PROJECT MANAGEMENT INFORMATION SYSTEM IN CV.GEMA KARYA

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ABSTRACT

CV. Gema Karya is a company engaged in the construction of the Road in the field of manufacture, maintenance, and repair, the project is derived from tenders with government agencies both auction and appointment. CV.Gema Karya was established in 2013 by choosing a construction service as its business, founded by Mr. Angga Ginanjar in Garut. CV.Gema Karya has often done some construction work, especially in the field of road construction, but some problems often occur when doing the job, such as the delay of the project because the project scheduling has not been prepared, the absence of risk readings, and poor budget management.

Based on the problems that have been described previously required a solution to improve the effectiveness in monitoring, controlling and scheduling project implementation, so as to minimize the occurrence of problems in a project. The following methods are able to fulfill the objective is Earned Value Management (EVM) method, a method that facilitates cost control and project time, Probability Impact Matrix (PIM) method to analyze risk and impact opportunities, and Critical Path Methode CPM) as a method for project scheduling that can be useful in evaluating schedules and breaking critical paths / project work

The results of black box testing and beta testing that has been done, it can be concluded that the system built can be accepted by users. Works well and has assisted the Director and Chief Technical Officer.

Keywords: Project Management, Earned Value Management, Probability Impact Matrix, Critical Path Methode, Risk Management

1. INTRODUCING

CV. Gema Karya is a company engaged in the construction of the Road in the field of manufacture, maintenance, and repair, the project is derived from tenders with government agencies both auction and appointment. CV.Gema Karya was established in 2013 by choosing a construction service as its business, founded by Mr. Angga Ginanjar in Garut. CV.Gema Karya has often donesome construction works especially in the field of highway construction, but some problems often occur when doing the work.

Based on the interview with Mr. Angga Ginanjar as the Director of CV. Gema Karya stated that in the construction of a project there are some projects that are experiencing delays in project work, As in a routine road maintenance project road in Pameungpeuk Garut area, where road maintenance projects can not be implemented as schedules that have been specified in the Work Order, is caused by several factors, one of which is the scheduling factor or project planning which includes project cost and project time, which is still not well compiled. The company only uses estimates without doing calculations, consequently the project is often delayed, due to the delay the company must spend more money for employees and bear the fines that are given, in addition to planning that has not been well prepared next factor is the absence of risk readings that will occur during the project, so far the company just follow the days of the project and when the project takes place that is not in want the new company can read the risks on the same day but it takes several days to determine the completion of the risks that occur as a result of the delays in the work, then the absence of supervision and control of costs and the time of the project as a result the company can not supervise or control the costs incurred in each job because of the absence of supervision and control of this company can certainly lose due to incompatible costs incurred with the initial plan in the set and also result at the completion of work.

Based on the problems that have been described previously required a solution to problem solving is by analysis and application of a method to improve the effectiveness in monitoring, controlling and scheduling project implementation, so as to minimize the occurrence of problems in a project. Here is a method that is able to fulfill the purpose is Earned Value Management (EVM) method, EVM method is a method that facilitate in controlling cost and time of project, Probability Impact Matrix (PIM) method to analyze the opportunity of emergence of risk and its impact which result project to be late, as well as the Critical Path Method (CPM) method as a method for project scheduling that can be useful in evaluating schedules and deciding on a critical path /

project work that can not be delayed at all during the project, can see how long a job can be completed until the end of the work. From the exposure, this research entitled "Project Management Information System at CV. Gema Karya ".

1.2 Scope of problem

Limitations of the problems of the system to be built are as follows:

1. This system is a web-based application and uses the PHP programming language on its development and uses MySql database.

2. The data used comes from CV. Gema Karya is project data which includes, cost budget plan, schedule data of project activity and data of company completeness.

3. The method used in the project control phase using the Earned Value Management (EVM) method to manage the estimated time and cost of the project.

4. The method used to analyze the probability of the emergence of risk and its impact using Probability Impact Matrix (PIM) method.

5. The method used in project scheduling and the determination of the project critical path is the Critical Path Methode (CPM) method.

6. Control of time and cost or often called montoring, monitoring of costs to be used to fit as predetermined, and monitoring the timing of interrelated project work can be properly monitored.

1.5.2 Data Collection

Data collection techniques used in this study are as follows:

Interview

Data collection techniques by holding question and answer directly to Mr. Angga Ginanjar as the main Director of CV.Gema Karya to get information about what happened along with the facts.

B.Observation

Techniques of data collection with direct review of things

relating to the problem under study.

C. Primary Data

Primary data is the basic data that must exist in this study which in can from the results of data collection steps, primary data such as: data

budget plans for project costs, project schedules and activities.

D. Secondary Data

Secondary data is supporting data in this research, secondary data covering company profile and data of completeness of company. The data sekundar obtained through data collection step.1.5.3

System Analysis

Stages performed in the system analysis consisting of:

A.Analysis of Current Business Systems

Analysis of the currently running system in CV.Gema Karya and proposed business rules for CV.Gema Karya.B.Analisis Metode

The method analysis is to explain the application of the method on the data used as the research material with three methods such as Critical Path Method Methode (CPM), Earned Value Management (EVM) and Probability Impact Matrix (PIM)

• Critical Path Methode (CPM)

o Critical Path Method (CPM) is the method used in project scheduling and the determination of the project critical path.

• Earned Value Management (EVM)

o Earned Value Management (EVM) is a method that can be used for cost control and project time.

• Probability Impact matrix (PIM)

o Probability Impact matrix (PIM) is a method to analyze the opportunity of emergence of risk and its impact and prepare solution handling.

C.Analysis System Will Be Built

Analysis of the system will be built describes the system that will be built in CV.Gema Karya, and in accordance with the needs.

1.5.4 System Design Will Be Built

The process captures the need in the previous stage for the design of the system to be built. System design consists of database design, menu structure design, interface design and message design.

A. Database Design

Database design is the stage to map the conceptual model to the database model that will be used. Database design is divided into two namely the relation scheme and table structure design.

B. Menu Structure Design

At this stage is done its design menu structure that describes the relevance of each menu that can be accessed by the user.

C. Interface Design

Interface design is made to describe the appearance of the program that will be used by the user to interact with the system to be created. The design is based on the interface that will be generated when the program is implemented.

D. Message Design

In this stage is doing the design of making messages in the system. Messages made consist of error messages, messages successfully saved, edited and deleted.

2. RISET CONTENT

2.1 Analysis

Analysis is a process to identify problems and system requirements that will be built in this case how to build a project management system.

2.2 Analysis System

The problem analysis on the system running on the CV. Gema Karya is as follows:

1. Director difficulties in project scheduling, due to limited human resources.

2. Risk estimates are often ignored when project planning so as to make the project is not appropriate as planned

3. Absence of supervision and control over time and cost resulting in disruption of project schedule and reduced profits

The case study which is the subject of this research is the activity of Routine Road Routing Project Wil.Pameungpeuk. The contract value agreed by both parties is Rp. 75,505,000 with a processing time of 60 calendar days.

In the Route Rehabilitation / Maintenance Route Wil.Pameungpeuk project, there are 4 jobs consisting of sub sub jobs, namely:

a. Introduction Phase: This stage is the preparation stage before doing the work in the field.

1. Survey Location: Approach Location to determine how much damage and the area to be repaired

2. Job Preparation: This stage is the preparation to start the project such as preparation of raw materials and others

3. Socialization of the Community: Conducting socialization to local residents at the project site

4. Coordination of Traffic Arrangements: Coordinate with the police for traffic management

B.Tahap Early Work: This stage is the initial stage of marking and other activities

1. Marking Damaged Roads: Conducting marked road markings in areas of project area coverage

2. Giant Steeping Description: Begin digging the damaged path to prepare for the repair

3. Mobilization of Materials: Mobilize materials to any areas that have damaged roads

C.The first stage of work: The first stage of starting a job

1. Tellford Bottom Base: Is the first layer to start fixing a damaged path

2. Class A base aggregate: This stage is the second stage or second layer for the damaged path

1. 3. Hot asphalt mixture: It is the next step to strengthen the two layers that have been done

3. Liquid Asphalt Layer: The final stage pours the asphalt to coat the damaged path after coating by 3 layers

D. Report: Is the stages performed after the work is completed to the relevant departments.

2.2 Project Planning Analysis

The project design analysis contains project scheduling analysis and risk analysis on routine road maintenance project wil.Pameungpeuk. In this case project scheduling using Critical Path Method (CPM) and risk management method using Probability Impact Matrix (PIM).

CPM (Critical Path Method) is one of the management techniques that can be used to plan and execute activities and show relationships between activities. Used to find the fastest path in working on a project, where every rojects included in this path are not given break / break time for the work. The following activity data can be seen in table 3.6

Table 3. 5 Project Plan

No Activities Code Activity Activities Predecessor Duration (Day)
1 Survey Locations A - 2
2 Job Preparation B A 1
3 Community Socialization C B 1
4 Coordination of Traffic Arrangements D B 1
5 Marked Road Damage E C, D 2
6 GREAT Pavement Picking F E 4
7 Mobilization of Material G F 7
8 Bottom of Tellford Bottom Layer H 10
9 Aggregate Base Class A I G 10
10 Asphalt Heat Mix J G 10
11 Asphaltic Adhesive Layer K H, I, J 10
12 Final Report L K 2
Total 60

Based on a series of activities in the project Routine road maintenance wil.Pameungpeuk in table 3.6 described in the form of network diagram of the work produced.

2.3 Project Scheduling Analysis

CPM (Critical Path Method) is one of the management techniques that can be used to plan and execute activities and show relationships between activities. Used to find the fastest path in working on a project, where every project included in this path is not given a break / break time for the process.
determined so that project delays can be minimized. To determine the completion time in Critical Path Method (CPM) method consists of two stages, namely forward computation, and backward computation.

1. Advanced Calculations

EF(i-j) = ES (i-j) + t (i-j)
EF0-1 = ES0-1 + t0-1 = 0 + 2 = 2
EF1-2 = ES1-2 + t1-2 = 2 + 1 = 3
EF2-3 = ES2-3 + t2-3 = 3 + 2 = 5
EF2-4 = ES2-4 + t2-4 = 3 + 1 = 4
EF3-5 = ES3-5 + t3-5 = 5 + 1 = 6
EF4-5 = ES4-5 + t4-5 = 4 +1 = 5
EF5-6 = ES5-6 + t5-6 = 6 + 4 = 10
EF6-7 = ES6-7 + t6-7 = 10 + 17 = 27
EF7-8 = ES7-8 + t7-8 = 10 + 17 = 27
EF7-9 = ES7-9 + t7-9 = 10 + 17 = 27
EF7-10 = ES7-10 + t7-10=10 + 17 = 27
EF8-11 = ES8-11 + t8-11= 27 + 10 = 37
EF9-11 = ES9-11 + t9-11= 27 + 10 = 37
EF10-11 = ES10-11 + t10-11=27 + 10 = 37
EF11-12 = ES11-12 + t11-11=37 + 1 = 38

2.4 Project Risk Analysis

The risk management process has several stages of identifying the risks, determining the probable value, the risks that will occur, and the handling of the risks that occur. The risk management process begins with the identification of risks that aim to identify and create daftar risiko that might happen. The process of identifying this incident is done by brainstorming method or approach of discussion and interview with representatives from the company that is with Mr.

Ayi Bobon as the chief executive explains that there are some risk factors that can lead to disruption of project activity

2.5 Determining Possible and Impact Values

After the stage of risk identification on the routine wil.Pameungpeuk road maintenance project has been performed, after which the risk will be assessed by scaling the scale using a boston quadrilateral matrix (Boston Square Matrix).

2.6 Determining the Level of Risk Interest

After determining the probability value and the impact of risk, then do the calculation of risk interest level using Probability Impact Matrix method. The importance of risk is calculated using the Risk Exposure formula.

Risk Exporsure = probability (outcome) * loss (outcome)

Ket :

a. *Risk Exposure* = Level of Risk Interest

b. *Probability (outcome)* = Risk Probability Value

c. *Loss (outcome)* = The impact value generated

Based on the risk management analysis, risk management can assist the Chief Executive in identifying possible risks so that if risks occur they can be handled as quickly as possible on the basis of their importance and with predetermined risk control measures so that the project risk handling is not too long and can affect a predetermined schedule so that project delays can be minimized.

The following is an assessment table of the impact criteria of the Impact Criteria Assessment Table

Table 3. 12 Impact Assessment Criteria

No Assessment of Impact Values

1 Very Low (slight) 1 The impact is not significantly felt, loss
finance is meaningless

2 Low (minor) 2 On-site handling is required

3 Medium (significant) 3 Need to be addressed by team leader on a
directly

4 Height (severe) 4 There is extra time on the schedule
planned.

5 Very High (major) 5 Need to be handled by the director or necessary
special handling

Table 3. 13 Probability Measurements

No Assessment of Possible Values

1 Very Low (Very Unlikely) 1 Rare, only under certain conditions

2 Low (Unlikely) 2 Sometimes it happens under certain conditions

3 Medium (Possible) 3 Can occur under certain conditions

4 Height (Likely) 4 Occurs under certain conditions

5 Very High (Very Likely) 5 Often occurs under certain conditions

According to the boston matrix, the assessment of each risk opportunity and its impact is made on a scale of 1 to 25 as described in Table 3.12

Table 3. 14 Level of Risk Scale

No Risk Level Scale

1 1-5 Low
2 6-14 Average
3 15-25 Height

Based on interviews with Mr. Ayi Bobon during the two project implementers, the possibility values and impact of the risks generated on the project implementation Routine maintenance of the road wil.Pameungpeuk based on table 3.11 and table 3.12, which can be seen in table 3.13

Table 3. 15 Possible Values and Risk ImpactsNo Risk of Risk Code Value of Possible Impact

1 Device in use Damaged R1 1 2
2 The tool in use is stolen R2 2 2
3 Natural Condition Does Not Support R3 2 2
4 Natural Disaster R4 4 4
5 Labor Pain R5 3 3
6 Late Material Mobilization R6 3 5
7 Late Materials From Supplier R7 3 5
8 The occurrence of accidents due to motorists do not see signs of road works R8 1 23

Determining the Level of Risk of Interest After determining the probability value and the impact of risk, then perform the calculation of risk level using the Probability Impact Matrix method. The importance of risk is calculated using the Risk Exposure formula.

Risk Exporsure = probability (outcome) * loss (outcome)

Ket :

a. Risk Exposure = Risk Level

b. Probability (outcome) = Risk Probability Value

c. Loss (outcome) = The impact value generated

The following calculation of risk level can be seen in table 3.14

Table 3. 16 Risk Interest Rate calculation results

No Risk Code Possible Impact Risk Interest Level

1	R1	1	2	2
2	R2	2	2	4
3	R3	2	2	4
4	R4	4	4	16
5	R5	3	3	9
6	R6	3	5	15
7	R7	3	5	15
8	R8	1	2	2

According to the calculation of the level of risk importance, then the risk matrix will be created. The risk matrix is the matrix for finding medium and high low risk scales. Table 3.15 is a risk matrix resulting from interest calculations

Table 3. 17 Risk Matrix resulting from calculation
No Risk Risk Codes Level Of Interest Level Risk

1 Device in use Damaged R1 2 Low
2 The tool in use is stolen R2 4 Low
3 Natural Conditions Do Not Support R3 4 Low
4 Natural Disasters R4 16 Height
5 Labor Pain R5 9 Medium
6 Late Mobilization of Materials R6 15 High
7 Late Materials From Supplier R7 15 Height
8 The occurrence of accidents due to riders do not see the road signs R8 2 Low work

According to the result of determining the risk level above can be found 4 low risk level that is R1, R2, R3, R8, and 1 medium risk that is R5, and R4, R6, R7 with high risk level and must get more attention because it will have big impact on project sustainability .

4 Risk Mitigation

Table 3. 18 Risk Mitigation

Risk Level Risk Code Risk Taker Control Action Measures

Low R1 Finding a tool rental place or coordinating with other companies to borrow temporarily the required equipment. Technical Executives

Low R2 Immediately contact the authorities and search the same goods to the relevant agencies or partner companies to borrow stolen equipment Technical Implementation

Low R3 Wait until the natural conditions improve to resume the Technical Implementation project

High R4 Evacuate goods and the Labor, then meet with the relevant agencies on the problems faced in order to reach agreement again to continue the project. Technical Executor, Director

Moderate R5 Directly coordinate with the surrounding village Leaders such as RT / RW to find and prepare replacement workers in the area around the project Technical Implementation

High R6 Directly performs repairs to a tool carrying materials, or renting a tool first for mobilizing the Technical ImplementerTinggi R7

Directly contact other suppliers to be able to send replacement goods as soon as possible and contact the relevant authorities whenever there is a delay in the Technical Executor, Director

Low R8 Contact the local puskesmas for immediate treatment of the victims of the Technical Executor

Based on the risk management analysis that has been done, risk management can assist the Chief Executive in identifying the risks that may occur, so that if the risk occurs then it can be handled as quickly as possible based on the level of importance and with predetermined risk control measures so that the project risk handling is not too long and may affect the scheduled schedule so that project delays can be minimized.

2.7 Project Control Analysis

The project control analysis contains an evaluation of the estimated time and cost incurred in the Wil.Pameungpeuk road construction project undertaken by CV.Gema Karya. In this project control analysis, Earned Value Method (EVM)

The weight of the work is calculated based on the unit price of work in accordance with the project contract. Percentage of work weight will be used in performing BCWS analysis and Earned Value Method (EVM) analysis. The weights are calculated using the following formula:

$$\textbf{Bobot} = \frac{(\textbf{the price of the job})}{\textbf{the total price of the job}} \textbf{x } 100\%$$

Value method or Earned Value Method, a method that can provide information about the progress of the project in a certain period of time and can estimate the progress of the project in the next period, ie in terms of cost and project completion time. There are three indicators in the study of this method, namely:

a. BCWS (Budgeted Cost of Work Schedule) or Planned Value (PV)

b. BCWP (Budgeted Cost of Work Performed) or Earned Value (EV)

c. ACWP (Actual Cost of Work Performed) or Actual Cost (AC)

PV or also called Budgeted Cost for Work Schedule (BCWS) is a budgeted expense for the work scheduled in a certain period and set in the budget. Obtained by multiplying the percentage of progress of the plan with the total budget of the project Budget at Completion (BAC) ie the total price of the project and obtained Weight (progress plan) that is the amount of weight per week

The results of the project performance recapitulation using the EVM method can be summarized in table 3.30 it can be concluded that the work of the research project Routine road maintenance that was done for 7 weeks there was a delay in week 7. With this recapitutasi, we can conclude the company suffered a budget loss exceeding budgeted budget should be Rp. 75.169.804., - to be Rp. 76.8 million, - .

After performing the recapitulation results further comparing the PV, EV, and AC charts to find out the project is running in accordance with the plan, if the graph does not match the one that was not previously planned then the Director or technical implementer must immediately take action to immediately do penangnan against costs and the time of the project to be in agreement with what has been planned before.

Based on the graph and the above description shows that if the EV and AC exceed the position PV

then certainly there is a deviation of the cost and time that has been specified it must be immediately determined solution handling but if the EV and AC does not exceed the PV boundary then the project goes according to the plan in the set.

2.8 Non Functional Needs Analysis

Non-functional requirements analysis describes the system requirements required to run the built applications. The non-functional requirements for running a project management system include hardware requirements, software requirements, and users who will use the application. Non-functional needs analysis aims to build applications that can be used in accordance with the needs in data processing, and if there is a need for reports that have been made to easily take it

2.9 User Analysis required

The project management system to be built in general will be used by two user companies ie Director, and technical implementer. The director of the company is the person in charge of the company and the technical implementer responsible for managing the daily activities during the project. Both users have different access rights. The permissions granted to these two users are as follows:

a. The technical implementer in the project management system is tasked with the input of the project activity that has been done, the project risk input.

b. The company's director in the project management system is responsible for projects that have the task of viewing project progress, viewing reports, and viewing work schedules

Impelemetasi System

Impelementasi system is a stage to know which system has been built can be used properly. This stage is the stage where the system is ready for use. After impelementasi then dilakakukan testing of the system has been built, the test is done to determine the deficiencies that exist in the system. From the results of these assessments as material for further system development.

4.1.1. Used Hardware

Hardware specifications used in the construction of Project Management Information System at CV.Gema Karya can be seen in the following table 4.1

Tabel 4. 1 Used Hardware

Specification	
Processor	Intel Core i3
RAM	RAM 2 GB
VGA	VGA Onboard
Monitor	14”
Harddisk	500 GB

4.1.2. Software Used

Hardware specifications used in the construction of Project Management Information System at CV.Gema Karya can be seen in table 4.2 below

Tabel 4. 2 Software Used

Software Used	Specification
Operation System	Windows 10
Web Browser	Mozilla Firefox or Google Chrome
Languange Program	PHP
DBMS	MySQL
Web Server	Xampp Serve

3. INVOLUCRE

3.1 Conclusion

Based on research and test results that have been done on Project Management Information System at CV.Gema Karya, can be drawn some conclusions as follows:

1. This system can assist the Director in managing the project schedule to know the interdependence of work
2. This system can assist the Director in a project to control project costs in order to avoid cost swelling
3. The system can assist the Director in managing project risks, to identify possible risks to the project

3.2 Suggestion

Based on the results of testing the system, obtained some suggestions that can be made pertmbangan

1. Need to have job notifications when to start, to avoid delay in project time
2. Need handling automatically appear when the actual cost has exceeded the project budget

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