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RESCHEDULING USING THE PDM METHOD WITH MICROSOFT PROJECT 2021 IN THE URBAN SLUM QUALITY IMPROVEMENT PROJECT FOR AIR SANTRI, BANJAR REGENCY

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ABSTRACT

In project development planning is a measure of the success of a project, which can determine the allocation of funds, time and quality to be obtained. This planning is combined with the use of special planning software, namely Microsoft Project 2021, which with this software can help make rescheduling easy and can track developments in the field. The data was analyzed using the Precedent Diagram Method (PDM) using the Microsoft Project 2021 application and the resulting plan is a network of all project work scopes. The results of the scheduling analysis of the Air Santri Urban Slum Quality Improvement Project, Banjar Regency, using the Microsoft Project 2021 application is that the project was carried out for 335 days obtained based on the scope of work with the largest duration of this project, namely 12 months 25 days starting on May 21 2021 ending on June 15, 2022. The total duration for each scope of work is Public Open Space (RTP) for 331 days, Retaining Walls (DPT) for 335 days, Roads for 139 days, Pier for 96 days, Waste Management Area (TPS) 170 days duration, SPAL DT 57 days duration and Clean water installation 201 days duration.

Keywords: Microsoft Project 2021, Precedence Diagram Method (PDM), scheduling.

1. INTRODUCTION

In project development planning is a measure of the success of a project, which can determine the use of funds, time and quality to be obtained. Therefore, in order to obtain efficiency and effectiveness at work, good project management is needed. So that efficiency and effectiveness can be met properly in running a project, this is influenced by 2 aspects, namely planning and scheduling.

In data analysis and planning of project activities, of course delay is an unexpected condition, because it can harm the contractor and the project owner, both in terms of time, cost and effort. Scheduling is combined with the use of special planning software, namely Microsoft Project 2021, which with this software can help make rescheduling easy and can track developments in the field.

The Air Santri Urban Slum Quality Improvement Project located in Murung Kenanga Village, Martapura District, Banjar Regency, South Kalimantan is analyzed in

the form of project scheduling using the PDM method assisted by Microsoft Project 2021 because this project is still in the form of a bar chart (S curve) so to make it easier in future scheduling it is used Microsoft Projects.

2. THEORITICAL STUDY

Project Scheduling

Husen (2009) project scheduling is an element of planning results that shows information about planned scheduling and project progress in the form of resource performance in the form of costs, labor, equipment and materials, as well as project duration plans and project progress from the completion timeline.

PDM (Precedence Diagram Method)

Ervianto (2005) the advantage of the PDM method over the CPM method is that there is no dummy activity, which is why the network is simpler. This happens because there are overlapping relationships that can be created without the need to increase the number of activities (Arianto, 2010).

The PDM method includes networks in the Activity On Node (AON) classification. Activities are written on square nodes, while arrows serve to show the relationship between interrelated activities (Soeharto, 1999 in Arianto, 2010).

Figure 1. PDM Activity Symbol
(Source: Arianto, 2010)

Work Breakdown Structure (WBS)

WBS is a method used to determine and classify the activities of a project into smaller parts so that it is easier to manage. The WBS lists the jobs, sub-jobs, key stages of the project and the products or services provided. The WBS is prepared based on studying all documents on the project which include contracts, drawings and specifications. The project is further divided into sections following a certain structural and hierarchical scheme into sufficiently detailed work elements, known as the Work Breakdown Structure.

Microsoft Projects

Microsoft Project is an application of the project planning form. With this application, project leaders are assisted in calculating detailed work schedules based on work projects. Microsoft Project can also help track and monitor the use of resources, both human resources and equipment. All stages of a project can be presented in a report. Reports obtained in the form of planning, resource usage, equipment costs and labor costs.

The advantage of this application is its ability to manage the scheduling of a task, manage and control the time and cost of converting input data into output data based on goals. Can schedule production effectively and efficiently. Can draw tasks on nodes with various customizable views. Microsoft Project also has the ability to create work schedules or calendar systems with several constraints such as holidays, working hours or other constraints. There are several scheduling methods that can be used in Microsoft Project, namely the Critical Path Method (CPM), the Precedence Diagram Method (PDM), and the Program Evaluation and Review Technique (PERT).

3. METHOD

The following methodology scheme can be seen in Figure 2.

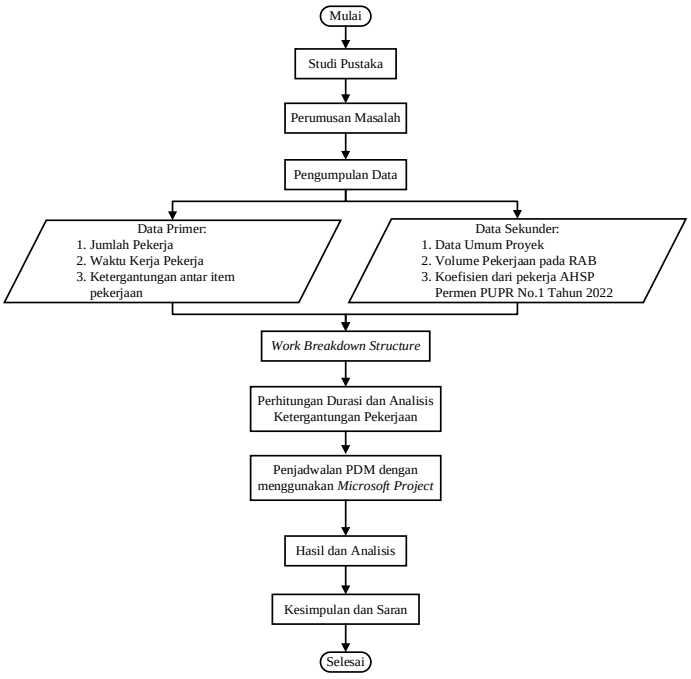

Figure 2. Flow Chart of Research Methods

4. RESULT AND DISCUSSION

In research on this project divided into 7 (seven) scope of work, namely:

1) Public Open Space (RTP)
2) Earth Retaining Wall (DPT)
3) Street
4) Pier
5) Waste Management Site (TPS)
6) SPAL DT
7) Installation of clean water

Create a WBS (Work Breakdown Structure)

The WBS analyzed 7 types of work, namely preparatory work, earthwork, drainage, roads, structural, architectural, and mechanical, electrical, plumbing. The following is an example of a schematic from the Work Breakdown Structure for the construction of public open spaces in this project as shown in Figure 3.

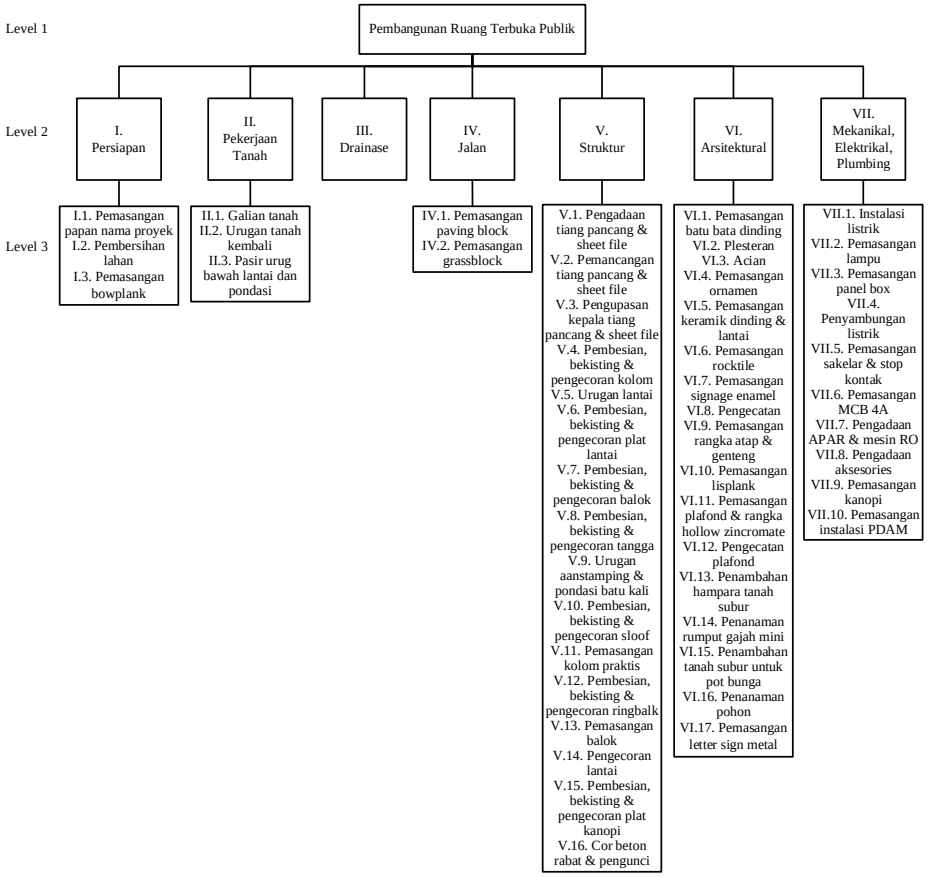

Figure 3. Work Breakdown Structure of Public Open Space Development

Job Duration Calculation

There are 7 (seven) types of work included in the preparation of the network in the Santri Air Urban Slum Quality Improvement Development Project located in Murung Kenanga Village, Martapura District, Banjar Regency, namely:

1) Preparation
2) Earthworks
3) Drainage
4) Street
5) Structure
6) Architectural
7) Mechanical, electrical, plumbing.

The duration of the work items in this study was obtained from the calculation of the volume of work obtained from the RAB, the number of workers obtained from interviews and the coefficient of workers obtained from AHSP. For the calculation of the duration of activities can be obtained from the following formula:

$$Duration = \frac{Work\ Volume}{Productivity}$$

$$Durasi = \frac{Work\ Volume}{\left(\frac{The\ number\ of\ workers}{Worker\ Coefficient}\right)}$$

Calculation example:

Calculation of the duration of brick wall installation work in public open spaces.

Is known:

Number of workers = 15 people

Work volume = 105.71 m2

Worker coefficient = 0.850 OH

Completion:

$$Duration = \frac{Work\ Volume}{Productivity} = \frac{105{,}71}{\left(\frac{15}{0{,}85}\right)} = 5{,}99 \approx 6 \text{ hari}$$

No	Uraian	Kode	Satuan	Koefisien	Harga Satuan (Rp)	Jumlah Harga (Rp)
1	2	3	4	5	6	7
A	Tenaga Kerja					
1	Pekerja	L.01	OH	0,850		
2	Tukang batu	L.02	OH	0,425		
3	Mandor	L.04	OH	0,085		
				Jumlah Harga Tenaga Kerja		
B	Bahan					
1	Bata merah	M.25.c	buah	500		
2	Portland *cement*	M.23	kg	106,50		
3	Pasir pasang	M.05.b.3	m^3	0,37		
				Jumlah Harga Bahan		
C	Peralatan					
1	Molen kapasitas 0,3 m^3	E.32.a	Hari	0,0238		
				Jumlah Harga Peralatan		
D	Jumlah Harga Tenaga Kerja, Bahan dan Peralatan (A+B+C)					
E	Biaya umum dan Keuntungan (Maksimum 15%)				15% x D	
F	**Harga Satuan Pekerjaan per - m^3 (D+E)**					

Figure 4. Table of Coefficient of Brick Wall Installation on AHSP

Dependency Relations Between Jobs

The following is an example of an analysis of the dependency relationship between work in preparatory work in the scope of work in public open spaces shown in Table 1.

Table 1. Relationship between dependencies between jobs in preparatory work in the scope of work in public open spaces

No	URAIAN PEKERJAAN		Kode Kegiatan	Kegiatan Sebelumnya	Durasi (Hari)
	PEMBANGUNAN RUANG TERBUKA PUBLIK		1		
I	PERSIAPAN		2		
	1.1	Papan nama proyek	3		
		1. Dikawasan AIR SANTRI MURUNG KENANGA	4	7 FF=0	1
		2. Di Kawasan TPS	5	4 SS=0	1
	1.2	Membersihkan Lapangan dan Perataan Lahan	6	Start	4
	1.3	Pengukuran dan Pemasangan Bouwplank	7	6 FS=0	3

Calculation Forward Backward

The PDM method has forward and backward calculations that need to be taken into account, in order to determine the critical path in planning.

Critical Path Determination

The following is an example of a critical path table for preparatory work in the scope of public open space work in Table 2.

Table 2. Critical path for preparatory work in the scope of public open space work

Kode Kegiatan	Durasi (Hari)	ES	EF	LS	LF	(LF-EF)	Status
1							
2							
3							
4	1	6	7	6	7	0	Kritis
5	1	6	7	6	7	0	Kritis
6	4	0	4	0	4	0	Kritis
7	3	4	7	4	7	0	Kritis

Data Processing with the Microsoft Project 2021 Program

The following is an example of the PDM method network diagram display based on Table 1. The scope of work being analyzed, namely the scope of work in public open spaces is shown in Figure 5.

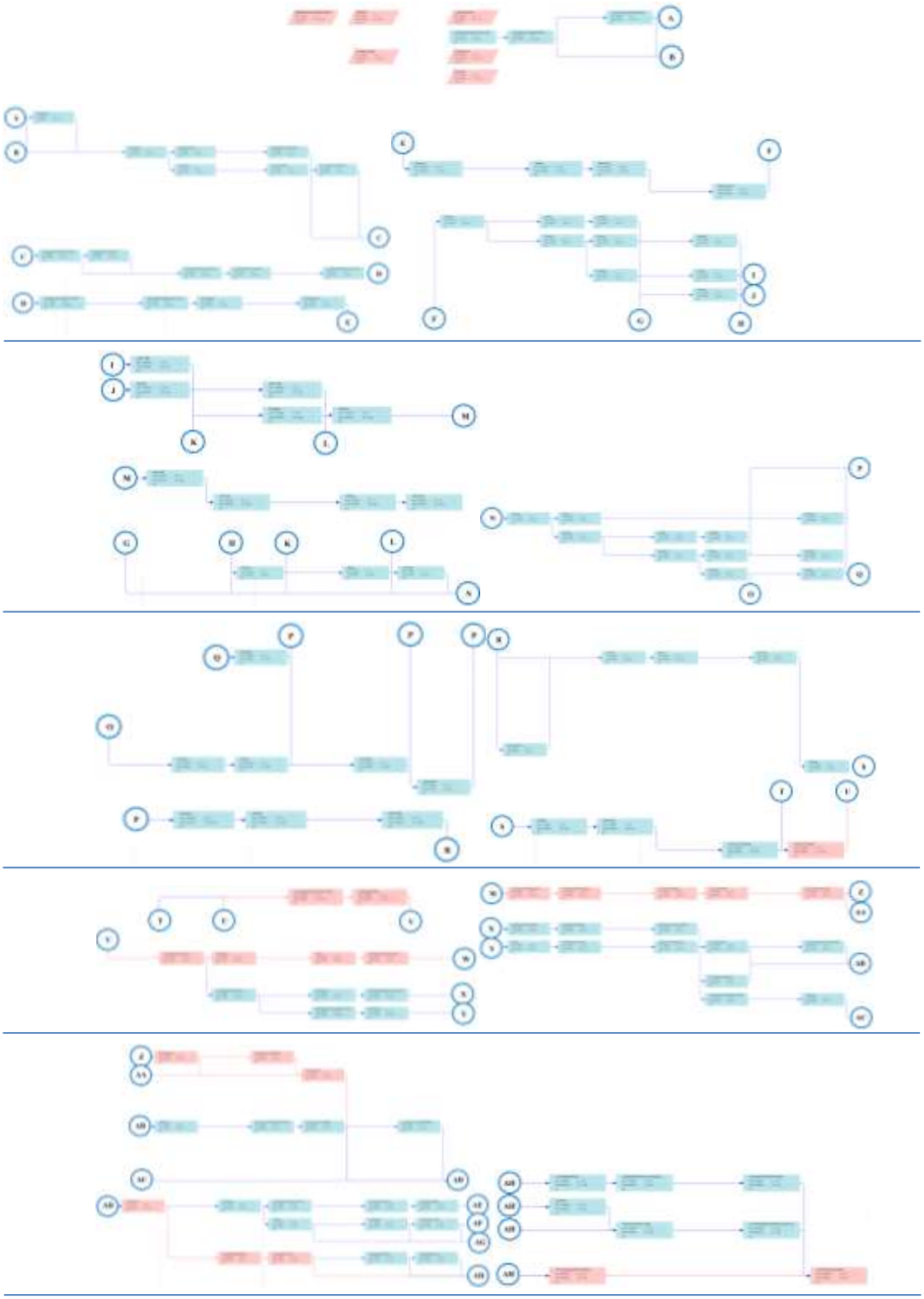

Figure 5. Network Diagram of the PDM Method for Public Open Space Work

Results

Based on the result of rescheduling with Ms. The project to get the duration of each scope of work from each type of work in the Air Santri Urban Slum Quality Improvement Project or the duration of level 2 on the WBS is made in Table 3 recap.

Table 3. Recapitulation of the Scope of Work Duration in the Air Santri Urban Slum Quality Improvement Project

No	URAIAN		Durasi (Hari)
	PENINGKATAN KUALITAS PERMUKIMAN KUMUH PERKOTAAN AIR SANTRI KABUPATEN BANJAR		
I	PERSIAPAN		7
II	PEKERJAAN TANAH		
	2.1	RUANG TERBUKA PUBLIK	6
	2.2	DINDING PENAHAN TANAH DAN PEDESTRIAN	8
	2.3	JALAN	10
	2.4	TPS	10
	2.5	SPAL DT	7
	2.6	INSTALASI AIR BERSIH	52
III	DRAINASE		
	3.1	DINDING PENAHAN TANAH DAN PEDESTRIAN	5
	3.2	JALAN	1
	3.3	TPS	10
	3.4	SPAL DT	4
IV	JALAN		
	4.1	RUANG TERBUKA PUBLIK	11
	4.2	DINDING PENAHAN TANAH DAN PEDESTRIAN	3
	4.3	JALAN	21
	4.4	INSTALASI AIR BERSIH	35

No	URAIAN		Durasi (Hari)
V	STRUKTUR		
	5.1	RUANG TERBUKA PUBLIK	262
	5.2	DINDING PENAHAN TANAH DAN PEDESTRIAN	293
	5.3	JALAN	99
	5.4	DERMAGA	66
	5.5	TPS	61
	5.6	SPAL DT	22
	5.7	INSTALASI AIR BERSIH	20
VI	ARSITEKTURAL		
	6.1	RUANG TERBUKA PUBLIK	37
	6.2	DINDING PENAHAN TANAH DAN PEDESTRIAN	13
	6.3	DERMAGA	23
	6.4	TPS	79
	6.5	SPAL DT	26
VII	MEKANIKAL, ELEKTRIKAL, PLUMBING		
	7.1	RUANG TERBUKA PUBLIK	8
	7.2	DINDING PENAHAN TANAH DAN PEDESTRIAN	6
	7.3	JALAN	1
	7.4	DERMAGA	3
	7.5	TPS	10
	7.6	SPAL DT	29
	7.7	INSTALASI AIR BERSIH	67

Based on the result of rescheduling with Ms. The project gets the duration of each scope of work in the Air Santri Urban Slum Quality Improvement Project or the duration of level 1 on the WBS seen in Table 4.

Table 4. Duration of Each Scope of Work in the Air Santri Urban Slum Quality Improvement Project

No	URAIAN	Durasi (Hari)
I	RUANG TERBUKA PUBLIK	331
II	DINDING PENAHAN TANAH DAN PEDESTRIAN	335
III	JALAN	139
IV	DERMAGA	96
V	TPS	170
VI	SPAL DT	57
VII	INSTALASI AIR BERSIH	201

The following is a display of the level 2 network diagram Work Breakdown Structure in the Air Santri Urban Slum Quality Improvement Project as shown in Figure 6.

Figure 6. Network Diagram Level 2 Work Breakdown Structure of the Air Santri Urban Slum Quality Improvement Project

5. CONCLUSIONS AND SUGGESTIONS

Conclusion

The results of the analysis carried out on rescheduling using the PDM method with the microsoft project 2021 on the Quality Improvement Project for Urban Slums of Air Santri, Banjar Regency, can be summarized as follows:

1) Based on the contract data of the Air Santri Urban Slum Quality Improvement Project, Banjar Regency, the normal duration is 356 working days.

2) After rescheduling with Microsoft Project 2021 for the normal duration of the project, the duration of work can be determined based on the scope of work that is larger than this project, namely a retaining wall with a duration of 335 working days out of 356 working days based on the contract.
3) The duration results obtained for each scope of work are based on the existing network on Ms. Project on the Improvement of the Quality of the Santri Urban Slum Settlements Project, Banjar Regency, namely:
    a) Public Open Space (RTP) obtained a duration of 331 days,
    b) Soil retaining walls (DPT) obtained a duration of 335 days,
    c) The road obtained a duration of 139 days,
    d) Wharf obtained duration of 96 days,
    e) The Waste Management Site (TPS) has a duration of 170 days,
    f) SPAL DT obtained a duration of 57 days,
    g) Clean water installations obtained a duration of 201 days.

Suggestion

Based on the analysis and calculations carried out, the following suggestions can be given, namely:

1) Check each number of workers against the volume of work done whether the work can be done with the number of workers and the volume of work available.
2) Dependency relationships between jobs need to be calculated when rescheduling projects, so that work is more effective.
3) Work on the critical path is an important activity to ensure that project performance is in sync with the planned schedule.
4) The use of this software is best applied to large-scale and complicated projects, so that its usefulness can be seen.
5) The use of the Microsoft Project 2021 application is used more frequently so that it can be an alternative in project planning.

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