PROJECT MANAGEMENT INFORMATION SYSTEM AT CV. DUA DUA

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ABSTRACT

Project management managed by CV. DUA DUA *has several problems, including in the implementation of the mismatch between scheduled and planned costs, this happens because project supervision and reporting is still done manually, so the company difficulties in measuring the performance and progress of the project in terms of cost and time and the risks Appear to have a negative impact on the completion of projects that could be detrimental to the company. Then needed information system that can solve the problem. The objective of this research is to simplify the process of reporting that can measure the performance and progress of the project and identify the risks that arise and handling it. The method used in project management is Earned Value Management (EVM) method for analysis of project performance measurement and progress in terms of time and cost of project, and Earn Monetary Value (EMV) method to calculate risk handling cost. Information system test is done using black box. Based on the results in accordance with the functional objectives of the system is as you wish. So that the project management information system built already meet the objectives to be achieved*

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

1. INTRODUCTION

CV DUA DUA is a company engaged in construction services experienced in dealing with road construction environment, retaining the road, construction of the bridge, construction, pipeline clean water and so on.
Based on the interview there were problems faced by CV DUA DUA among them, namely the supervision of a project can't be done every day, due to the limited human resources, the limited oversight of this cause at a time when the implementation of common discrepancy or delay in completion. Furthermore, in the process of reporting activities are still carried out manually, this makes the reporting process is quite long, which resulted in difficulties in measuring the company's performance and the progress of the project, both in terms of time and costs against the realization of decision-making in doing when there are discrepancies between the plan and realization. Barriers that often arises at the moment of the project took place, among which there are some employees who are sick and permission, material damage, delay in the delivery of materials, weather factors resulted in some job that forced paused. Risk-the risk that certainly has not been managed well, consequently impacting on the delay time of the completion of the project and the company's profits also became diminished due to the addition of the time and costs that must be incurred to the company risk.
Based on the problems that have been pointed out then needed a solution to address the problems that often occur in the work of the project, namely the need for systems that can help companies in the process of project management CV DUA DUA. The system will be built this project reporting quickly and measure the performance and progress of the project using Earned Value Management (EVM) system and help manage risk and provide recommendations for handling, along with the costs of issue when the risk occurs
.

2. CONTENT OF RESEARCH

2.1 Riview Literature

Contains theories from several experts used as a reference on research.

2.1.1 Definition of Information System

Information systems is the way organized to collect, enter, and process the data and store it, manage, control and report it so that it can support a company or organization to achieve goals
. [1]

2.1.2 Definition of Project Management

Project Management is a project that is implemented on a temporary basis needs to be managed and controlled properly. To make arrangements and control it is necessary the rules of

money become a guide for its implementation. According to PMBOK Project Management.

2.1.3 Earned Value Management (EVM) Method

Earned Value Management (EVM) is an objective measuring technique and provides early warning if there are performance issues, EVM measures performance and progress through integrated management with overall project cost, time and scope.[2]

2.1.4 Risk Mangement

Risk management is a measurement or structured approach to managing uncertainty related to threats as well as a series of human activities, developing strategies for managing and mitigating risks, measurements starting with identification, measuring and determining the risks, finding ways to deal with those risks.[3]
Stages of risk management :

1. *Identification is the initial stage where identification to know which risks can affect the project, from identification of risk can get the result of a list of risks, once known risk will be grouped by type of risk. The following are the types of risks that exist in the construction project (Wideman, 1992) :*
   a. *External: rain, earthquake, the influence of the environment, the influence of the market, and inflation.*
   b. *Internal: factors of the company itself, personal, less precisely estimated time and cost.*
   c. *Techniques: design changes, the risk on the technology and tools supporting the project.*
   d. *Legal: permissions, licenses and things that are unexpected.*
2. *The assessment phase is to assess the level of importance of the risks, analyze risks, download the magnitude of risk dinominalkan in the form of fees.*
3. *The handling is a stage where this type of risk and cost risks that face value has been dihitunng can be managed/handled, so any solutions and in charge of the risk can be determined, there are response handling against the risk. According to Flanagan and Norman: [4]*
   a. *Acceptable risk, i.e. the risk of ditangulangi form by individuals or companies because of its consequences is assessed quite small. For example, the cost of the promotion company to get the project in the future.*
   b. *Reduced risks, ie forms of risk that can be mitigated or handled by handling an alternative action whose value of consequences can be nil or at least lesser consequence. For example, education to the workforce in the face of risk.*
   c. *The risk is transferred, i.e. a form of risk that can be dipindakan to any other part or whole. For example, for the safety and health of work programs, the company guarantees its employees on the insurance company to pay the premiums.*
   d. *The risk avoided, which is the same as refusing to accept a risk which means refusing to accept the project Reduced risks, that is, the form of risk that can be derived from the action of the value of consequences. For example, education to the workforce in the face of risk..*

2.1.5 Expexted Monetary Value (EMV) Method

Monetery expected Value (EMV) is the concept of statistics to calculate the average of the results of future events that are included in both scenarios that do not include a case. If the value of the EMV is positive then it can be inferred to opportunities (positive risk) and if the value of EMV obtained negative then it can be inferred the threat (risk of negative) that can be detrimental to the company. EMV in the project is calculated by multiplying the value of the frequency of occurrence for each risk multiplied by the value of compensation or costs incurred. Here is the formula of Monetery Expected Value.[5]

EMV = Probailitas * Konsekuensi

Descriptoion :
EMV : Expected Monetary Value (The Value Of The Money Expected)
Probability : the frequency of occurrence of risks
Consequence : the cost or compensation.

2.2 Analisys Monitoring

Analysis of the monitoring project contains the analysis of the monitoring costs and time to the project undertaken. The methods used to menugkur the performance and progress of the project i.e. the Earned Value Management (EVM).

2.2.1 Earned Value Mangement (EVM) Analysis

Earned Value Management (EVM) is a method to find out the progress of a project larger or smaller than the budget that should and can be seen whether the project more quickly or more slowly than planned previously.

The s-curve is a tool monitor and evaluation of informative, can show the progress of the project on the basis of activities, time and weight of the work presented as cumulative prensentase from all the activities of the project. S-curve visualisation can give information on project progress by comparing it against a schedule plan. From this note is there any delay or acceleration of the project and

schedule in terms of cost can know if the swelling cost. The indication can be preliminary information in order to perform the Act of correction in the process control of the schedule or the cost. [6]

The case studies analysed in the report of the working environment of the road construction project Kp. Lebak Jaha and Cipaku, the project has a total budget of the project (BAC) of 182,908,000.00 and time of work for 28 days (4 weeks), there is a work holiday that is Friday so that a total of 24 work days.

The following is the pelaksaan project planning progress can be seen in table 1, while actual project work progress can be seen in table 2. the actual weighting is in progress table daily activities derived from the activity report of the project.

NO	URAIAN	BOBOT %	MINGGU KE-1							MINGGU KE-2						
			29	30	31	1	2	3	4	5	6	7	8	9	10	11
I	MATA PEMBAYARAN UMUM															
	PEKERJAAN PERSIAPAN															
1	Pas. Bouplank/Propil	1,15	0,144	0,144	0,144		0,144	0,144	0,144	0,144	0,144					
2	Pem. Lokasi/Bongkaran	1,71	0,244	0,244	0,244		0,244	0,244	0,244	0,244						
II	MATA PEMBAYARAN UTAMA															
	PEKERJAAN KONSTRUKSI															
1	Pek. Galian Tanah	1,11		0,16	0,16		0,16	0,16	0,16	0,16	0,16					
2	Pek. Buangan Sisa Galian	0,67			0,096		0,096	0,096	0,096	0,096	0,096	0,096				
3	Pek. Bekisting	1,48										0,099		0,099	0,099	0,099
4	Pek. Urugan Pasir Urug	4,15														0,319
5	Pek. Beton Mutu fc 9,8 Mpa K-125	23,98														1,844
6	Pek. Pas Lantai Paving Block Natural 6 cm (manual)	65,75														5,06
		100,00														
	TOTAL BOBOT		0,39	0,55	0,64		0,64	0,64	0,64	0,64	0,40	0,20		0,10	0,10	7,32
	TOTAL KUMULATIF PERMINGGU		0,39	0,938	1,582		2,25	2,87	3,51	0,64	1,04	1,24		1,33	1,43	8,76

Figure 1. Planning Implementation

MINGGU KE-3							MINGGU KE-4							Rencana
12	13	14	15	16	17	18	19	20	21	22	23	24	25	
														1,15
														1,71
														1,11
														0,67
0,099	0,099	0,099		0,099	0,099	0,099	0,099	0,099	0,099		0,099	0,099		1,48
0,319	0,319	0,319		0,319	0,319	0,319	0,319	0,319	0,319		0,319	0,319	0,319	4,15
1,844	1,844	1,844		1,844	1,844	1,844	1,844	1,844	1,844		1,844	1,844	1,844	23,98
5,06	5,06	5,06		5,06	5,06	5,06	5,06	5,06	5,06		5,06	5,06	5,06	65,75
7,32	7,32	7,32		7,32	7,32	7,32	7,32	7,32	7,32		7,32	7,32	7,22	100
7,32	14,64	21,97		29,29	36,61	43,93	7,32	14,64	21,97		29,29	36,61	43,83	

Figure 1. Planning Implementation (continued)

NO	URAIAN	BOBOT %	MINGGU KE-1							MINGGU KE-2						
			29	30	31	1	2	3	4	5	6	7	8	9	10	11
I	MATA PEMBAYARAN UMUM															
	PEKERJAAN PERSIAPAN															
1	Pas. Bouplank/Propil	1,15	0,144	0,14	0,13		0,12	0,13	0,15	0,15	0,15					
2	Pem. Lokasi/Bongkaran	1,71	0,244	0,24	0,24		0,24	0,25	0,25	0,25						
II	MATA PEMBAYARAN UTAMA															
	PEKERJAAN KONSTRUKSI															
1	Pek. Galian Tanah	1,11		0,16	0,16		0,15	0,15	0,16	0,16	0,17					
2	Pek. Buangan Sisa Galian	0,67			0,09		0,09	0,08	0,08	0,10	0,11	0,12				
3	Pek. Bekisting	1,48										0,10		0,10	0,09	0,08
4	Pek. Urugan Pasir Urug	4,15														0,32
5	Pek. Beton Mutu fc 9,8 Mpa K-125	23,98														1,84
6	Pek. Pas Lantai Paving Block Natural 6 cm (manual)	65,75														5,06
		100,00														
	TOTAL BOBOT		0,39	0,54	0,62		0,60	0,61	0,64	0,66	0,43	0,22		0,10	0,09	7,30
	TOTAL KUMULATIF PERMINGGU		0,39	0,93	1,55		2,15	2,76	3,40	4,06	4,49	4,71		4,81	4,90	12,20

Figure 2. Progress Activities

MINGGU KE-3							MINGGU KE-4						
12	13	14	15	16	17	18	19	20	21	22	23	24	25
0,09	0,07	0,08		0,08	0,09	0,10	0,11	0,11	0,12		0,13	0,13	
0,32	0,31	0,30		0,30	0,31	0,31	0,32	0,32	0,32		0,33	0,34	0,35
1,84	1,81	1,82		1,82	1,82	1,83	1,84	1,85	1,86		1,86	1,86	1,87
5,06	5,02	4,98		4,98	4,99	5,05	5,06	5,08	5,09		5,10	5,12	5,14
7,31	7,21	7,18		7,18	7,21	7,29	7,33	7,36	7,39		7,42	7,45	7,36
19,52	26,73	33,91		41,09	48,30	55,59	62,92	70,28	77,67		85,09	92,54	100

Figure 2. Progress Activities (continued)

From image 1 and image 2 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).

There are three basic elements which becomes reference in monitoring and evaluation of the project to measure the performance of the time and cost of a project including the following: [7]
a. Plan of the volume and cost of the work (PV)
b. realization of the volume of work and the plan cost (EV)
c. realization of the cost and volume of work (AC)

1. Planned Value (PV)

Its Value is the cost budgeted for work that is expected to be in a certain period, the following Calcutation of PV on day 1:

Calcutation PV On Day-1 :
PV = (%Progress rencana) x BAC
= 0,39 % x 182.908.000,00
= 713.341,20

In the table below are the results from the Calcutation of Planned Value (PV) whose results are inserted into the table can be seen in table 1.

Tables 1. Hasil CalcutationPlanned Value (PV)

Hari	% rencana	BAC	PV
1	0,39	182.908.000,00	713.341,20
2	0,55	182.908.000,00	1.005.994,00
3	0,64	182.908.000,00	1.170.611,20
4	0,64	182.908.000,00	1.170.611,20
5	0,64	182.908.000,00	1.170.611,20
6	0,64	182.908.000,00	1.170.611,20
7	0,64	182.908.000,00	1.170.611,20
8	0,40	182.908.000,00	731.632,00
9	0,20	182.908.000,00	365.816,00
10	0,10	182.908.000,00	182.908,00
11	0,10	182.908.000,00	182.908,00
12	7,32	182.908.000,00	13.388.865,60
13	7,32	182.908.000,00	13.388.865,60
14	7,32	182.908.000,00	13.388.865,60
15	7,32	182.908.000,00	13.388.865,60
16	7,32	182.908.000,00	13.388.865,60
17	7,32	182.908.000,00	13.388.865,60
18	7,32	182.908.000,00	13.388.865,60
19	7,32	182.908.000,00	13.388.865,60
20	7,32	182.908.000,00	13.388.865,60
21	7,32	182.908.000,00	13.388.865,60
22	7,32	182.908.000,00	13.388.865,60

Hari	% rencana	BAC	PV
23	7,32	182.908.000,00	13.388.865,60
24	7,22	182.908.000,00	13.205.957,60

2. Earned Value (EV)

Earned Value cost is budgeted for the work that has been done is done, the following Calcutation of EV on day 1:

Calcutation EV On Day-1 :
EV = (%Progress aktual) x BAC
= 0,39 % x 182.908.000,00
= 713.341,20

In the table below are the results from the Calcutation of Earned Value (EV) which is inserted into the table can be seen in table 2.

Tables 2. Hasil CalcutationEarned Value (EV)

Hari	% Aktual	BAC	PV
1	0,39	182.908.000,00	713.341,20
2	0,54	182.908.000,00	987.703,20
3	0,62	182.908.000,00	1.134.029,60
4	0,60	182.908.000,00	1.097.448,00
5	0,61	182.908.000,00	1.115.738,80
6	0,64	182.908.000,00	1.170.611,20
7	0,66	182.908.000,00	1.207.192,80
8	0,43	182.908.000,00	786.504,40
9	0,22	182.908.000,00	402.397,60
10	0,10	182.908.000,00	182.908,00
11	0,09	182.908.000,00	164.617,20
12	7,30	182.908.000,00	13.352.284,00
13	7,31	182.908.000,00	13.370.574,80
14	7,21	182.908.000,00	13.187.666,80
15	7,18	182.908.000,00	13.132.794,40
16	7,18	182.908.000,00	13.132.794,40
17	7,21	182.908.000,00	13.187.666,80
18	7,29	182.908.000,00	13.333.993,20
19	7,33	182.908.000,00	13.407.156,40
20	7,36	182.908.000,00	13.462.028,80
21	7,39	182.908.000,00	13.516.901,20
22	7,42	182.908.000,00	13.571.773,60
23	7,45	182.908.000,00	13.626.646,00
24	7,36	182.908.000,00	13.462.028,80

3. Cost Variance (CV) and Shcedule Variance (SV) Analysis

Analysis of the variants consists of Cost Variance (CV), and Schedule Variance (SV). CV indicates whether project spending is larger or smaller than the budgeted costs, while SV indicates whether project or accelerating more slowly than previously scheduled, following the Calcutation of CV and SV : [7]

Calcutation CV and SV On Day-1 :
CV = EV – AC
= 713.341,20 – 632.743,47
= 80.597,73

SV = EV – PV
= 713.341,20 – 713.341,20
= 0

Description:
SV = 0, the project runs with just in time.
SV > 0, there was an acceleration of the project against the plan.
SV > 0, project delays took place against the plan.

4. Performance Index Analysis

Analysis of performance index comprises the Cost Performance Index (CPI) and Schedule Performance Index (SPI), this performance index analysis can analyze the irregularities which occurred in the cost and time in a way to measure it. The CPI shows the weighted values obtained against the costs incurred, while SPI indicates the extent of the work which was able to be resolved against the planned work, here is a Calcutation of the CPI and SPI.

Calcutation CPI and SPI On Day-1 :
CPI = EV / AC
= 713.341,20 / 632.743,47
= 1,1274

SPI = EV / PV
= 713.341,20 / 713.341,20
= 1

Description:
SPI = 1, the project goes according to plan.
SPI > 1, there was an acceleration of the project against the plan.
SPI 1, occurred < project delays against plan.

5. Cost Estimation Analysis (EAC) and Project Completion Time (ETC)

Calcutation of the EAC, namely to calculate the estimated cost of completion of the project, while the ETC was to estimate the time/schedule the completion of the project, here is a Calcutation of the EAC and ETC. [7]

Calcutation EAC and ETC On Day-1 :
EAC = BAC / CPI
= 182.908.000,00 / 1,1274
= 162.241.915,38

ETC = Original time estimate / SPI
= 28 / 1,0000
= 28 hari

6. Result of Recan EVM Method Analysis

Based on the results of the analysis of the method of EVM, to make it easier to analyze the conditions of the project, then the results of the analysis variants, can be seen in table 3.

Table 3. *Result of Recap EVM*

Hari	Analisis Varian		Analisis Kinerja		Analisis Estimasi	
	Waktu SV (Rp)	Biaya CV (Rp)	Waktu SPI	Biaya CPI	Waktu ETC (hari)	Biaya EAC (Rp)
1	80.597,73	0,00	1,1274	1,0000	162.241.915,38	24
2	89.110,94	-18.290,80	1,0992	0,9818	166.405.974,07	24
3	102.607,05	-36.581,60	1,0995	0,9688	166.358.475,81	25
4	99.295,61	-73.163,20	1,0995	0,9375	166.358.731,67	26

5	100.890,11	-54.872,40	1,0994	0,9531	166.368.637,70	25
6	105.839,74	0,00	1,0994	1,0000	166.370.540,63	24
7	109.202,48	36.581,60	1,0995	1,0313	166.362.169,70	23
8	71.517,17	54.872,40	1,1000	1,0750	166.276.100,00	22
9	53.313,30	36.581,60	1,1527	1,1000	158.674.681,82	22
10	16.527,46	0,00	1,0993	1,0000	166.380.540,00	24
11	14.874,71	-18.290,80	1,0993	0,9000	166.380.544,44	27
12	1.214.123,49	-36.581,60	1,1000	0,9973	166.276.171,37	24
13	1.215.776,23	-18.290,80	1,1000	0,9986	166.276.314,23	24
14	1.199.157,58	-201.198,80	1,1000	0,9850	166.276.133,43	24
15	1.194.160,57	-256.071,20	1,1000	0,9809	166.276.237,19	24
16	1.194.160,57	-256.071,20	1,1000	0,9809	166.276.237,19	24
17	1.199.142,53	-201.198,80	1,1000	0,9850	166.276.342,16	24
18	1.212.433,91	-54.872,40	1,1000	0,9959	166.276.533,47	24
19	1.219.081,73	18.290,80	1,1000	1,0014	166.276.598,50	24
20	1.224.071,84	73.163,20	1,1000	1,0055	166.276.589,13	24
21	1.229.052,57	128.035,60	1,1000	1,0096	166.276.706,77	24
22	1.234.034,53	182.908,00	1,1000	1,0137	166.276.806,87	24
23	1.239.025,88	237.780,40	1,1000	1,0178	166.276.780,13	24
24	1.224.197,38	256.071,20	1,1000	1,0194	166.274.883,42	24

Based on the results of the calculations on the recap until the 24th day of that project is estimated to experience a profit with a budget that is issued under the figure of Rp. 166,276,806.87. Due to the value of the cost budget sebeleum VAT 10% to do all activities amounting to Rp. 166,280,840.00.

Following are the results of the s-curve monitoring, with a duration of 24 days, in Figure 3. As Follows:

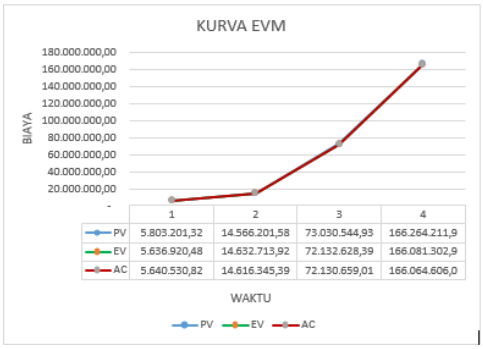


Figure 3. Curve EVM

2.3 Risk Management Project Analysis

Risk management is essential in the work of the project, through risk management, the risk that may occur will be identified before the project is done so that when the risks that arise can be dealt with and did not result in any damage or even failure of the project. Aim to improve the opportunities and impacts of positive events, and reduce the chance of adverse events and the impact of the project. The following are the stages for risk identification, risk assessment and responses using Expected Monetary Value (EMV).

2.3.1 Risk Identification

This identification process is done by looking for the kinds of risk in accordance with risk categories, the list of risks is obtained by means of approach to the discussions and interviews with the company, the results of the identification of this risk can be seen in table 4.

Tables 4. Risk Identification

Kode Risiko	Jenis Risiko	Desripsi Risiko
R1	Estimasi	Jadwal pekerjaan tidak sesuai dengan rencana
R2		Biaya tidak sesuai dengan rencana
R3	Pesonal	Ada pekerja yang izin
R4		Ada pekerja yang sakit
R5		Ada pekerja yang belum memahami cara bekerja
R6	Keselamatan Kerja	Kecelakaan kerja
R7	External	Cuaca seperti hujan dan angin, yang menagkibatkan pekerjaan dihentikan sementara.
R8		Bencana alam sepert banjir dan longsor yang dapat mempengaruhi penyelesaian proyek.
R9	Alat Penunjang Konstruksi	Peralatan rusak (pompa air, mobil, beton molen)
R10		Peralatan hilang seperti pencurian bahan dilokasi
R11		Terlambat pengiriman barang

2.3.2 Risk Asessment

Risk assessment is carried out by means of assessing the level of importance, menganalisi risk category as well as assessing the risk portion with specific criteria. Risk analysis risk classification based on the probability of making as well as konskuensi to do a probability value, determined by the frequency of occurrence, while the value of konskuensi is determined on the basis of a fee or other compensation must be removed.

1. Determine Cost of Risk

At this stage the extent of the calculated cost of the company must be issued to deal with those risks by using the method of Expected Monetary Value (EMV). Assessment of the probability and the consequences the result of interviews and discussions. Can be seen in table 5 and Figure 6.

Tables 5. Probability

Kode Risiko	Desripsi Risiko	Probabilitas (%)
R1	Jadwal pekerjaan tidak sesuai dengan rencana	50
R2	Biaya tidak sesuai dengan rencana	45
R3	Ada pekerja yang izin	5
R4	Ada pekerja yang sakit	30
R5	Ada pekerja yang belum memahami cara bekerja	10
R6	Kecelakaan kerja	5
R7	Cuaca seperti hujan dan angin, yang menagkibatkan pekerjaan dihentikan sementara.	30
R8	Bencana alam sepert banjir dan longsor yang dapat mempengaruhi penyelesaian proyek.	10
R9	Peralatan rusak (pompa air, mobil, beton molen)	20
R10	Peralatan hilang seperti pencurian bahan dilokasi	5
R11	Terlambat pengiriman barang	40

After the value of the probability is known, then look for the value of the consequences. The

consequence is a value or most estimates must be issued for each risk. The following table 6.

Tables 6. Consequences

Kode Risiko	Desripsi Risiko	Konsekuensi (Rp.)
R1	Jadwal pekerjaan tidak sesuai dengan rencana	4.000.000
R2	Biaya tidak sesuai dengan rencana	3.500.000
R3	Ada pekerja yang izin	900.000
R4	Ada pekerja yang sakit	1.250.000
R5	Ada pekerja yang belum memahami cara bekerja	1.500.000
R6	Kecelakaan Kerja	1.200.000
R7	Cuaca seperti hujan dan angin, yang menagkibatkan pekerjaan dihentikan sementara.	1.250.000
R8	Bencana alam sepert banjir dan longsor yang dapat mempengaruhi penyelesaian proyek.	1.000.000
R9	Peralatan rusak (pompa air, mobil, beton molen)	3.000.000
R10	Peralatan hilang seperti pencurian bahan dilokasi	2.500.000
R11	Terlambat pengiriman barang	2.000.000

After the value of the probability and the consequences have been obtained, and then do the calculations of each risk using EMV.

Following are the results of the calculations of risk assessment using EMV. Can be seen in table 7.

Tables 7. Calcutation Risk Value

Kode Risiko	Probabilitas (%)	Konsekuensi (Rp.)	EMV
R1	50	4.000.000	2.000.000
R2	45	3.500.000	1.575.000
R3	5	900.000	50.000
R4	30	1.250.000	375.000
R5	10	1.500.000	150.000
R6	5	1.200.000	60.000
R7	30	1.250.000	375.000
R8	10	1.000.000	100.000
R9	20	3.000.000	600.000
R10	5	2.500.000	125.000
R11	40	2.000.000	800.000

Calcutation based on EMV in table 7 is the value or cost of each risk. So companies have to spend as much money as the figure if one of those risks occur. It would be nice at the stage of planning the company first planned costs for each risk.

2.3.3 Risk Handling

Based on the results of the risk assessment has been done before, then do mitigation or response handling against the risk, here are handling or mitigation for each risk can be seen in Figure 4.

Kode Risiko	Desripsi Risiko	Respon Terhadap Ritiko	Deskripsi Penanganan Risiko
R1	Jadwal pekerjaan tidak sesuai dengan rencana	Direduksi	Memanfaatkan SDM yang ada dengan menambah jam kerja dan pemahaman tentang proyek yang dikerjakan
R2	Biaya tidak sesuai dengan rencana	Dikurangi	Memanfaatkan SDM yang ada dengan menambah jam kerja dan mengurangi biaya-biaya yang kurang diperlukan
R3	Ada pekerja yang izin	Diterima	Memanfaatkan SDM yang ada, atau menambah pegawai yang baru
R4	Ada pekerja yang sakit	Diterima	Memanfaatkan SDM yang ada, atau menambah pegawai yang baru
R5	Ada pekerja yang belum memahami cara bekerja	Dikurangi	Pelaksana teknis dan mandor terus berkomunikasi dengan pekerja, dan berikan arahan dalam pekerjaan untuk pegawai tersebut.
R6	Kecelakaan Kerja	Dipindahkan	Selalu Menggunakan alat keselamatan kerja, dan berhati hati dalam melakukan pekerjaan atau selalu menjamin pekerja ke pada pihak asuransi dengan membayar preminya
R7	Cuaca seperti hujan dan angin, yang menagkibatkan pekerjaan dihentikan sementara.	Diterima	Bila memungkinkan dapat dijalankan tetap bekerja atau jika hujan terjadi disiang-sore pengerjaan di alihkan pada malam hari
R8	Bencana alam sepert banjir dan longsor yang dapat mempengaruhi penyelesaian proyek.	Diterima	Bila memunginkan dapat dijalankan tetap bekerja
R9	Peralatan rusak (pompa air, mobil, beton molen)	Diterima	Segera mencari alat proyek baru dapat menyewa ke perusahaan lain yang merentalkan alat-alat konstruksi
R10	Peralatan hilang seperti pencurian bahan dilokasi	Dikurangi	Segera mencari alat proyek baru dapat menyewa ke perusahaan lain yang merentalkan alat-alat konstruksi atau dapat dititipkan pada masyarakat setempat
R11	Terlambat pengiriman barang	Dikurangi	Segera komunikasikan dengan pihak suplier barang dan membuat perjanjian jika terjadi keterlambatan barang, suplier mencari kebutuhan proyek dari pihak lain.

Figure 4. Risk Handling

2.4 Analysis of The User

Analysis of the user (user) is required to support the project management system will be built in accordance with the needs of the system. Analysis of present users with required are as follows in table 8.

Tables 8. User Analysis

Pengguna	Tugas dan Tanggung Jawab	Tingkat Pendidikan	Keadaan
Pelaksana Teknis	Mengisi Laporan kegiatan proyek, membuat laporan harian kegiatan proyek.	S1	Baik
Penanggung Jawab Teknik	Memonitoring Keberlangsungan proyek, mengelola kemajuan proyek dan laporan proyek, mengelola jadwal proyek, rekap mingguan	SMK	Baik
Wakil Direktur	Membuat struktur kegiatan, jadwal pekerjaan dan membuat AHSP.	S1	Baik
Penasihat administrasi dan keuangan	Membuat rencana anggaran biaya (RAB).	S1	Baik
Direktur	Melihat progress proyek, melihat progress proyek, mengelola data proyek	S1	Baik

2.5 Analysis of Functional Requirements

In building information systems project management CV. TWO TWO used this modeling

analysis tools include the structured entity relantionship diagram, the diagram context, data flow diagrams, data dictionaries and process specifications. The following diagram and context DFD Level 1 in Figure 5 and Figure 6.

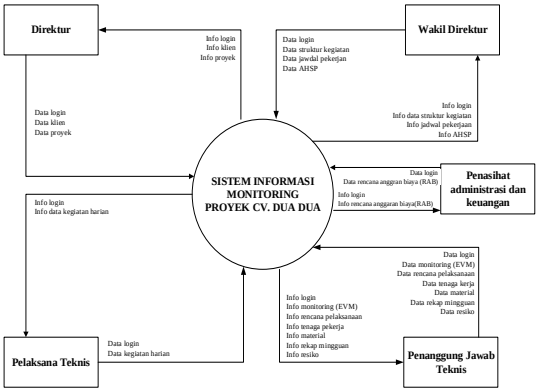


Figure 5. Diagram and Context

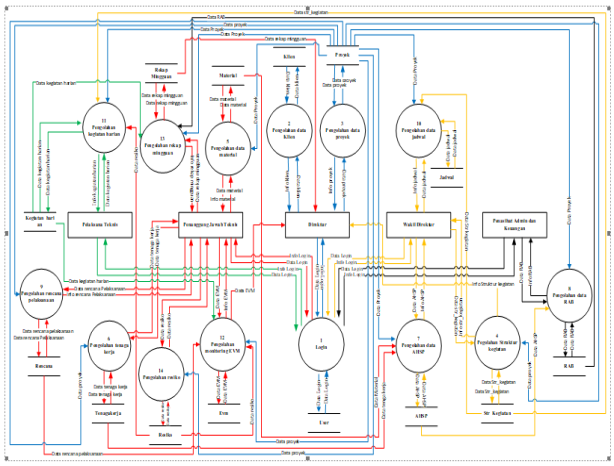


Figure 6. DFD Level 1

2.6 Designing

The design is the definition of functional requirements and is a preparation for designing the wake system implementation or constitute how to describe a system that will be established. Here is the design of the database information systems project management CV. TWO TWO in Figure 7.

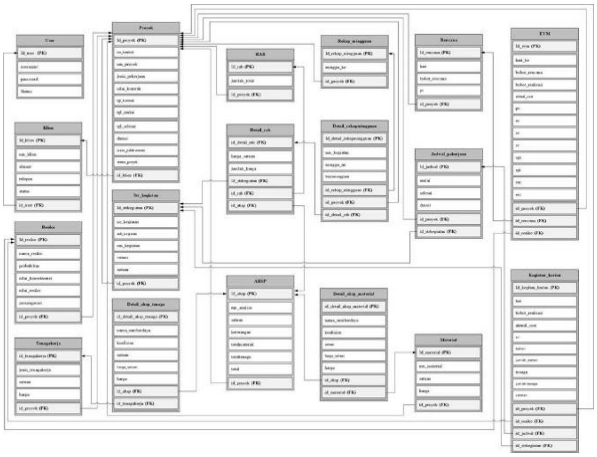


Figure 7. Database Implementation

2.7 Test

Software testing aims to evaluate the attribute or the ability of a program or system and determines that the software testing met the required results.

Testing is done by testing the alpha and beta testing. The first test is done by testing the alpha or can be called Black Box testing, with the results of tests alpa that the system meets the needs of the expected. Testing the second beta test, with results from beta testing declared the system had enough help in resolving the problems facing the company.

2.8 Interface Implementation

Here is the interface of information system project management CV. TWO two with showed the results of risk management, as well as handling cost that must be removed, as well as the results of monitoring by using the method of EVM and depicted on the curve of EVM. Can be seen in the following image:

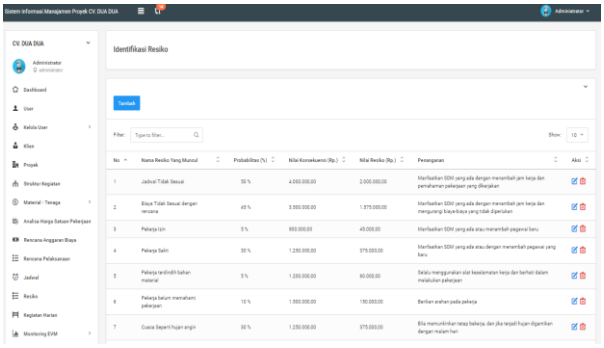


Figure 8. Interface Risk

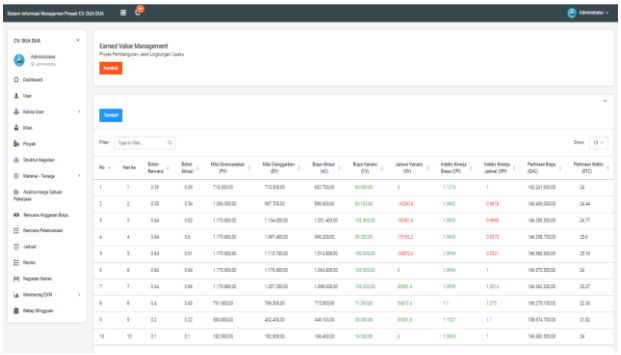


Figure 9. Interface Monitoring EVM

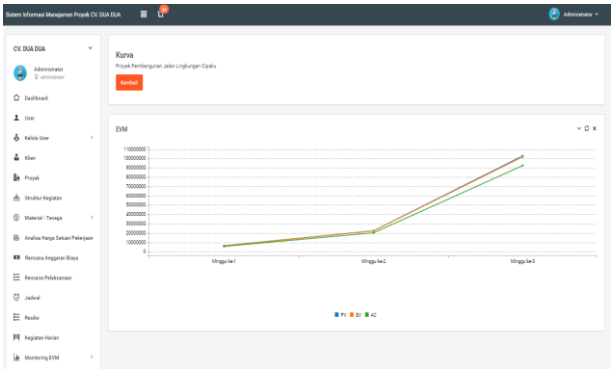


Figure 10. Curve EVM

3. CLOSING

Results from research that has been done, the conclusion that the application of Project Management information systems can assist the Director in the reporting process in a quick and measure the performance and progress of the project as well as be able to manage the risks and responses, along with the costs that must be incurred when the risk occurs

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

1. *Added feature to send messages so that project managers can exchange information regarding employment with other employees.*
2. *Add the scheduling analysis to figure out how big the influence of delay a work towards sustainability.*

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