV in week 2:
   CV = EV - AC
   = 53.956.980 - 53.956.980
   = 0
   SV = EV – PV
   = 53.956.980 - 11.266.800
   = 42.690.180

   Calculation of CV and SV in week 3:
   CV = EV - AC
   = 61.170.480 - 61.170.480
   = 0
   SV = EV – PV
   = 61.170.480 – 15.196.440
   = 45.974.040

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 and SPI calculation in week 1:
   CPI = EV/AC
   = 22.272.540 / 22.272.540
   = 1
   SPI = EV / PV
   = 22.272.540 / 219.840
   = 101.312

   CPI and SPI calculation in week 2:
   CPI = 53.956.980 / 53.956.980
   = 1
   SPI = 53.956.980 / 11.266.800
   = 4.79

CPI and SPI calculation in week 3:
CPI = 61.170.480 / 61.170.480
= 1
SPI = 61.170.480 / 15.196.440
= 4.02

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& ETC calculation in week 1:
EAC = BAC/CPI
= 137.400.000/1
= 90/101.325
ETC = OTE/SPI
= 137.400.000
= 0.89

EAC& ETC calculation in week 2:
EAC = BAC/CPI
= 137.400.000/1
= 137.400.000
ETC = OTE/SPI
= 90/4.79
= 18.79

EAC& ETC calculation in week 3:
EAC = BAC/CPI
= 137.400.000/1
= 137.400.000
ETC = OTE/SPI
= 90/4.02
= 22.79

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 11. Results Of The EVM Analysis

Minggu Ke	Analisa Varian		Analisa Kerja		Analisa Estimasi	
	Waktu	Biaya	Waktu	Biaya	Waktu	Biaya
	SV(Rp)	CV(Rp)	SPI	CPI	ETC (Hari)	EAC (Biaya)
1	22.052.700	0	101.325	1	0.89	137.400.000
2	42.690.180	0	4.79	1	18.79	137.400.000
3	45.974.040	0	4.02	1	22.39	137.400.000

Figure 11. Results Of The EVM Analysis

From the results of the analysis of the results of the analysis on the calculation of the recap to 3 weeks can be taken on the conclusions of the project goes according to plan because the value of the estimated time of completion (ETC) is 27 December day, faster than the duration of the project i.e. 90 days and the cost is Rp 137,400,000, equal to the total budget (BAC) Rp 137,400,000, a value of 1 indicates > spi project acceleration compared to the planned schedule, the value of the cpi = 1 indicates the cost equal to the cost that is planned.

7. *Comparison Of The Results Of The Planning And Realization*

Following are the results of the comparison between the planning and realisation of the project as shown in Figure 12. the results of the comparison of plan and the realization of the project

.

Minggu Ke	BAC	%Rencana	Biaya Rencana	%Aktual	Biaya Realisasi
1	137.400.000	0.16	219.840	16.21	22.272.540
2		8.2	11.266.800	39.27	53.956.980
3		11.06	15.196.080	44.52	61.170.480
Total			26.683.080	100	137.400.000

Figure 12. Results Of The Comparison Plan And The Realization Of The Project

Comparison of the results of the plan and the realization of it can be seen that the plan total in week 3 has a weight of 20% with a planned total cost amounting to 26,683,080 while the total work on the realization of the 3rd week of having achieved 100% with a fee of 137.400.00, this realization cost an amount equal to the value of the contract

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 Expected Monetary Value (EMV).

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 13 the identification of risks.

Kode Resiko	Deskripsi Resiko
1	Perkiraan jadwal dan biaya yang tidak sesuai perencanaan
2	Pekerja lapangan yang sakit sehingga mempengaruhi jadwal proyek
3	Kurangnya pemahaman pekerja lapangan terhadap arahan Pelaksana Teknis
4	Kemampuan SDM yang kurang / tidak sesuai dengan yang diharapkan
5	Kecelakaan kerja
6	Pengiriman barang terlambat
7	Terjadinya hujan / banjir / bencana alam
8	Kerusakan alat proyek (mobil, *dumptruck*, pompa air, beton molen)
9	Hilangnya bahan baku proyek dan alat proyek

Figure 13 The Identification Of Risks

2. Risk Assesment

Risk assessment is done to memastikaan objectivity variable degree of risk by way of assessing the level of importance, analyze risk categories as well as assess the portion of risk by providing criteria – certain criteria. Risk analysis based on probability of occurrence and the consequences that should be done, the probability value is determined by the frequency of occurrence, while the value of the consequences are determined based on cost or other compensation must be issued, the value of these consequences is the approximate figures for a risk, with the formula

EMV = Probability x Consequences

where :
EMV : Expected Monetary Value
Probability : The frequency of occurrence of risk
Consequences : Fee or other compensation must be issued.

The following is a table of calculation of the valuation rseperti seen in Figure 14. calculation value of the risk.

Kode Resiko	Probabilitas (%)	Konsekuensi (Rp.)	EMV
1	50	(-5.000.000)	-2.500.000
2	25	(-3.000.000)	-750.000
3	20	(-1.000.000)	-200.000
4	10	(-900.000)	-90.000
5	10	(-2.000.000)	-200.000
6	30	(-1.000.000)	-300.000
7	15	(-1.000.000)	-150.000
8	5	(-2.250.000)	-112.500
9	5	(-2.500.000)	-125.000
Total			-4.427.500

Figure 14. Calculation Value Of The Risk

Negative numbers (-4.427.500) indicates that there is a threat when the project takes place, companies have to spend as much money as 4,427,500 to deal with the risks that may occur.

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 15. Handling Risks.

Kode Resiko	Deskripsi Resiko	Penanganan Resiko
1	Pekerja lapangan yang sakit sehingga mempengaruhi jadwal proyek	Memanfaatkan SDM yang ada, seperti mandor yang ikut menggantikan tugas pegawai, atau menambah pegawai baru
2	Kurangnya pemahaman pekerja lapangan terhadap arahan Pelaksana Teknis	Menambah komunikasi dan arahan antara Pelaksana Teknis dan pekerja lapangan sampai mendetail, sehingga pekerja lapangan mengerti dengan maksud Pelaksana Teknis
3	Kemampuan SDM yang kurang / tidak sesuai dengan yang diharapkan	Memanfaatkan SDM yang ada dengan menambah jam kerja dan segera mencari karyawan yang baru dari kolega perusahaan
4	Kecelakaan lalu lintas	Selalu menggunakan alat keselamatan kerja dan tanda rambu-rambu sedang ada pekerjaan konstruksi
5	Pengiriman barang terlambat	Komunikasi dengan suplier barang dan membuat perjanjian jika terjadi keterlambatan barang, *supplier* bersedia mencari kebutuhan barang proyek dari pihak lain
6	Terjadinya hujan / banjir / bencana alam	Bila memungkinkan tetap menjalankan proyek sesuai jadwal.
7	Kerusakan alat proyek (mobil, *dumptruck*, pompa air, beton molen)	Mencari alat proyek yang baru dengan sementara meminjam kepada perusahaan lain atau menyewa ke perusahaan rental alat berat/konstruksi
8	Hilangnya bahan baku proyek dan alat proyek	Menitipkan kepada warga sekitar yang dapat dipercaya atau menyewa keamanan bila perlu

Figure 15. Handling Risks

3. PENUTUP

Results from research that has been done, the conclusion that the application of project management information system can help directors in monitoring the running of the project schedule, estimate time of completion of the project, the estimated cost of completion of the project as well as store data risks and handling along with a cost that must be removed when the risk occurs.

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

1. Add the management of K3 in order to make the company better in the management of occupational safety and health work.
2. Add the job management add or less, because it is not uncommon when a project owner project took place should change plans or schedule that is already made
3. Add monitoring weather to ease in integration for risk management.

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