PROJECT MANAGEMENT INFORMATION SYSTEM AT PT. YUDHA PERKASA UTAMA

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ABSTRACT

PT. Yudha Perkasa Utama is a company range on construction services. During the working of the project many experience obstacles so that experiencing a delay of the planned schedule, due to the deficiency of control by project manager on time and cost. The risk factor often overlooked because of the complication in risk management as well as less of communication, cause of it a job can't running according to expectation.

Consider of the problem, it is required Project Management Information System at PT. Yudha Perkasa Utama based on website, to support the project management process on the project planning, the execution, also controlling project by analysis planning schedule using Critical Path Method (CPM), time and cost management using Earned Value Management (EVM), qualitative risk analysis using Probability Impact Matrix (PIM) also for communication management adjust by communication features.

This Project Management Information System has contribute to assist the site manager to planning schedule for the critical job analysis also control time and cost of the project, help the project managers on manage the risk also help the project managers,the site managers and the administrative departments doing the project communication management.

Keywords : *Project, Critical Path Method, Earned Value Management, Probability Impact Matrix, Communication Management, SIM, Website.*

1. INTRODUCTION

Construction project requires planning, to implementation of the project work properly so that the job runs as scheduled, both from a time and cost factors. Many projects are experiencing barriers that occur during the work of the project so that experiencing a delay of the planned schedule. This is a concern, because the schedule is made as long as this is only a start date up to the date of completion in each item, and the absence of a determination of the focus of the work can be delayed or could not be postponed. So, create a site manager who is in charge of making the scheduling difficulties of determining planning, so that the work to be not specific.

Furthermore, namely lack of supervision by project manager with respect to time and cost, where the cost is not used in accordance with the planned, because the evaluation of the progress made by the site manager during this absence of control that can calculate the deviation with respect to time and cost, making it difficult to evaluate progress on each project performance and control measures in case of swellingcosts, as expenses are not conducted surveillance earlier.

Risk factors appear to be a barrier for the working of the project often overlooked because of the difficulty in qualify risk, which during the absence of risk and how to handle record-keeping in the event, so the risks that arise during the working of the project affect the working of the project experiencing delays.

The lack of communication and coordination between the project manager, site manager and bag. Administration during the working of the project, resulting in the job run as expected, where employees who replace doing project work more than one job.

Based on these problems need solutions, namely the need for application of project management, with project scheduling and control do the time and cost of the project, so that when doing the planning and controlling time and costs can be in accordance with the actual project work. Cost control and time carried out based on the evaluation of the working of the project perminggu in order to work in the project each week can be evaluated and work projects can be better controlled.

The solution to the problem of necessity of project risk management in project, so that tenants can be identified the possibility of risks will arise so that the risk can be controlled well. It can reduce the chance of resistance that will occur in the work of the project.

The next solution to the problem of the lack of good communication during the project work, the necessity of applied communication management so that it can planneeds to stakeholders such as project manager, site manager and bag. The administration requires information for the project took place with can do a status report every need to be achieved. It

can reduce miscommunication during the work on the project, so that problems that arise can be coordinated properly.

1.1 Information System

Information system (IS) is a set of interconnected elements or components that can be put together (input), manipulate (process), store and disseminate (output) data, information and provide feedback such as reactions to meet and achieve certain goals, such as increasing profits or improve our services. [1] to provide useful information by defining information and closely related about the data and knowledge.

1.2 Project Management

Project management is a combination of the application, knowledge, tools and techniques to take control of the project to meet the specified requirements, which typically include, but are not limited to: scope, quality, schedule, and budget risks. wherethe management or process stages the project was the Initiating and Planning, Executing, Monitoring and Controlling, Closing. [3]

1.3 Project Scheduling

Construction project scheduling is a great tool to determine the time required by an activity in the settlement and as a tool to determine when started and completion of the works on the contract of a project. Precision scheduling in project implementation is very influential on the terhindarnya losses and stray from the schedule of the plan. [2]

1.3.1 Metode Critical Path Method (CPM)

The method of critical path or critical path method is a path that has a series of components of the work, with the total number of identify the longest time and shows the fastest completion of the project. Critical path consists of a set of critical activities, starting from the initial work up tothe final work. On the line was located works that in implementation of the work experience delays, will affect the overall project completion delays.

1. *Advanced Calculations*
   Advanced calculations used to identify the slowest time of the start and completion of each work activity, as well as the latest occurrence of any activity of the job.

$$EF = ES + D$$
$$EF(i\text{-}j) = ES(i\text{-}j) + D(i\text{-}j)$$

2. *Backward Calculation*
   Calculation of the retreat is to identify the time or date most recently, may start andterminate the employment without delaying the completion of the overall project, which has been produced from the calculation of the developed world.

$$LS = LF\text{-}D$$
$$LS(i\text{-}j) = LS(i\text{-}j) + D(i\text{-}j)$$

3. *Total Float*
   The total Float is the amount of time a job that can be postponed, without affecting the overall project schedule. The same amount of time with the time gained when all previous work started as early as possible, while the next job starts as late as possible.

$$TF = LF - EF = LS - ES$$
$$TF = L(j) - E(j) - D(i\text{-}j)$$

1.4 Project Control

Control is the effort used to determine compliance with the targets perencanan, designing information systems, comparing with the standard implementation, by analyzing the possibility of deviations between implementation and standard, then take the action necessary in order that the management of resources are used effectively and efficiently in order to achieve a particular goal. [2]

1.4.1 Metode Earned Value Management (EVM)

EVM (Earned Value Management) is a method used for the management of time and cost, with the whole project as well as performance and identifying the packages work in it and to predict the performance of cost and time. A concept of cost budget calculations in accordance with the work that has been completed (the budgeted cost of works performed).

In the calculation of the weighting is calculated based on the unit price of the work in accordance with the contract value (does not include VAT of 10%). As for the formula used is as follows:

$$Weight = \left(\frac{Price}{Total\ Job\ Price}\right) x100\%$$

There are three basic elements which becomes reference in analyzing the performance of the project based on the concept of earned value. The third element is as follows.

a. ***BCWP = budgeted cost of work performed***
   Budgeted Cost for Work Performed (BCWP) or also called EV (Earned Value) is the value received from the completion of the work at any given time. BCWP is calculated based on the outcome accumulation of works that have been diselesai done at a certain time period.

$$EV = (\%progress\ aktual)\ x\ BAC$$

b. ***BCWS = budgeted cost of work scheduled***
   Budgeted Cost for Work Scheduled (BCWS) or also called PV (Planned Value) is the cost that is allocated on the basis of the work plan drawn up with respect to time. BCWS is the budget to one package of work associated with the schedule of implementation. Where in it

there is a mix of cost, schedule, and scope of work. [2]

PV = (%progress rencana) x BAC

c. *ACWP = actual cost of work performed*

The actual Cost for Work Performed (ACWP) is the amount of the actual cost of the work that has been carried out. Obtained from data reporting, i.e., actual cost of allexpense reports from a work package. So is the number of actual ACWP, from spending or funds that are used to carry out the work in a specific period of time.

The use of elements of the concept of value to analyze the performance of the project, including:

A Variant Of The Cost

A variant of the cost or the Cost Variance (CV) is the difference of the value obtained after the completion of part of the work with the actual implementation of the project. :

1. ***A Variant Of The Cost***

A variant of the cost or the Cost Variance (CV) is the difference of the value obtained after the completion of part of the work with the actual implementation of the project.

$$CV = EV - AC$$

2. ***Schedule Variant***

Variants of the schedule or Schedule Variance (SV) is the difference of a part of the work that has been carried out with part of the work planned..

$$SV = EV - PV$$

3. ***Cost Performance Index***

Cost performance index or the Cost Performance Index (CPI) is the ratio between the value received from the completion of the work with the actual costs incurred to complete a job.

$$CPI = EV/AC$$

4. ***Schedule Performance Index***

Schedule performance index or the Schedule Performance Index (SPI) is the ratio between the completion of the field work with the plan on a certain period of time.

$$SPI = EV/PV$$

5. ***Cost Prediction***

Prediction of the cost of the completion of the project (EAC), the value of the estimate at completion (EAC) be obtained an estimate of the difference between the cost of completion of the project plan (BAC) and the cost of completion of the project based on the performance of the work that has been accomplished (EAC), and to determine the estimated costs for remaining work or Estimate to Completion (ETC).

$$ETC = \left(\frac{BAC - EV}{CPI}\right)$$

$$EAC = AC + ETC$$

1.5 Risk Management Project

Project risk management includes the process of doing risk management planning, identification, analysis, planning, response and control of the risk on the project. The purpose of the risk management of the project is to increase the likelihood and the impact of positive events that occur, as well as reducing the likelihood and the impact of negative events in the work of the project. [3]

1.5.1 Probability Impact Matrix (PIM)

Probability and Impact Matrix to qualitative analysis, which is used to measure the chance of occurrence of risks and planning risk response based on the level of risk, given the level of risk based on an estimate of the probability and the impact that will be evaluated at each respective interests priority risk and conducted special attention. With the calculation as follows:

Risk Score = Probability x Impact

Description:
Risk Score = risk interest Rate
Probability = value the possibility of risk
Impact risk impact = value

As for the probability and impact matrix on a qualitative risk analysis.

Probability Rating							
	Very High	5	5	10	15	20	25
	High	4	4	8	12	16	20
	Moderate	3	3	6	9	12	15
	Low	2	2	4	6	8	10
	Very Low	1	1	2	3	4	5
			1	2	3	4	5
			Very Low	Low	Moderate	High	Very High
			Impact Rating				

Figure 1 Boston Square Matrix

Description:
15-25 = High Risk
06 -12 = Moderate Risk
01-05 = Low Risk

For an explanation of the value of the probability and impact as a parameter later inBoston Square Matrix.

Table 1 Definition of Risk Impact Rating

Impact	*Very Low 1*	*Low 2*	*Moderate 3*	*High 4*	*Very High 5*
Cost Impact of threat	*Insignificant cost increase*	*<5% cost increase*	*5-10% cost increase*	*10-20% cost increase*	*>20% cost increase*
Cost impact of opportunity	*Insignificant cost reduction*	*<1% cost reduction*	*1-3% cost reduction*	*3-5% cost reduction*	*>5% cost reduction*
Schedule impact of threat	*Insignificant slippage*	*<1 month slippage*	*1-3 months slippage*	*3-6 months slippage*	*>6 months slippage*
Schedule impact of opportunity	*Insignificant improvement*	*<1 month improvement*	*1-2 months improvement*	*2-3 months improvement*	*>3 months improvement*

Table 2 The definition of value of the probability of the risk

Probability	*Value*	*Description*
Very Low	***1***	*Rarely occurs, only under certain conditions*
Low	***2***	*Sometimes it happens in certain conditions*
Moderate	***3***	*Occurs under certain conditions*
High	***4***	*Often occurs in certain conditions*
Very High	***5***	*It always happens under certain conditions*

1.6 Project communication management

Management of communication projects including the processes needed to ensurethat the information in the project created with precise and quick, both in terms of collection and storage. This creates an important relationship between people, ideas, and the necessary information so that project ended with success.

Everyone involved in the project should be ready to send and receive communications and should understand how communication is done where the project team involved as individuals and how communication can affect the overall project. [3]

1.6.1 Planning Communications Management

Communication is a process Planning management developed in the approach andthe right project communications plan based on stakeholder information needs and requirements.

The main benefit of this process is to identify and document the approach to communicate effectively and efficiently with stakeholders.

As for communication management planning step is identifying stakeholders, meanit does the identification of stakeholders [3] is to know the list of stakeholders is needed to merencakanan communication with the stakeholders of the project.

Table 3 Identification of Stakeholders

Project Name:		***Construction Of The Office Building BPJS Gianyar Bali Employment***		
No	***Stakeholder***	***Information Need***	***The Importance of the project***	***The Role***
1	*Project Manager*	*Receive the report project performance*	*Monitor Project performance process*	*Making decision*
2	*Site Manager*	*The agenda of each communication plan*	*Realization of project performance*	*The receptient informatio*
3	*Administration Department*	*The project performance report has been run*	*Archive project report*	*The receptient informatio*

Communication management planning is a component of a project management plan describes how communication projects done. The following is the agenda of communication planning communication.

Table 4 Communications Planning

Types of Meetings	***The Communication Agenda***	***Time***	***Responer***	***Participant***	***Input***	***Output***
Budget Plan Report	*Define the project work and cost estimation*	*02/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Make the details against volume*	*Budget Plan Report*
The Preparation of the schedule of implementation	*Determine the periode of execution of work*	*07/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Make the plan work schedules*	*The Preparation of the schedule of implementation*

1.6.2 Manage Communications

Manage communication is the process of creating, distributing, collecting, storing, retrieving, and most recently was a project information in accordance with the planned in communication management. The main benefit of this process is to allow the flow of efficient and effective communication between the stakeholders of the project. [3]

As for output on this communication management processes such as performance status report, which contained the status process and finish on any communication planning that has been done, with the results or outputs of each item on the agendathe results format in the form of communication has been done, in the form of a report in the form of soft copy or hard copy, it is to identify that the items on the agenda of such communications is already done , as reporting against project manageras the person in charge of the project.

Table 5 Communication Reporting

Type of Reportin g	***Items***	***Time***	***Respon er***	***Participant***	***Input***	***Output***	***Status***	***Format***
Budget Plan Report	*Budget Plan*	*02/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Based on the work item details*	*Budget Plan Report*	*Finished*	*Soft copy*
Schedule project work	*- Order type of project work - Weights job*	*07/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Plan schedules work based on time period & weights*	*Jadwal pekerjaan proyek*	*Schedule project work*	*Soft copy*

1.6.3. Control Communication

Control communication is the process of pemantuan and control overall communication to ensure stakeholder information needs on any agenda of communication have been met. The benefit of this process is ensuring the optimal flow of informationto all participants in the communication. [3]

Process kontroling carried out by the project manager was referring to the results ofreporting has been done by the participants in the communications planning, reporting status and proof formats in the form of soft copy and hard copy.

Table 6 Changes of Request

REQUEST CHANGES	
Project Name	**Construction Of The Office Building BPJS Gianyar Bali Employment**
Project Manager	**Project Manager**
Types Of Communication	**Types Of Communication**
Proposers	**Proposers**
Date	17/04/2017
Description of necessary changes proposed/desired: -progress report on the project there is a lack of data consultants -handover of the project have yet to be processed because there is someshortage of project progress reports. -meeting schedule to reschedule the next stage after the progress reportare met.	
The proposal was accepted/not? If not, give reasons	
Submitted by: **Site Manager**	**Approved by: Project Manager**
Date : 17/04/2017	**Date :** 17/04/2017

With regard to the control of communication in some planning such communications are not met, then the participants in the stakeholder requesting the changes will be approved by the project manager, when it will be filled at each item planning communication.

2. CONTENT OF THE RESEARCH

2.1 Analysis of The Critical Path Method CPM

Based on networks that have been created, then calculate the total time of the completion of the project, using the calculations forward (forward pass), calculation of the retrograde (backward pass), and calculate the float. And critical path found: ***I-II-V-IX-XV-XVIII.***

The path is the longest amount of time that indicates the completion of the projectthe fastest, then the path can be a reference project manager that the line was located on activities which should be timely, it would in the event of delay will impact the overall activities of the project.

Table 7 Critical Job Analysis Project Results

No	Jobs Name	Code	Duration (Week)	Job Status
I	Preparation Work	I	2	Critical Path
II	Job Site Development	II	11	Critical Path
III	Employment Structure Under The	III	7	-------
IV	The Upper Structure Of The Work	IV	6	-------
V	The work of Roof and Canopy	V	4	Critical Path
VI	The work spouse and Partition	VI	1	-------
VII	The work floor and Wall Coatings	VII	8	-------
VIII	The work of door, window and Lock	VIII	2	-------
IX	Work Stair Railling	IX	2	Critical Path
X	The work of the roof and Ceiling	X	2	-------
XI	Painting Work	XI	2	-------
XII	Interior Work	XII	2	-------
XIII	Work Furniture	XIII	2	-------
XIV	Job Elektikal-Main Building	XIV	2	-------
XV	Electrical Site Development w ork and guard post	XV	4	Critical Path
XVI	Electronic Job	XVI	2	-------
XVII	Plumbing Work	XVII	4	-------
XVIII	Drainage Work	XVIII	1	Critical Path

2.2 Analysis of Project Control Method of EVM

Analysis of control of the project, there is an analysis of the evaluation of the project budgets on a construction project in Gianyar Bali BPJS office building that has beencarried out by PT. Major Yudha of the mighty.

Table 8 Analysis of AC, PV, and EV

Week	Actual Cost	Planned Value	Earned Value
1	Rp. 51.764.000	Rp. 56.267.498	Rp. 56.267.498
2	Rp. 51.764.000	Rp. 56.267.498	Rp. 56.267.498

Following are the results of the analysis method using EVM from week 1 to week 2,can be seen in table 9.

Table 9 Recap EVM Method analysis results

Week	Variance Analysis		Performance Analysis		Estimation Analysis	
	Cost	Schedule	Cost	Cost	Schedule	Cost
	CV (Rp.)	SV (Rp.)	CPI	SPI	ETC (Rp.)	EAC (Rp.)
1	Rp. 4.503.498	-	1,087	1	Rp. 5.109.153.248	Rp. 5.160.917.248
2	Rp. 4.503.498	-	1,087	1	Rp. 5.109.153.248	Rp. 5.160.917.248

Based on the results of the analysis on the calculation of the recap of week 1 until weeks afterwards, it is values of the estimated cost of the remaining (ETC) and the final cost of completion (EAC) is going to be an evaluation by the project manager that the costs that will be incurred for next weeks must not exceed the value of the estimated cost of the remaining (ETC), so that the time and costs that do remain as planned until the project is completed.

2.3 Qualitative Risk Analysis

Risk analysis used in qualitative identification of risk, by doing generated from secondary data (Literature and journals) and developed with the field observations of the mighty. Further interviews with the help of a questionnaire research to identify the probability of risk, then the respondent parties

determine the probability and impact of those risks into the scale value.

Table 10 The results of the calculation of the level of risk

Risk Variabel	*P*	*D*	*IR*	*Risk Level*
Labor project for anyone unable to attend	*3*	*2*	*6*	*Middle*
There are projects that labor resign	*3*	*3*	*9*	*Middle*
The project less labor to understand the results of the design of construction that has been carried out by experts of the company	*1*	*2*	*2*	*Low*
Lack of understanding of employees towards jobdesk	*2*	*3*	*6*	*Middle*
The estimated schedule is not appropriate planning	*2*	*3*	*6*	*Middle*
The estimated cost of which is not in accordance with the budgeted	*1*	*2*	*2*	*Middle*
Fall exposed to heavy equipment	*3*	*5*	*15*	*High*
Exposed materials	*3*	*5*	*15*	*High*
Traffic accidents	*2*	*3*	*6*	*Middle*
Delay delivery of ancillary tools	*1*	*3*	*3*	*Low*
The crash construction support tool	*1*	*2*	*2*	*Low*
The level of difficulty of use of the unpredictability of the previous	*1*	*1*	*1*	*Low*
Access the tool inadequate weight	*3*	*4*	*12*	*Middle*
The occurrence of natural disasters and the rainfall is quite high	*2*	*3*	*6*	*Middle*
Delay delivery of materials	*2*	*4*	*8*	*Middle*
Material delivery errors	*1*	*3*	*3*	*Low*
Tools/supporting the construction of lost/stolen	*3*	*2*	*6*	*Middle*

Description:

P = Probability, D = Impact, IR = Importance Of Risk

2.4. Management of communication

Project communication management is to bridge the project team involved duringproject work, so you can plan your needs and create an important relationship between stakeholders who need information for the project took place with can see anyprogress needs to be achieved to the project team involved..

2.4.1 Management Planning Communications

Communication management planning is a component of a project management plan describes how communication projects done, here is the agenda of the meeting as a form of communication that is done company.

Tabel 11 identification of Stakeholders

Project Name:		***Construction Of The Office Building BPJS Gianyar Bali Employment***		
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Tabel 12 Communication Planning

Types of Meetings	***The Communication Agenda***	***Time***	***Responer***	***Participant***	***Input***	***Output***
Budget Plan Report	*Define the project work and cost estimation*	*01/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Make the details against volume*	*Budget Plan Report*
The Preparation of the schedule of implementation	*Determine the periode of execution of work*	*06/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Make the plan work schedules*	*The Preparation of the schedule of implementation*
The Preparation of the schedule of implementation	*Determine the period of implementation*	*06/02/2017*	*Project Manager*	*Site Manager, Administration Dept.*	*Make the plan work schedules*	*The Preparation of the schedule of implementation*

The resulting communication planning that project manager responsibility againstworkmanship and finish up with a project until the needs are met. Of course this will help the communication agenda and reduce all the miscommunication of the work,both to the suitability of the project work plan up to the cost of the project.

2.4.1 Manage Communications

The following is the form of reporting of communication planning that has been done up to the work of the 14th week of the project on the project construction of the Office building BPJS Gianyar Bali employment.

Tabel 13 Communication Reporting

Type of Reporting	Items	Time	Responer	Particpant	Input	Output	Status	Format
Budget Plan Report	Budget Plan	01/02/2017	Project Manager	Site Manager, Administration Dept.	Based on the work item details	Budget Plan Report	Finished	Soft copy
Schedule project work	- Order type of project work - Weights job	06/02/2017	Project Manager	Site Manager, Administration Dept.	Plan schedules work based on time period & weights	Jadwal pekerjaan proyek	Schedule project work	Soft copy
Project progress report	The work done with the weighted	22/05/2017	Project Manager	Site Manager, Administration Dept.	Create a report of the progress of the project.	Project progress report	Process	Soft copy

Exodus at this communication management processes such as performance status report, which contained the status process and finish on any communication planning that has been done, with the results or outputs of each item on the agenda the results format in the form of communication has been done, the report in the form ofsoft copy or hard copy, it is to identify that the items on the agenda of such communications is already done, as reporting against project manager as the person in charge of the project.

2.4.2 Control Communication

Control communication is the process of pemantuan and control overall communication to ensure stakeholder information needs on any agenda of communication have been met. The benefit of this process is ensuring the optimal flow of informationto all participants in the communication.

In the case of agenda communication project development office building BPJS gianyar bali employment change of plans proposed by the Site Manager on request changes regarding the progress report on the project.

Table 14 Request Changes

REQUEST CHANGES	
Project Name	***Construction Of The Office Building BPJS Gianyar Bali Employment***
Project Manager	*Bennatyar, S.T*
Types Of Communication	*Progress Report On The Project*
Proposers	*Hendi Bowherlan S.*
Date	*22/05/2017*
Description of necessary changes proposed/desired: *-progress report on the project there is a lack of data consultants* *-handover of the project have yet to be processed because there is someshortage of project progress reports.* *-meeting schedule to reschedule the next stage after the progress reportare met.*	
The proposal was accepted/not? *If not, give reasons*	
Submitted by: ***Site Manager***	***Approved by: Project Manager***
Date : *22/05/2017*	***Date :*** *22/05/2017*

It can reduce the misskomunikasi between the stakeholders, so that the things are not met between stakeholders, can be immediately communicated properly, so that it can perform solutions in early to avoid problems in communication.

2.5. System Analysis

System analysis is the phase to study the interaction of the system consisting of the perpetrators of the system processes, procedures, and related information as well as existing in the company. Stages that are conducted in the analysis system consists of the analysis of the problem, the analysis of a system that is running a non functional requirements, analysis, and a functional needs analysis.

2.5.1 Use Case Diagram

Use Case Diagram is a diagram that shows the functionality of a system or class of how these systems interact with the output of the system and explains the system is functionally seen by the user.

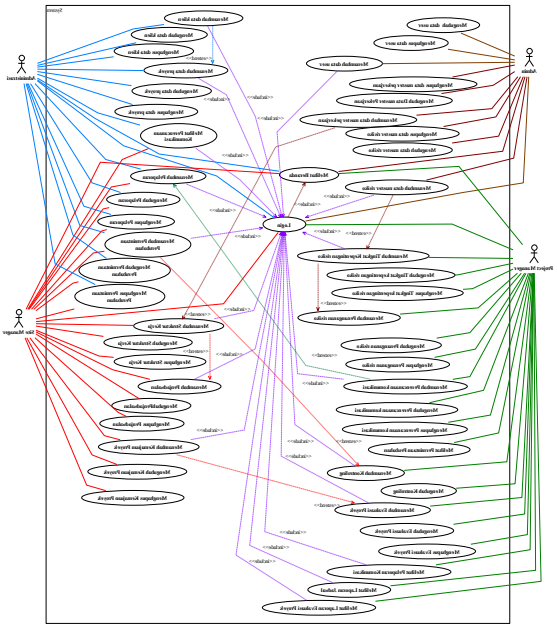


Figure 2 Use Case Diagram

3. CONCLUSION

3.1. Conclusions

Based on the results obtained in the study of this final task, then the conclusion to be drawn as follows:

1. *Management information systems projects that are built can assist Site Managers in planning scheduling.*
2. *Management information systems this project can help a Site Manager in controlling time and costs in accordance with the planned and the project manager can perform an evaluation of the project.*
3. *Management information systems this project can help the Project Manager within the project risks so as to qualify the risks and obstacles that arise during the project work can be identified properly.*
4. *Management information systems this project can help Project Manager, Site Manager and Bag. Administasi to do the communication during the work on the project, so that it can plan to stakeholder needs.*

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