



The Influence of Discipline and Training on Teacher Performance in Junior High Schools

Yusuf Juniardi¹, Irwan Lakawa², hujiyanto³,

^{1,2,3}Universitas Sulawesi Tenggara, Indonesia

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Representative E-Mail: yusufjuniardi301@gmail.com

ABSTRACT

Today the development of construction projects is fast and often on a large scale requires large costs and has methods that can improve the quality of planning and control to deal with the number of complex project activities that sometimes increase. A construction project is a series of activities that are only carried out once and have a limited time where the end and beginning of the project are relatively certain. The implementation of repetitive (repetitive) work on construction projects does not always have to be completed for one item of activity first and then for the second, third and so on. This is definitely ineffective in the use of resources, duration, and has the effect of increasing project costs. Implementation of multi-item projects characterized by work? Repetitive work should be engineered for more effective use of resources by grouping workers from one work item to another. The success of a construction project is highly dependent on scheduling and planning. This study applies the Line Of Balance (LoB) method to project scheduling where initially the project was planned using the S Curve method. Line of Balance is a variation of the linear scheduling method that allows balance of operations so that each activity can continue. The project is The Park Kendari Builder. In this study, the research method in calculating using the Line of balance was carried out. Conflict analysis was carried out after drawing into the line chart the results of the planner's calculations using the Line of Balance (LoB) method. Conflict analysis and drawing diagrams obtained the final duration of work of 56 week.

Keywords: Scheduling, Line of Balance (LOB), Scheduling Method and Typical.

I. INTRODUCTION

A construction project is a series of activities that are only carried out once and generally have a short time where the beginning and end of the project are relatively certain (Prabowo, 2019). The construction of this project was carried out by PT. Dacrea Design and Engineering Consultants, development named The Park Kendari, because in the construction of the package so that there are no delays in the construction of the project, every construction project requires a schedule. It is necessary that the order – the sequence of work in a project can run well, so that a highly optimal work can be produced. So, there must be a schedule to find out that each work item does not wait for each other in the construction process, so as to minimize the time the construction process takes place. For this reason, by dealing with this, companies are required to improve high management and try their best to take appropriate actions and strategies, to control ongoing development projects.

The success of a construction project is highly dependent on the planning and planning. Project scheduling helps show the relationship between activities on a project, Scheduling the relationship that must be done between jobs, and shows realistic time estimates for each activity / activity. Without proper planning, a project will fail/delay which can be detrimental to a company, for example, a delay in the implementation of a project can result in more project completion time which can eventually lead to excessive project costs. Therefore, proper planning and in accordance with project characteristics are needed to deal with uncertain project conditions, so that projects can be carried out at an efficient cost and time (Prabowo, 2019). There are many methods that have been developed for scheduling the implementation time of a construction project, including the S Curve, Bar Chart, CPM (critical Path Method), PDM (Precedence Diagram Method), PERT (Project Evaluation and Review Technique), LOB (Line of Balance), and others (Aulia, 2016). Starting from this problem, in connection with the importance of scheduling which is closely related to time control and optimization of project work in a project in order to ensure smooth implementation, the authors are interested in studying project scheduling problems and raise the title: Overview of Construction Project Implementation using the Line of Balance Method (LOB) Construction of The Park Kendari.

II. LITERATURE REVIEW

2.1 Project

A project is a temporary activity that has clear plans, goals and objectives, takes place within a certain period of time, with a certain cost allocation. (Poli, 2017).

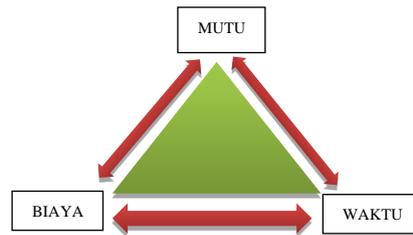


Image 1 Illustration of a Repetitive Project

As shown in the figure above, important parameters for project organizers are often allocated to project targets. These three boundaries attract each other. That is, if you want to improve the performance of items that have been mutually agreed upon in the contract, it is generally followed by an increase in quality which results in an increase in costs that exceed the budget. On the other hand, if you want to cut costs, you usually have to compromise on quality and schedule. These 3 things are mandatory benchmarks for project organizers who are often associated as project targets. The third limit above is called the triple constraint (Wibowo, 2020).

A project is defined as a series of unique activities that are interrelated to achieve a certain result and carried out within a certain time period.

2.2 Project Planning Stage

According to Mahapatni (2019). The stages covering the project include:

- Determination of project objectives and their needs, in this case it is necessary to determine the final project results, time, cost and performance which are the objectives.
- Any work required to achieve the project objectives should be detailed and listed.
- The project organization is designed to define the existing departments, required subcontractors and managers who are responsible for the work.
- A schedule for each job is created, showing the time each activity starts and finishes deadlines.
- A budget plan and the required capabilities are prepared.
- Evaluation of project completion time, cost and performance According to Santosa (2008) the planning stage in the project life cycle will include the procurement of detailed project plans and the determination of detailed project specifications.
- Planning is the most vital function in a project management activity.

2.3 Construction Project Scheduling Concept

Project is a series of activities that have dimensions of time, physical and cost in order to realize ideas and achieve certain goals. This series of activities consists of the feasibility study stage, the planning and design stage, the auction/tender stage, and the construction implementation stage. From this we can see that planning is one of the most important parts of a construction project. Planning is the process of selecting information and making assumptions about future conditions to formulate activities that need to be carried out in order to achieve predetermined goals. The 3 main elements that will be considered in planning are time, cost and quality.

A project requires scheduling, which is the allocation of available time to carry out each work item, in order to complete a project so that it can be achieved optimally by considering existing limitations. Scheduling follows the development of the project with various problems. The monitoring and updating process is always carried out in order to produce the most realistic scheduling so that the allocation of resources and the determination of the duration is in accordance with the goals and objectives of the project (Azizah, 2017).

Scheduling determines when activities are started, postponed and completed, so that financing and resource usage are adjusted specified needs. All activities in an organization are connected based on a logical relationship, thus forming a work network (network diagram) which contains trajectories of events & activities (Sudipta, 2013).

2.4 Project Scheduling Method

There are several construction project scheduling methods that are often used in managing resources and time on projects. Each method has its own advantages or disadvantages. The use of this method is based on the needs and the results to be achieved on scheduling performance. And then, the variables that influence it must also be monitored, for example quality, work safety, materials and equipment availability. If there is a deviation from the initial plan, evaluation and corrective action are carried out so that the project remains in the desired condition (Prabowo, 2019).

- Barchart (Barchart)

The Barchart method was first developed by a mechanical engineer from the United States named Henry L. Gant in 1917. Barchart itself is often also known as the Gantt Chart. This method later became popularly used in construction scheduling (Sudarson, 2020).

- curve S

The S curve is a graph developed by Warren T. Hanum on the basis of observations of a number of large projects from start to finish, the S curve can show progress based on time, activities, and work weights that are presented as a cumulative percentage of all projects (Rezky, 2018).

- Line Of Balance (LoB)

Line of balance (LoB) was first applied to the manufacturing industry and production control, which aims to obtain or evaluate the production line flow rate of a product. Originally used by the Goodyear Company in the early 1940s and developed by the US Navy in the 1950s to plan and control work with both repetitive and non-repetitive units. LOB has not been widely developed and applied by the construction industry because of the more popular network scheduling technique (Pai, 2013).

Line of Balance (LoB) Is a project scheduling method intended for planning housing area, the number of activities is relatively small with repetitive activities. LoB also functions as a control and monitoring medium, because it can be used to show the amount of work that has been completed within a certain time, so that the production level can always be controlled whether it is in accordance with the initial plan (Sanjaya, 2014). projects that have repetitive activities. As in buildings, highway construction, pipe installation and others, especially projects with.

2.5 LOB procedure

- According to Su and Lucko (2015) The scheduling process using LOB involves several basic stages, including:
- Prepare a logic diagram showing the production sequence of one cycle of repetitive work
- Estimate the number of work teams for each activity item
- Prepare a LOB schedule
- Specifies the buffer time (if desired)
- Draws a LOB graph.

III. RESEARCH METHODS

3.1 Location and Time of Implementation

This research is located on Jalan Antero Hamra, Bende Village, Kadia District, Kendari City. Construction of The Park Kendari. and for more details can be seen in Figure 2 below.

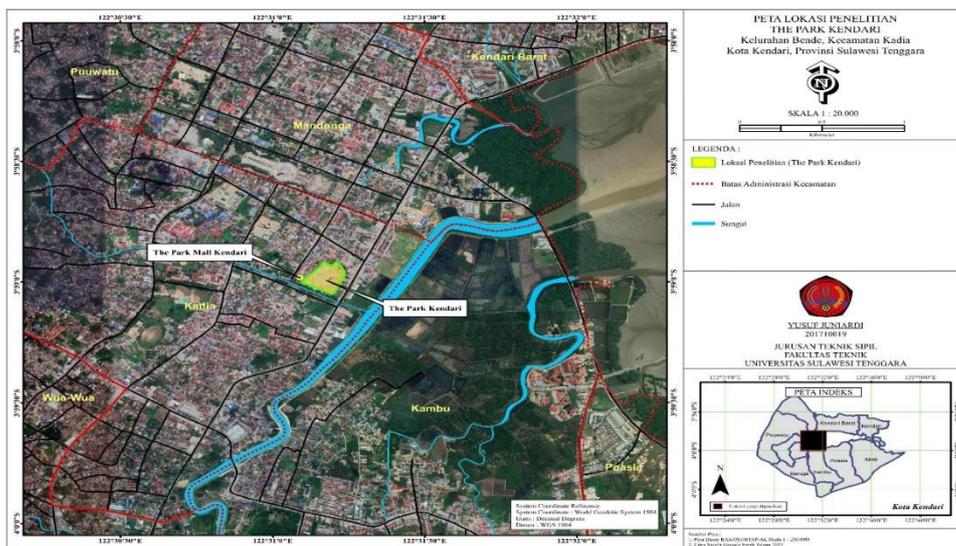


Image 2 Antero Hamra Street, Bende Village, Kadia District, Kendari City

3.2 Types and Sources of Data

The types and sources of data to be used in this study are presented in table 1 as follows:

Table 1 Types and sources of data.

No	Data Type	Data source
1	Secondary Data	
	Time Schedule	PT. Dacrea design and Engineering consultants
	Site Managemen	PT. Dacrea design and Engineering consultants

3.3 Research Variables

The indicators of this research variable can be seen in table 2

Table 2 Research Variable Indicators.

No	Review Elements	Indicator
1	Implementation cost	1. Creating WBS 2. Diagram Drawing
2	Execution time	1. Identify project activities 2. Estimated activity duration 3. Start to start and Finish to finish

IV. RESULTS AND DISCUSSION

4.1 Project Data Overview

The project that will be a case study in the preparation of this research can be seen as follows: Project: Construction work of The Park Kendari Project location: Jalan Antero Hamra, Bende Village, Kadia District, Kendari City Building height: 4 floors Land area: \pm 5 hectares Contractor: PT. Dacrea Design and Engineering Consultants. In scheduling the implementation of the construction project, the construction of The Park Kendari uses conventional scheduling methods that are only guided by the project S curve. It is known from the project schedule for the completion of floors 1 to 4 it will take 70 weeks (attachment 4). Based on the data obtained from the construction project of The Park Kendari Building, the planner used the S curve method. For this research, we will try to apply the LOB method to the project scheduling.

Table 3 provides a list of project work data consisting of job descriptions and work weights.

No	Type of work	Weight
1	Preparatory work	10.0446%
2	Earthworks & Sub-structure	0.8090%
3	Upper Structure Work	47.5198%
4	Steel Works	8.2476%
5	Wall and Wallcovering Works	4.4548%
6	Work Metal Roof	2.9822%
7	Work Finishing Floor	3.2846%
8	Ceiling Works	1.2242%
9	Door, Window and Lock Works	3.7727%
10	Work Sanitary	1.0603%
11	Work Railing and others	1.4082%
12	Work Facade	6.7087%
13	Outside Work	6.0341%
14	'PROVISIONAL SUMS (Provisional Sum for Contingencies and Daywork Allowances)	2.4492%

4.2 Line of Balance (LoB)

4.2.1 Method

a. Making WBS (Work Breakdown Structure)

WBS (Work Breakdown Structure) is a method of organizing projects into a hierarchical reporting structure, WBS is used to breakdown or solve each work process into more detail, this is intended so that the project planning process has a better level. Broadly speaking, through WBS we can make schedules, budgets, and what activities need to be done and the space scope in it. WBS is very important to create because it can create harmonious collaboration within a team.

a. WBS (Work Breakdown Structure) preparation

From the list of jobs in table 3, modifications are made in the form of simplification of the WBS hierarchy for jobs using the same resources, this is done to make it easier to arrange project scheduling using the LoB method. The project time duration follows the project scheduling data.

Table 4 WBS data and time duration of each work item.

No	Job List	Duration Each Floor (week)
1	Upper Structure Work	6
2	Steel Works	6
3	Wall and Wallcovering Works	3
4	Floor Finishing Works	3
5	Ceiling Works	3
6	Door, Window and Lock Works	3
7	Work Sanitary	3
8	Work Railing and others	3
9	Work Facade	4

c. Create a one-cycle job sequence logic diagram

The arrangement of the work dependency logic is structured in such a way that it can produce project scheduling with continuous use of resources for repetitive activities. The logic of the job dependency of the project work is given in Figure 3 below:

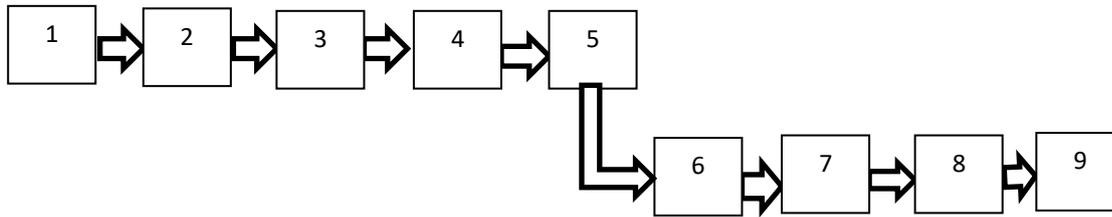


Image 3 Logic Diagram of One Cycle Job Sequence

2) Preparation of Line of Balance (LoB) schedule

The first step that must be done is to modify the barchart of the project scheduling data by simplifying the WBS. The next step is to transfer the line diagram to the new barchart to do a conflict analysis of project scheduling.

There are 2 calculation techniques in the Line of Balance (LoB) method, namely forward calculation and backward calculation. Forward calculation is used if the duration of the predecessor job (successor) is less than or equal to the duration of the following job (predecessor). For example, structural work has a duration of 2 weeks while the predecessor work is architectural work which has a duration of 7 weeks, so architectural work can be carried out immediately after structural work is carried out on the initial floor or production line drawing can be based on the first unit control point.

Determine the calculation in making the schedule Line of Balance are the following:

Calculation of Upper Structure Work

$$M = 25 \text{ people} \times 43 \text{ weeks} \times 8 \text{ hours}$$

$$M = 8600 \text{ working hours per weekly target unit}$$

$$N = \frac{8600 \times 1 \text{ floor}}{56 \text{ hours}}$$

$$N = 154 \text{ Total workers}$$

$$n = 200 \text{ estimated number of workers}$$

$$H = 3 \text{ number of groups needed}$$

$$A = 200 \text{ number of workers} \times 3$$

$$A = 600$$

$$R = \frac{600 \times 56}{8600}$$

$$R = 3.91 \text{ the actual mean of the working group used}$$

$$t = \frac{8600}{200 \times 8 \text{ jam}}$$

$$t = 344 \text{ working time of 1 unit (hours)}$$

$$T = \frac{344}{3.91 \times 30 \text{ day}}$$

$$T = 88.05$$

2641.43 The time needed to start work on the last unit The duration of 1 unit (hours) of work will be changed to weeks 344 time for the type of work 1 unit (hours): 8 hours per day = 43 days = 6 weeks

Table 5 schedule Line of Balance (LoB)

No	list Work	Duration 1 Floor (Sunday)	Duration 4 Floor (Sunday)	Calculation	Start	Calculation	Finish
1	Work Upper Structure	6	24	0	0	24 + 0	24
2	Steel Works	6	24	6 + 0	6	24 + 6	30
3	profession wall and wall cladding	3	12	33 - 12	21	30 + 3	33
4	profession floor finishing	3	12	21 + 3	24	12 + 24	36
5	Work ceiling	3	12	24 + 3	27	12 + 27	39
6	pint job. windows and keys	3	12	27 + 3	30	12 + 30	42
7	profession sanitary	3	12	30 + 3	33	12 + 33	45
8	profession railling and etc	3	12	33 + 3	36	12 + 36	48
9	Work Facade	4	16	36 + 4	40	16 + 40	56

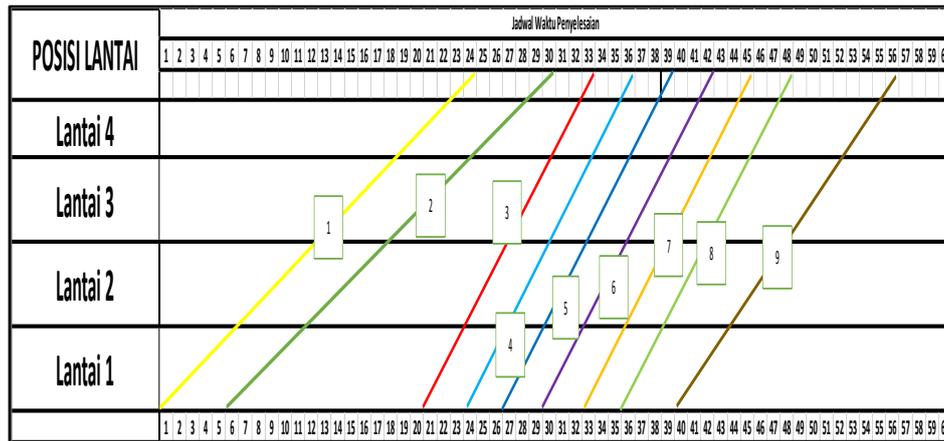


Image 4 Diagram Line of Balance and Position of The Park Kendari Project Scheduling Floor

V. CONCLUSIONS

5.1 Conclusion

1. Line of Balance method (LoB) Is a project scheduling method that is suitable to be applied to construction projects with work packages repetitive/repeated because of the method Line of Balance (LoB) able to display well the work package schedule repetitive/repeated for each unit in the form of a line chart that is easier to understand so that it can show errors that occur in the progress of work and can estimate possible disturbances.
2. Scheduling results with the method Line of Balance obtained a duration of 56 weeks, which is 2 weeks faster than the initial scheduling with the S Curve method which is 58 weeks.

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