

PROJECT MANAJEMEN INFORMATION SYSTEM IN PT. WIN SEJAHTERA

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ABSTRACT

PT. Win Sejahtera has several problems in the implementation of project work, namely the project controller has difficulty in determining the number of workers when the project is not in accordance with the planned schedule and requires additional labor to avoid delays, and lack of project supervision because the project manager must oversee the project and report project progress to companies whose project locations are far apart. These problems cause a swelling of costs towards the company and reduce the profits received by the company, because it relates to corporate finance, the director requires information on project activities carried out by the company. Steps to solve company problems using the method of adding employees, this method is used when there is a delay and there must be additional employees, the Earned Value Management method is used to determine the performance of the progress of project implementation. The results of the research are achieved, the system built can assist the project controller in supervising the project implementation activities, this system can also help the project controller in knowing the number of additional workers that must be prepared for late project execution and arranging finances so that the payment of additional workforce is in accordance with the needs, in reporting the progress of work to the project controller when the company works on 2 projects at the same time with a distance of projects that are far apart so that the reporting process can be carried out at the project implementation site, for the director to see all project activities undertaken by the company.

Keywords: Projects, Project Monitoring, Scheduling, Project Management, Labor, Earned Value Management, Gantt Chart.

1. INTRODUCTION

PT. WIN SEJAHTERA is a construction company located on Jl. Soekarno Hatta No.132 E-F Sumber Sari - Bandung. Established in 1984 and inaugurated in 1992. Each year the company can handle 3-5 projects, projects that are handled are

diverse, such as the construction of hotels, buildings, shops and housing

Based on the results of interviews with Mr. Bambang as Project Controller of PT. WIN SEJAHTERA stated that during the implementation of construction projects there was often a mismatch between the planned schedule and realization in the field, which resulted in the company having to pay for the addition of labor and the company's profits to be reduced. As in the construction of the Rukan Development project - Jl. Dr. Cipto Cirebon in 2016 as attached in Appendix E-5, where the data shows the schedule of the Schedule Schedule Project work is not in accordance with the Schedule of Work schedule in the field, because when the earthworks for excavating the foundation occur rain during the daytime, it becomes workmanship only done half a day and resulted in the schedule in the beginning being inappropriate, the work schedule for the land should be 5 weeks to 8 weeks. As a result, the construction of the Rukan Development project - Jl. Dr. Cipto Cirebon has a delay because the project controller has difficulty in determining the amount of labor that must be added so that the project can be continued without any delay.

PT. WIN SEJAHTERA can handle 2 to 3 projects carried out at the same time. This is an advantage for the company, but on the other hand it creates problems for the company. The problem that happened was the difficulty when monitoring the project, because the project manager had to go round and round to oversee the project and report the progress of the project to the company whose project location was far apart. This causes delays in project progress reporting from the project manager to the project controller when the project experiences a delay in the project controller, not immediately knowing that there is a delay due to late project progress reporting and the project is not supervised properly.

In addition to the problems mentioned earlier, Bambang also said that there was an increase in project costs in the implementation of the project, with the number of projects experiencing cost overruns of 3 projects and an average project cost swelling of Rp. 10,681,334.00. This happens because in the process of monitoring the implementation of the project, the project controller has difficulty knowing

the performance of the progress of project implementation in terms of costs so that the supervision of the progress of project implementation in terms of costs is less controlled. For example when the project is underway, in the middle of the project there are obstacles such as erratic weather resulting in delayed work and there must be additional workforce so that there is no delay from the schedule schedule, it causes a swelling of the costs to be released by the company and the benefits reduced. Therefore it is necessary to control costs and time to assist the project controller in estimating costs and time can be in line with the realization of work in the field, and related to finance, the director requires information on project activities carried out by the company, so that the director can know each problem each project done by the company by looking at evaluations and delays in delay. Based on the problems that occur, it can be concluded that the core problem lies in the difficulties that occur in the supervision of projects that have not been properly regulated by the company. According to these problems, a web-based system will be built that can be accessed wherever the user is and it is hoped that the system will overcome the problems that exist in PT. WIN SEJAHTERA as outlined in the form of thesis research with the title "Project Management Information System In PT. WIN SEJAHTERA ". The goals to be achieved in building a project management information system at PT. Win Sejahtera is as follows:

1. Assist the project controller in overseeing project implementation activities so that the project runs according to plan and there is no delay.
2. Assist the project manager in reporting the progress of the work to the project controller when the company works on 2 projects at the same time with a distance of projects that are far apart so that the reporting process can be carried out at the project implementation site.
3. Assist the project controller in knowing the addition of the number of workers that must be prepared for the needs of the execution of the project when there is a delay in workmanship and can arrange finances so that the payment of additional workforce is in accordance with needs.
4. Assist the director to find out all project activities carried out by the company such as evaluation and recap of delays in each project for material evaluation.

2. RESEARCH METHODS

The research method used in designing the Project Management Information System at PT. Win Sejahtera can be seen in picture 1. [5]



Figure 1 Research methodology

3. CONTENT OF RESEARCH

3.1 Project Monitoring Analysis

The project monitoring analysis is an analysis that contains an evaluation of the budget for an irrigation development improvement project located in the village of Cibala - Cirebon, which was carried out by PT. WIN SEJAHTERA, the project completion time is 120 (one hundred and twenty) days or for 18 weeks. In this case the project evaluation analysis uses the Earned value method (EVM). [1]

3.1.1 Analysis of Job Weight

Job weight is needed to know all the percentage of the work price of the total project cost. Job weight is calculated based on the work unit price according to the contract value (excluding VAT = 10%), the work price is obtained from (Project Budget Plan). Later the percentage of work weight will be used in conducting Planned Value (PV) analysis and Earned Value (EV) analysis.

Table 1. Analysis of Job Weight

No	Nama Kegiatan	Harga Pekerjaan (Rp)	Bobot (%)
1	Pekerjaan Kistdam pasir/tanah dibungkus karung plastik bagor atau terpal uk 45x120 cm	685.260,00	0.22
2	Pekerjaan Pembuatan dan Pemasangan Papan Nama Proyek	198.000,00	0.06
3	Pekerjaan Galian Tanah Biasa sedalam ≤ 1 m	8.744.310,74	2.81
4	Pekerjaan Pasangan Batu dengan Mortar tipe N (mutu PP tertentu setara dengan campuran 1PC:4PP) dengan jarak angkut 400 m	244.723.902,05	78.68
5	Pekerjaan Plesteran tebal 1,5 cm dengan mortar jenis PC-PP tipe s (mutu PP tertentu setara dengan campuran 1PC:3PP) dengan jarak angkut 400 m	56.083.196,61	18.03
6	Pekerjaan Timbunan tanah atau urugan tanah kembali termasuk perataan dan perapihan	588.178,56	0.19
Harga Total Pekerjaan		311.022.847,96	100

3.1.2 Project Evaluation Analysis

Method of Value Results or Earned Value Method, a method that provides information about the progress of the project in a certain period of time and can know and estimate the progress of the project in the next period that is ongoing, namely in terms of cost and time of project completion. There are three indicators in the assessment of the results value method, as follows:

1. BCWS (Budgeted Cost of Work Schedule) or Planned Value (PV)
2. BCWP (Budgeted Cost of Work Performed) or Earned Value (EV)
3. ACWP (Actual Cost of Work Performed) or Actual Cost (AC)

Because of the progress report of the work carried out every week of the activity, therefore, the value of PV, EV and AC is grouped together per week of activity.

3.1.2.1 Calculation of Planned Value (PV)

PV or also known as the Budgeted Cost of Work Schedule (BCWS), is the budgeted costs for all jobs scheduled for a certain period and set in the budget. Obtained by multiplying the percentage of the progress of the plan with the total budget of the Budget At Completion (BAC) project.

Table 2. Calculation Results Planned Value (PV)

No	Minggu	Bobot (%)	PV	
			Mingguan (Rp.)	Kumulatif (Rp.)
1	Minggu ke-1	0,28	883.260,00	883.260,00
2	Minggu ke-2	10,54	32.776.565,44	33.659.825,44
3	Minggu ke-3	10,54	32.776.565,44	66.436.390,88
4	Minggu ke-4	10,54	32.776.565,44	99.212.956,32
5	Minggu ke-5	10,54	32.776.565,44	131.989.521,77
6	Minggu ke-6	9,84	30.590.487,76	162.580.009,52
7	Minggu ke-7	9,84	30.590.487,76	193.170.497,28
8	Minggu ke-8	9,84	30.590.487,76	223.760.985,03
9	Minggu ke-9	9,84	30.590.487,76	254.351.472,79
10	Minggu ke-10	3,61	11.216.639,32	265.568.112,11
11	Minggu ke-11	3,61	11.216.639,32	276.784.751,43
12	Minggu ke-12	3,61	11.216.639,32	288.001.390,76
13	Minggu ke-13	3,61	11.216.639,32	299.218.030,08
14	Minggu ke-14	3,61	11.216.639,32	310.434.669,40
15	Minggu ke-15	0,05	147.044,64	310.581.714,04
16	Minggu ke-16	0,05	147.044,64	310.728.758,68
17	Minggu ke-17	0,05	147.044,64	310.875.803,32
18	Minggu ke-18	0,05	147.044,64	311.022.847,96

3.1.2.2 Calculation of Perhitungan Earned Value (EV)

EV or also called Budgeted of Work Performed (BCWP) is the value received from the completion of a job during a certain time period, this indicator shows the value of the results of work completed on the budget provided. EV is obtained by multiplying the percentage of progress that has been carried out with the total budget at the Budget At Completion (BAC) project. The work is said to be complete, if the implementation percentage reaches 100%.

Table 3. Calculation of Earned Value (EV)

No	Progres	Bobot %	EV	
			Mingguan (Rp.)	Kumulatif (Rp.)
1	Minggu ke-1	0,28	883.300	883.300
2	Minggu ke-2	10,54	32.776.600	33.659.900
3	Minggu ke-3	10,54	32.776.600	66.436.500
4	Minggu ke-4	10,54	32.776.600	99.213.100
5	Minggu ke-5	10,54	32.776.600	131.989.700
6	Minggu ke-6	9,84	30.590.500	162.580.200
7	Minggu ke-7	9,84	30.590.500	193.170.700
8	Minggu ke-8	7,87	24.472.400	217.643.100
9	Minggu ke-9	8,85	27.531.400	245.174.500
10	Minggu ke-10	5,84	18.150.500	263.325.000

3.1.2.3 Calculation of Actual Cost (AC)

Actual Cost Analysis is the amount of the actual cost of the work that has been carried out. AC value is obtained based on expenditure costs from work that has been carried out.

Table 4. Actual Cost Calculation (AC) Analysis

No	AC	
	Mingguan (Rp.)	Kumulatif (Rp.)
1	850.000	850.000
2	32.500.000	33.350.000
3	32.500.000	65.850.000
4	32.500.000	98.350.000
5	32.500.000	130.850.000
6	30.500.000	161.350.000
7	30.500.000	191.850.000
8	30.500.000	222.350.000
9	30.500.000	252.850.000
10	11.500.000	264.350.000

3.1.2.4 Calculation of Analysis Variance

Variant analysis is done by looking for the value of Cost Variance (CV) and Schedule Variance (SV). The CV calculation is obtained from EV minus AC, while SV is obtained from EV minus PV. The PV value (Planned Value Calculation Analysis), EV value (Earned Value Calculation Analysis) and AC value are obtained from the Actual Cost Calculation Analysis table. The rating table of the result value elements can be seen in table 5

Table 5. Assessment of Value Element Results

Indikator	Varian	Nilai	Kinerja	Nilai	Penilaian
Biaya	CV	+	CPI	> 1	Untung
	CV	0	CPI	= 1	Pengeluaran = biaya rencana
	CV	-	CPI	< 1	Rugi
Jadwal	SV	+	SPI	> 1	Lebih cepat dari jadwal
	SV	0	SPI	= 1	Sesuai jadwal
	SV	-	SPI	< 1	Terlambat dari jadwal

Table 6. Calculation Analysis Cost Variance (CV)

Progres	EV	AC	CV = EV - AC
Minggu ke-1	883.300	850.000	33.300
Minggu ke-2	33.659.900	33.350.000	309.900
Minggu ke-3	66.436.500	65.850.000	586.500
Minggu ke-4	99.213.100	98.350.000	863.100
Minggu ke-5	131.989.700	130.850.000	1.139.700
Minggu ke-6	162.580.200	161.350.000	1.230.200
Minggu ke-7	193.170.700	191.850.000	1.320.700
Minggu ke-8	217.643.100	222.350.000	-4.706.900
Minggu ke-9	245.174.500	252.850.000	-7.675.500
Minggu ke-10	263.325.000	264.350.000	-1.025.000

Based on the table above, the CV value is > 0 for the 1st week to 7th week period, this shows that the work is completed at a lower cost than planned, and in the 8th to 10th weeks CV value < 0, this shows greater expenditure. [6]

Table 7. Analysis of Calculation of Schedule Variance (SV)

Progres	EV	PV	SV = EV - PV
Minggu ke-1	883.300	883.300	0
Minggu ke-2	33.659.900	33.659.900	0
Minggu ke-3	66.436.500	66.436.500	0
Minggu ke-4	99.213.100	99.213.100	0
Minggu ke-5	131.989.700	131.989.700	0
Minggu ke-6	162.580.200	162.580.200	0
Minggu ke-7	193.170.700	193.170.700	0
Minggu ke-8	217.643.100	223.761.200	-6118100
Minggu ke-9	245.174.500	254.351.700	-9177200
Minggu ke-10	263.325.000	265.568.300	-2243300

Based on table 7, obtained an SV value = 0 from week 1 to week 7, this data shows that the project work is being carried out according to plan. Week 8 to week 10 SV value < 0, this shows that the work done has a delay from the schedule. for details of delay can be seen in table 3.15 (Table of Project Implementation Progress). [3]

3.1.2.5 Calculation of Job Index Analysis

Performance index analysis is done by finding the value of the Schedule Performance Index (SPI) and Cost Performance Index (CPI). Calculation of SPI is obtained from a comparison between the EV value and the value of PV, while the CPI is obtained from a comparison between the EV value and the AC value.

Table 8. Analysis of Cost Performance Index (CPI) Calculations

Progres	EV	AC	CPI = EV/AC
Minggu ke-1	883.300	850.000	1,039
Minggu ke-2	33.659.900	33.350.000	1,009
Minggu ke-3	66.436.500	65.850.000	1,009
Minggu ke-4	99.213.100	98.350.000	1,009
Minggu ke-5	131.989.700	130.850.000	1,009
Minggu ke-6	162.580.200	161.350.000	1,008
Minggu ke-7	193.170.700	191.850.000	1,007
Minggu ke-8	217.643.100	222.350.000	0,979
Minggu ke-9	245.174.500	252.850.000	0,970
Minggu ke-10	263.325.000	264.350.000	0,996

3.1.2.6 Calculation of Job Index Analysis

Performance index analysis is done by looking for cost estimates or Estimate At Completion (EAC) and Estimate To Complete (ETC), which is the estimated time for a particular job assuming the trend of project performance, but until the end of the project. Calculation, EAC is obtained from the total project cost or Budget At Completion (BAC) with CPI. ETC is obtained from a comparison between the duration of the project or Original Duration (OD) with SPI.

Table 9. Analysis of Estimate At Completion (EAC) Calculations

Progres	BAC	CPI	EAC = BAC / CPI
Minggu ke-1	311.022.847,96	1,039	299.297.400
Minggu ke-2	311.022.847,96	1,009	308.159.300
Minggu ke-3	311.022.847,96	1,009	308.277.100
Minggu ke-4	311.022.847,96	1,009	308.317.100
Minggu ke-5	311.022.847,96	1,009	308.337.200
Minggu ke-6	311.022.847,96	1,008	308.669.400
Minggu ke-7	311.022.847,96	1,007	308.896.400
Minggu ke-8	311.022.847,96	0,979	317.749.200
Minggu ke-9	311.022.847,96	0,970	320.759.800
Minggu ke-10	311.022.847,96	0,996	312.233.500

Table 10. Analysis of Estimate To Completion (ETC) Calculations

Progres	OD	SPI	ECT = OD/SPI
Minggu ke-1	120	1,000	120
Minggu ke-2	120	1,000	120
Minggu ke-3	120	1,000	120
Minggu ke-4	120	1,000	120
Minggu ke-5	120	1,000	120
Minggu ke-6	120	1,000	120
Minggu ke-7	120	1,000	120
Minggu ke-8	120	0,973	123
Minggu ke-9	120	0,964	124
Minggu ke-10	120	0,992	121

3.1.2.7 Calculation Results of Earned Value Method (EVM)

Based on the results of the analysis of variance, performance index, and estimates obtained by the values of the recapitulation of the results of the analysis can be seen in Table 10.

Table 10. Recapitulation of Calculation Results of Earned Value Method (EVM)

Progres	Analisis Varian		Analisis Kinerja		Analisis Estimasi	
	Waktu SV (Rp)	Biaya CV (Rp)	Waktu SPI	Biaya CPI	Waktu ETC (hari)	Biaya EAC (Rp)
Minggu ke-1	0	33.300	1,000	1,039	120	299.297.400
Minggu ke-2	0	309.900	1,000	1,009	120	308.159.300
Minggu ke-3	0	586.500	1,000	1,009	120	308.277.100
Minggu ke-4	0	863.100	1,000	1,009	120	308.317.100
Minggu ke-5	0	1.139.700	1,000	1,009	120	308.337.200
Minggu ke-6	0	1.230.200	1,000	1,008	120	308.669.400
Minggu ke-7	0	1.320.700	1,000	1,007	120	308.896.400
Minggu ke-8	-6.118.100	4.706.900	0,973	0,979	123	317.749.200
Minggu ke-9	-9.177.200	7.675.500	0,964	0,970	124	320.759.800
Minggu ke-10	-2.243.300	1.025.000	0,992	0,996	121	312.233.500

The results of the recapitulation of project performance using the EVM method in Table 10, obtained values at week 1 to week 7 the value of SV = 0, SPI = 1 and CV values > 0, CPI > 1, with that, this

shows project progress according to the schedule planned at the beginning of the project and the cost is smaller than the budget. In the 8th week the SV value is < 0, SPI < 1 and the CV value is < 0, CPI < 1, this indicates that the work experiences late workmanship and costs exceed the budget. So the conclusion is that the irrigation development project located in the village of Cibala - Cirebon is being worked on for 1.0 weeks experiencing delays from the planned schedule and costs incurred exceeding the planned costs of Rp. 312,233,500, even though the cost of the project plan was 311,022,847.96. [2]

3.1.3 Analysis of Additional Staff

The addition of employees, namely the addition of construction projects, often mismatches between the planned schedule and realization in the field because there are several factors that can affect the course of the project, such as uncertain weather and project location and require additional staff to complete the project on time with a contract that was agreed at the beginning. Based on the results of interviews with Mr. Bambang as Project Project Controller of PT. WIN SEJAHTERA stated that the method for calculating additional employees was determined at PT. WIN PROSPEROUS, and maximum workmanship per day, which is 12 m² has been determined from the observation of PT. WIN SEJAHTERA since the company was built. [3]

Table 10. Recapitulation of Labor Needs

Pekerjaan	Satuan	Harga Perhari
Pemasangan batu dan pengerjaan plesteran		
Upah tenaga kerja	Pekerja	M2 Rp. 100.000

Job volume = 125,480 m³

Duration of work = 1 week in the 8th week

Addition of labor =

Late workmanship: Late days:

Maximum work per person.

= 300 m³: 7 days: 12 m² / day

= 1.49 = 2 workers

So, the addition of labor due to delays that occur in the field is 9 workers. Then the costs incurred by the company are 2 x 100,000 = Rp. 200,000 for a 7-day period so the total payment of additional employees is Rp. 1,400,000.

3.2 System Analysis

System analysis is an elaboration of an interaction system, actors and information in order to be able to identify and evaluate all problems that arise from. Stages that must be carried out in system analysis include problem analysis, running system analysis, functional analysis and non-functional analysis. [9]

3.2.1 Use Case Diagram

Use case diagram is a diagram that shows the functionality of a system by drawing an interaction between users and the system to be built. [4]

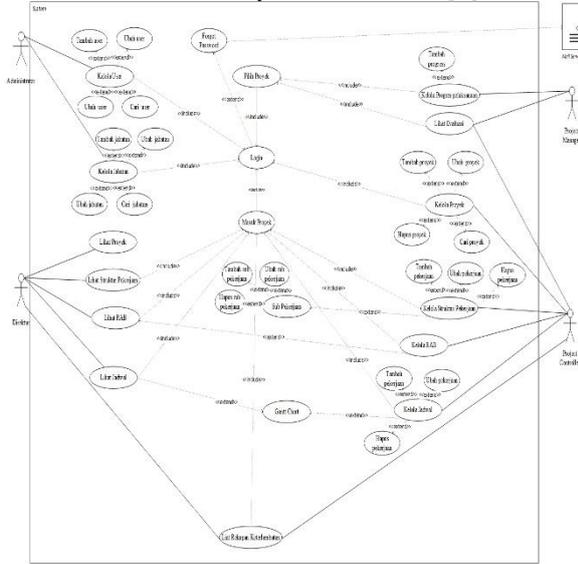


Figure 2 Use Case Diagram

3.2.2 Class Diagram

Class Diagram is a big picture of a system structure to define the class that will be created on the system. Following is the class diagram on the project management information system in PT. Win Sejahtera. [7]

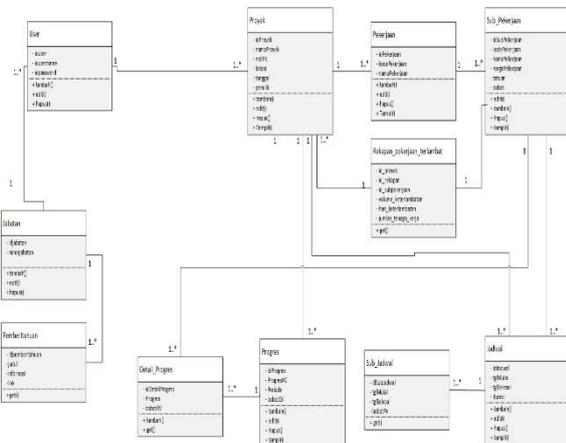


Figure 3 Class Diagram

3.3 Menu Structure Planning

The design of the menu structure to describe a connection of each menu that can be accessed by users is described as follows. [10]

3.3.1 Project Controller Menu Structure Planning

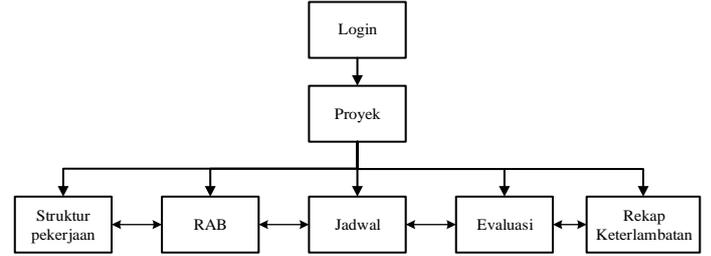


Figure 4. Menu Structure Project Controller

3.3 Data Planning

At this stage of data design conceptual is carried out from a model into a database model that will be used in making project management information systems at PT. Win Sejahtera. The design of the relation scheme can be seen in figure.5 [5]

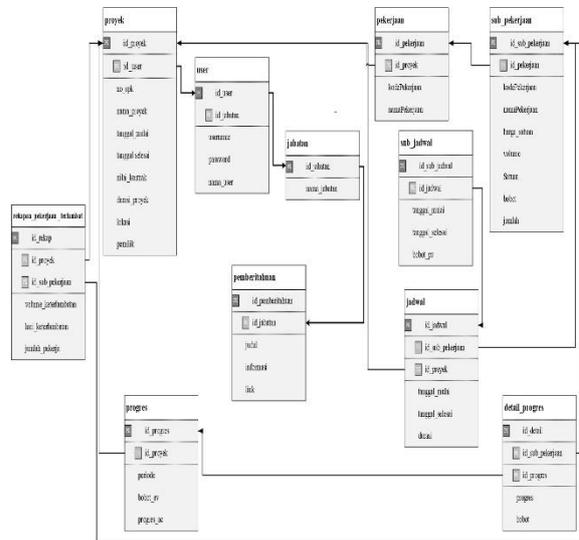


Figure 5. Relationship scheme

3.4 Perancangan Antarmuka

This stage is an illustration of the interaction between users and the project management information system that will be built.

Next is the design of the login interface so that users can enter the system according to their respective job desk, can be seen in Figure 5. [4]

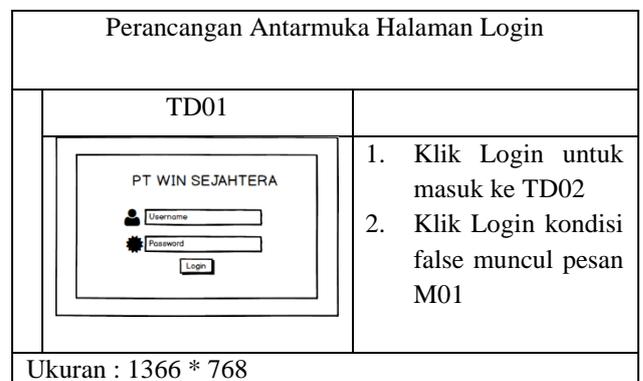


Figure 6. Designing the Project Schedule Interface

Furthermore, for interface design for project controller can be seen in figure 6.

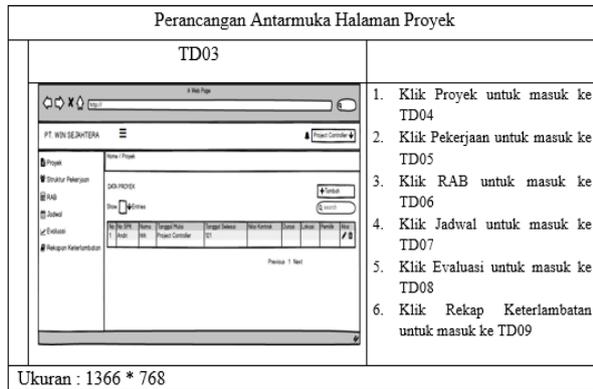


Figure 7. Project Controller page interface

Furthermore, the design of the interface for directors can be seen in Figure 7.

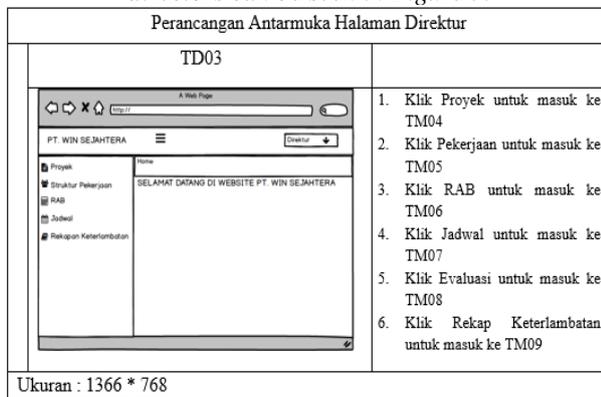


Figure 8. Interface of Director's Page

Furthermore, to design the interface for the project manager can be seen in Figure 8. Figure 8. Interface of the Director's Page

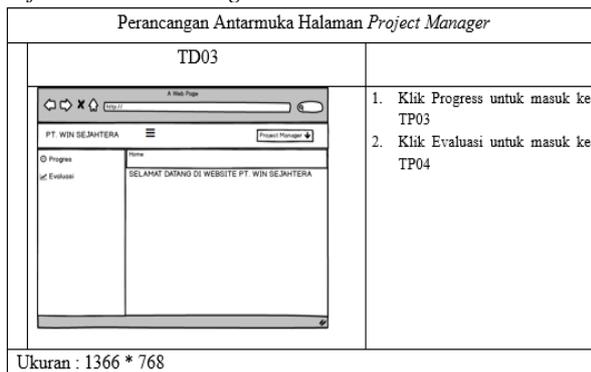


Figure 9. Interface of the Project Manager Page

Next to the interface design for the administrator can be seen in figure 9.

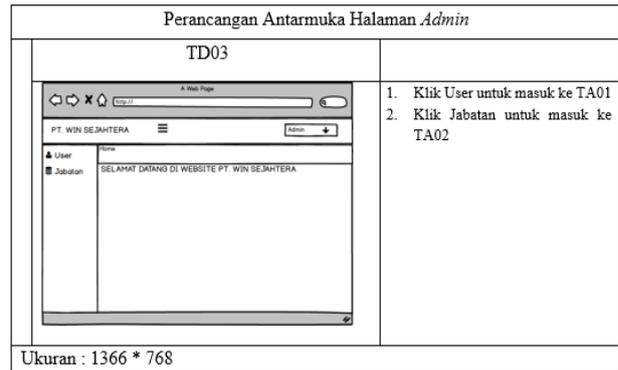


Figure 10. Administrator Page Interface

3.8 Conclusions of the Black Box Testing

Black box testing on research that will be conducted based on the case and the results of testing in this study, then conclusions can be drawn as follows: [8]

Project Management Information System PT. Win Sejahtera can produce stages of project management that are in line with the needs of the company such as making a budget plan (RAB), making a project implementation schedule and displaying a schedule in the form of a gantt chart, making project workforce schedules, monitoring project implementation and calculating the automatic addition of labor there is a work delay in the form of notification, with the user entering the correct data, the system will issue the output as expected and the system will give a warning if the user enters the wrong data.

3.9 Conclusions Beta Testing

In the beta testing that researchers have done by interviewing each user directly involved in using this system at PT. Win Sejahtera, it can be concluded that the system built has been quite helpful in handling project management, both from the planning stage to the project supervision stage, and every function and menus in this system are sufficient for the users.

4. CLOSING

Based on the results of the research obtained, the following conclusions are drawn.

1. The system built can help the Project Controller in overseeing project implementation activities so that the project runs according to plan and there are no delays. Supervision is carried out by looking at the progress of the weekly project activities reported by the Project Controller.
2. The system built can assist the Project Manager in reporting the progress of work to the project controller when the company works on 2 projects at the same time with a distance of projects that are far apart so that the reporting

process can be carried out at the project implementation site.

- 3 *The system that is built can help the project controller in knowing the increase in the number of workers that must be prepared for the needs of the execution of the project when there is a delay and can arrange finances so that the payment of additional workforce is in accordance with needs.*
- 4 *The system built can help the director in knowing the project activities undertaken by such evaluation and recap of delays from each project for evaluation material.*

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