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# ANALYSIS OF PROJECT MANAGEMENT TRANSMART CARREFOUR IN TEGAL CITY - CENTRAL JAVA

**Septi Dwi N.I.S*, Saihul Anwar****

*) Student of Civil Engineering Major, Faculty of Engineering, University of Swadaya Gunung Jati Cirebon
**) Lecturer of Civil Engineering Major, Faculty of Engineering, University of Swadaya Gunung Jati Cirebon

Email : ssepti.sari9@gmail.com

## ABSTRACT

Project implementation is said to be optimal if good project management planning so that it can be done efficiently, qualified, safe, and economical. To produce an optimal project management is required with certain methods adjusted by the project. The purpose of this study is to determine the scheduling of project time to be done by using CPM network method (Critical Path Method) which will result in the length of time of completion of the project and determine the start and end time in each work. The first step is to conduct a field survey, collecting project data such as time schedule, and basic theory. After the data collection is considered enough, then the data is determined again with the method of CPM (Critical Path Method), followed by determining how much the cost to be incurred, and then made barchart and curve S. From the research results obtained, for project implementation can be completed with time work plan 282 days or 47 weeks. But with that time there are some critical work that will affect the duration, so special attention is required on the work. And costs incurred as much as Rp 223,363,901,783.98.

***Keywords** : CPM (Critical Path Method), Duration of Work, Project Cost, Barchart, and Curve S*

# I. PRELIMINARY

## 1.1. Background

The progress of industrial activities in some aspects requires management that is required to have performance, the accuracy of economics, alignment, speed, accuracy, precision and high security to obtain the desired end result. One of the industrial activities is in the field of construction which is currently a national economic industry associated with land preparation and development, acceleration, improvement of buildings and structures, and other properties. Therefore, the construction industry is the most developed industry.

To smooth the running of a construction industry project management required that will manage the project from beginning to end of the project. The field of project management grows and evolves because of the need in the modern industrial world to coordinate and control various activities.

A project can be said to be good if the completion of the project is efficient, in terms of time, cost, work efficiency, human, and tools. Resource requirements for each project activity vary, so that the possibility of excess resources and can affect the budget cost.

Planning of project activities is a very important issue because the planning of activities is the basis for the project can be implemented and completed with the time already planned. At the planning stage of the project, it is necessary to estimate the duration of project implementation time. The level of accuracy of project completion time estimation is determined by the level of accuracy of the estimated duration of each activity within the project. In addition to the accuracy of the estimated time, the relationship between the activities of a project is required for the planning of a project. By estimating the time and cost in a project optimization is required. Optimization is done to optimize existing resources and minimize risk, but still get optimal results.

## 1.2. Formulation of The Problem

1. How to analyze the calculation of the volume of work, labor, material, and equipment on the project of Transmart Carrefour Tegal City?
2. How are the time and cost performance of the Transmart Carrefour project in Tegal City?
3. What is the form of the network Transmart Carrefour development in Tegal City?

## 1.3. Research Purposes

1. Knowing and determining the volume value of each work ;
2. Knowing and determining the cost results for the Transmart Carrefour project development ;
3. Knowing how to analyze the unit price of labor, materials, and tools at the Transmart Carrefour project ;
4. Knowing the critical work that exists in the Transmart Carrefour project.

# II. BASIC THEORY

## 2.1. Definition of Project Management

Project management is all planning, implementation, control, and coordination of a project from the beginning to the end of the project by using existing resources effectively and efficiently to achieve optimal project objectives.

## 2.2. Project Scheduling

Project scheduling is one of the outcomes of planning that can provide information about project schedules and progress in terms of resource performance in terms of cost, labor, equipment, and materials, as well as project duration and progress of time to complete the project. For the process of scheduling, the preparation of activities and relationships between activities is made in detail and detail that aims to assist the implementation of the project. There are several methods used to manage the time and resources used in the project :

### a. Barchart Method

Barchart found by Gantt and Fedrick W. Taylor in the form of block chart, with the length of the beam as a description of the timing of the implementation of each activity. The block chart format is informative, easy to read and effective as a communication, as well as an easy and simple creation process. The barchart consists of the y axis representing the activity or work package of the project scope, whereas the x axis denotes the unit of time of day, week, or month as the duration.

**b. Method S-Curve or Hanumm Curve**

S-curve can show the progress of project based on activity, time and work weight as a cumulative percentage of all project activities. To determine the value of the weight of work, the approach can be a percentage calculation based on the cost per item of work/activity divided by the budget, because the unit cost can be used as a percentage form so it is easier to calculate it.

**c. Critical Path Method**

In the network method known as the critical path, the path that has a series of components of activity with the longest total time and shows the fastest project completion time. Thus, the critical path consists of a series of critical activities, starting from the first activity to the final project activity (Soeharto, 1995).

A critical pathway is important for project implementation because on this path lies the activities whose execution must be timely and completed on time. If there is any delay, then cause the project delay.

The benefits of CPM (critical path method) for a project are :

- Provide a graphical display of a project's workflow ;
- Predict the time required to complete a project ;
- Determine the flow of activities that are of particular concern in maintaining the project completion schedule ;
- Completed the project quickly ;

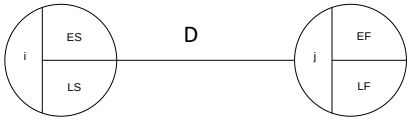
The symbols used in describing a network are as follows (Hayun, 2005) :

- ⟶ (Arrow/bow), represents an activity or activity that is the task required by the project. The arrowhead shows the direction each activity starts at the beginning and runs forward to the end from the left to the right. The length and the slope of the arrows do not have any meaning at all, so there is no need to use the scale.
- ◯ (Small circle/node), represents an event or event or event. Events (events) are defined as ends or meetings of one or more activities.
- - - - - - ➝ (Arrow with dashed lines), Dummy here is useful for limiting the start of activities as well as the usual activities, long and dummy slant does not mean anything so it does not need to scale. The difference with the usual activity is that dummy activities do not take time and resources, so the time of magic and cost is equal to zero.
- ⟶ (Thick arrow), is an activity on the critical path.

In the use of the above symbols must follow the rules, as follows (Hayun, 2005) :

a. Between two events (events) the same can only be described one arrow ;
b. The name of an activity is expressed by letter or by event number ;
c. Activity must flow from a low-numbered event to a high-numbered event ;
d. The diagram only has one of the fastest commencement events (initial event) and the fastest event completion (terminal event).

Here is an example of AOA network drawings with ES, LS, EF, and LF placements :




**Picture 1** ES, LS, EF, LF

EF = Es + D
LS = LF – D

- Early Start (*ES*) : the earliest time an activity can start after the previous activity is completed. When the activity time is declared or takes place in hour,

then this time is the earliest hour of activity started.

- Late Start (*LS*) : time latest an activity can be completed without delaying the completion of the project schedule.
- Early Finish (*EF*) : the earliest time of an activity can be completed if it begins at the earliest time of an activity and is completed according to its duration. If there is only one previous activity, then the EF of an earlier activity is the ES of the next activity.
- Late Finish (*LF*) : the last time an activity can start without slowing the completion of the project.

### 2.3. Project Control

The control process is implemented throughout the project implementation to achieve good results at every stage of the activity. Planning is made as a reference in the project concerned, including technical specifications, schedule, and budget. If the results of the control are not in accordance with the planning, it must be made follow-up steps for the implementation can be in accordance with the already planned.

Project control carried out in general can be grouped as follows :

1. Quality Control ;
2. Time Control ;
3. Cost Control.

### 2.4. Cost Budget Plan

The cost budget plan is the calculation of the forecast of the many costs required for materials, wages, and other costs associated with project implementation based on drawings and work specifications. A budget plan is required as a guideline for the implementation process of development to be carried out effectively and efficiently. Stages of the calculation of the budget plan :

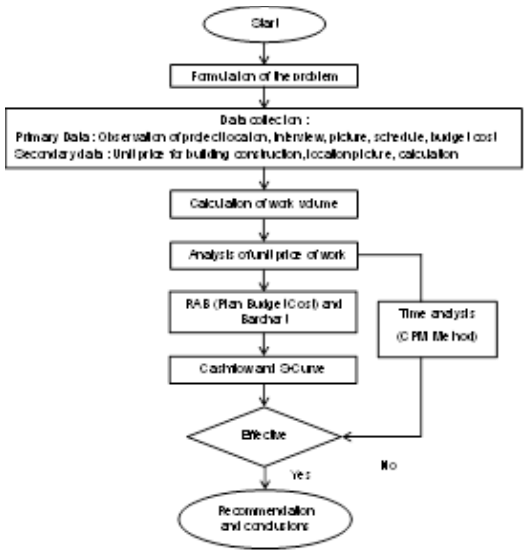
1. Stages of Cost Estimation ;
2. Stages of Calculation Budget Cost.

## III. RESEARCH METHOD

### 3.1. Location Project


**Picture 2.** Location Planning

### 3.1. Flow Of Research




**Picture 3.** Flow of Research

## IV. RESULTS OF RESEARCH

### 4.1. Description of Works

a. Preparation Works

1) The planning structure, the architect, MEP ( *Mechanical, Electrical, and Plumbing )* ;
2) Cleaning and masturation of land.

b. Land Works

1) Excavation work on soil pile cap, tie beam, and lower ground ;
2) Work hoard sand under pile cap, tie beam, and ground floor ;
3) Work hoard land on the ground floor ;
4) Compaction work.

c. Foundation works

1) Pile foundation construction work size 40x40 cm (170 point) ;
2) Works of pile cap ;
3) Works of tie beam.

d. Works of concrete reinforced

1) Work of column ;
2) Beam work ;
3) Floor plate work ;
4) Work of plate and ladder ;
5) Work of elevator structure that has a wall thickness plate 25 cm.

e. Architectural work ;

1) Wall work, plastering, and neat plastering ;
2) Granite work ;
3) Ceramic tile work ;
4) Work of partition, aluminum frame, and door / window glass ;
5) Painting work ;
6) Railling stairs work.

f. Works of mechanical and plumbing

1) Installation electrical work ;
2) Installation water work.

## 4.2. Calculation Volume of Work

Volume of work is to calculate the amount of volume of work in one unit. The volume of work is calculated based on the image of the building to be created. All parts of construction contained in the drawings should be calculated in a complete and thorough to get the calculation of the volume of work accurately and completely.

| NO | JOB DESCRIPTION | FORMULA | FORMULA | | | | | VOLUME OF JOB | |
|---|---|---|---|---|---|---|---|---|---|
| | | | L | W | H | Σ | @ | TOTAL | UNIT |
| I | PREPARATORY WORKS | | | | | | | | |
| 1 | Cleaning or maturation of soil | LxW | 184.00 | 69.29 | | | | 12749.36 | m² |
| 2 | Measurement and installation of bowplank | P | 506.58 | | | | | 506.58 | m' |
| | Sub Total I | | | | | | | | |
| II | PILING WORKS | | | | | | | | |
| 1 | Pile size 40x40 cm, section 15 + 15 m (GF) | ExT | | | 30.00 | | 709.00 | 21270.00 | m' |
| 2 | Pile size 40x40 cm, section 15 + 15 m (LG) | ExT | | | 30.00 | | 301.00 | 9030.00 | m' |
| 3 | Pile connection plate (GF) | E | | | | | 709.00 | 709.00 | set |
| 4 | Pile connection plate (LG) | E | | | | | 301.00 | 301.00 | set |
| 5 | Cuting head of pile (GF) | E | | | | | 709.00 | 709.00 | titik |
| 6 | Pile cuting head (LG) | E | | | | | 301.00 | 301.00 | titik |
| | Sub Total II | | | | | | | | |
| III | EXCAVATION & FILLING WORKS | | | | | | | | |
| 1 | Bringing fill soil for peil floor elevation | ExH | | | 1.50 | 5500.00 | | 8250.00 | m³ |
| 2 | Excavation for the pile cap (GF) | | | | | | | | |
| | PC1 | Ex@ | 1.20 | 1.20 | 0.90 | 1.30 | 5.00 | 6.48 | m³ |
| | PC5 | Ex@ | 3.30 | 2.10 | 1.35 | 9.36 | 17.00 | 159.04 | m³ |
| | PC6 | Ex@ | 3.30 | 2.10 | 1.35 | 9.36 | 57.00 | 533.26 | m³ |
| | PC8 | Ex@ | 4.50 | 2.10 | 1.35 | 12.76 | 28.00 | 357.21 | m³ |
| | PC8 (Modifcatiin) | Ex@ | | | | 11.85 | 1.00 | 11.85 | m³ |
| | PC9 | Ex@ | 3.40 | 3.40 | 1.35 | 15.61 | 5.00 | 78.03 | m³ |
| 3 | Excavation for the pile cap (LG) | | | | | | | | |
| | PC2 | Ex@ | 2.10 | 1.20 | 0.90 | 2.27 | 18.00 | 40.82 | m³ |
| | PC3 | Ex@ | | | | 2.83 | 8.00 | 22.60 | m³ |
| | PC4 | Ex@ | 2.10 | 2.10 | 1.35 | 5.95 | 36.00 | 214.33 | m³ |
| | PC5 | Ex@ | 3.30 | 2.10 | 1.35 | 9.36 | 7.00 | 65.49 | m³ |
| | PC6 | Ex@ | 3.30 | 2.10 | 1.35 | 9.36 | 6.00 | 56.13 | m³ |
| | PC8 | Ex@ | 4.50 | 2.10 | 1.35 | 12.76 | 1.00 | 12.76 | m³ |
| | PC9 | Ex@ | 3.40 | 3.40 | 1.00 | 11.56 | 2.00 | 23.12 | m³ |
| 4 | Excavation for the tie beam (GF) | | | | | | | | |
| | TB | Ex@ | 0.55 | 0.75 | 8.00 | 3.30 | 127.00 | 419.10 | m³ |
| | TB1 | Ex@ | 0.90 | 0.90 | 8.50 | 6.89 | 20.00 | 137.70 | m³ |
| | TBP | Ex@ | 0.40 | 0.65 | 8.00 | 2.08 | 45.00 | 93.60 | m³ |
| 5 | Excavation for the sloof (LG) | | | | | | | | |
| | TBP | Ex@ | 0.40 | 0.65 | 8.00 | 2.08 | 141.00 | 293.28 | m³ |

**Table 1.** Example Table Of Volume Calculation

## 4.3. Analysis of Unit Price and Duration

Analysis of unit price have two stage namely calculation of need and calculation of unit price. The calculation of needs aims to find the total amount to be used in the project according to the volume of work. To find the total value of need should know the value of the coefficient of each work. Coefficient value in this research is obtained from **"Lampiran Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat, Nomor 28/PRT/M/2016, Tentang Analisis Harga Satuan Pekerjaan Bidang Pekerjaan Umum"** and calculation. Calculation of need include labor, materials, and heavy equipment.

$$Need = Volume \times Coefficient$$

Calculation of unit price is the calculation need cost of labor, materials, and equipment to get the unit price or one particular work type.

$$Unit\ price = Need \times Price$$

After calculating the unit price of every need of labor, materials, and tools, it can determine a budget plan is needed to complete the project. Below is a table with details of budget :

**THE SUMMARY OF BADGET PLAN**
**Project Transmart Carrefour Tegal**
**Jalan Kolonel Sugiono No.82, Tegal City, Central Java**

| NO | JOB DESCRIPTION | LABOR | MATERIAL | EQUIPMENT |
|---|---|---|---|---|
| I | PREPARATORY WORKS | 155,457,391.20 | 61,447,668.80 | - |
| II | PILING WORKS | 183,586,604.82 | 2,686,600,000.00 | 56,455,275.65 |
| III | EXCAVATION & FILLING WORKS | 609,220,699.02 | - | 4,120,918,928.30 |
| IV | FOUNDATION WORKS | 1,525,894,974.76 | 21,820,808,686.01 | 869,034,826.96 |
| V | STP & GWT, PIT ESCALATOR, PIT TRAVELATOR, SEWAGE PIT & LUMP PIT | 207,623,777.35 | 1,221,769,179.77 | 24,706,392.74 |
| VI | STRUCTURAL WORKS | | | |
| 1 | Ground Floor | 1,363,152,511.26 | 7,039,465,293.88 | 323,528,156.83 |
| 2 | Lower Ground | 502,240,694.38 | 2,641,245,792.12 | 194,276,405.11 |
| 3 | Mezzanine | 882,501,938.18 | 3,919,561,385.99 | 110,727,419.18 |
| 4 | 1st floor | 1,083,465,208.54 | 4,958,447,179.94 | 199,617,110.88 |
| 5 | 1st floor (parking area) | 458,083,002.49 | 2,429,637,589.67 | 78,896,710.52 |
| 6 | 2nd floor | 934,034,071.26 | 4,497,959,915.52 | 181,640,833.38 |
| 7 | 3rd floor | 588,315,283.60 | 4,610,626,544.55 | 185,835,032.61 |
| 8 | Chiller room and ring beam | 126,111,577.79 | 563,659,769.50 | 17,997,436.25 |
| 9 | Roof and ring beam | 464,058,003.90 | 2,060,203,076.31 | 65,564,222.50 |
| 10 | Power house | 110,720,425.41 | 491,202,167.45 | 15,922,671.25 |
| 11 | Roof cover work and structural steelwork | | | |
| A | Canopy front | 178,850,069.59 | 1,309,695,748.06 | 203,156,808.67 |
| B | Steel roof | 251,280,000.00 | 1,932,000,000.00 | 300,006,000.00 |
| C | Upper deck (motor parking) | 29,870,910.00 | 229,666,500.00 | 35,663,213.25 |
| VII | ARCHITECTURE WORKS | | | |
| 1 | Mansory works | 2,463,748,503.09 | 982,448,906.94 | - |
| 2 | Waterproofing works | 477,480,449.70 | 724,716,783.49 | - |
| 3 | Tile and granite works | 609,850.80 | 12,209,322,599.80 | - |
| 4 | Metal work | 64,079,632.68 | 26,485,819,916.83 | - |
| 5 | Plastering works | 770,857,122.10 | 422,235,825.06 | - |
| 6 | Doors and windows (w/o shutter) | 23,512,010.00 | 9,991,097,156.07 | - |
| 7 | Glass works/facade | 37,279,661.19 | 170,717,097.63 | - |
| 8 | Painting works | 473,844,752.30 | 217,422,132.25 | - |
| 9 | Ceiling and partition | 107,791,502.40 | 229,063,436.06 | - |
| 10 | Toilet & sanitary equipment | 24,320,398.00 | 425,718,444.00 | - |
| 11 | Ceramic tile installation | 352,385,875.67 | 8,438,802,300.20 | - |
| 12 | Floor hardener & epoxy | 338,615,086.20 | 3,454,894,819.00 | - |
| 13 | Rolling doors | 1,840,860.00 | 2,925,000.00 | - |
| VIII | MECHANICAL , ELECTRICAL, PLUMBING WORKS | | | |
| 1 | Heating, Ventilation, Air-Conditioning works (HVAC works) | 208,724,950.00 | 9,333,103,908.97 | - |
| 2 | Plumbing works | 101,104,707.95 | 4,243,629,129.84 | - |
| 3 | Electrical works | 793,008,992.00 | 44,114,527,378.58 | - |
| 4 | Vertical transportation | 8,760,000.00 | 8,230,081,575.84 | - |
| 5 | Generator | 124,384,778.00 | 8,202,615,156.14 | - |
| | | | | |
| | SUB TOTAL | 16,026,816,275.62 | 200,353,138,064.28 | 6,983,947,444.08 |
| | TOTAL | | | **223,363,901,783.98** |

**Table 2.** Table Summary Of Badget Plan

Duration is the most important part and the main plan for achieving project success. The effect of duration on the project is on income on the project itself. To get the right duration, keep in mind some things that are the number of works to be performed, worker productivity, and the duration of the work. The duration used in this research was obtained from the interviews of the responsible parties at the project site and the assumptions. Here is the duration of the work :

| NO | JOB DESCRIPTION | DURATION |
|---|---|---|
| I | PREPARATORY WORKS | 1 |
| II | PILING WORKS | 6 |
| III | EXCAVATION & FILLING WORKS | 4 |
| IV | FOUNDATION WORKS | 5 |
| V | STP & GWT, PIT ESCALATOR, PIT TRAVELATOR, SEWAGE PIT | 2 |
| VI | STRUCTURAL WORKS | |
| 1 | Ground Floor | 8 |
| 2 | Lower Ground | 5 |
| 3 | Mezzanine | 3 |
| 4 | 1st floor | 5 |
| 5 | 1st floor (parking area) | 2 |
| 6 | 2nd floor | 5 |
| 7 | 3rd floor | 5 |
| 8 | Chiller room and ring beam | 1 |
| 9 | Roof and ring beam | 1 |
| 10 | Power house | 1 |
| 11 | Roof cover work and structural steelwork | |
| A | Canopy front | 2 |
| B | Steel roof | 4 |
| C | Upper deck (motor parking) | 1 |
| VII | ARCHITECTURE WORKS | |
| 1 | Mansory works | 5 |
| 2 | Waterproofing works | 2 |
| 3 | Tile and granite works | 1 |
| 4 | Metal work | 1 |
| 5 | Plastering works | 5 |
| 6 | Doors and windows (w/o shutter) | 1 |
| 7 | Glass works/facade | 1 |
| 8 | Painting works | 1 |
| 9 | Ceiling and partition | 1 |
| 10 | Toilet & sanitary equipment | 1 |
| 11 | Ceramic tile installation | 3 |
| 12 | Floor hardener & epoxy | 2 |
| 13 | Rolling doors | 1 |
| VIII | MECHANICAL , ELECTRICAL, PLUMBING WORKS | |
| 1 | Heating, Ventilation, Air-Conditioning works (HVAC works) | 2 |
| 2 | Plumbing works | 4 |
| 3 | Electrical works | 4 |
| 4 | Vertical transportation | 1 |
| 5 | Generator | 1 |

**Table 3.** Table Of Duration

### 4.4. Cashflow

Cashflow is a financial report to calculate the amount of money to be spent during the project. Cashflow is calculated for per week and per month.

$$Cashflow = Progress \times Total\ badget\ Plan$$

### 4.5. Critical Path Method ( CPM )

The use of this method aims to find complex project completion times and find critical activity, linking dependencies between components of one activity with others activity using signs. The steps to create a Critical Path Method are :

1. Make a list of works ;
2. Estimated duration for each works ;
3. Analysis of duration using CPM (EF, LS, and Float Time) ;
4. Picture network planning.

### 4.6. Forward Calculation

Forward calculation is a step forward to calculate the earliest completed time of an activity (EF / Earliest Finish time). By EF = ES + D. Where EF (Earliest Finish time) is the earliest completed Time of an activity, ES (Earliest Start time) is the earliest start time of an activity, and D (Duration) is the period of an activity.

### 4.7. Backward Calculation

Backward calculation is a step back to determine the last time the activity can start (LS / Latest Start time). By LS = LF - D. Where LS (Latest Start time) is the last time the activity can start, LF (Latest Finish Time) is The last time the activity may be completed, And D (Duration) is the period of activity.

### 4.8. Float Time

Float time is obtained from the formula :

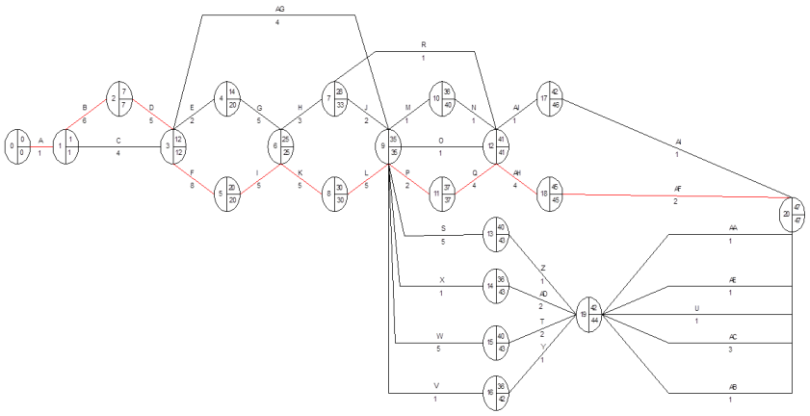
FF = EETj – Duration – EETi
TF = LETj – Duration – EETi

### 4.9. Critical Path

The critical path is the path that has the result of the free float and total float equals zero.

| NO | JOB DESCRIPTION | CODE | EVENT | | DURATION | EVENT | | FREE FLOAT | TOTAL FLOAT |
|---|---|---|---|---|---|---|---|---|---|
| | | | EETi | LETi | | EETj | LETj | | |
| I | PREPARATORY WORKS | | | | | | | | |
| 1 | Measurement and installation of bowplank | A | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| II | PILING WORKS | B | 1 | 1 | 6 | 7 | 7 | 0 | 0 |
| III | EXCAVATION & FILLING WORKS | C | 1 | 1 | 4 | 12 | 12 | 7 | 7 |
| IV | FOUNDATION WORKS | D | 7 | 7 | 5 | 12 | 12 | 0 | 0 |
| V | STP & GWT, PIT ESCALATOR, PIT TRAVELATOR | E | 12 | 12 | 2 | 14 | 20 | 0 | 6 |
| | SEWAGE PIT & LUMP PIT | | | | | | | | |
| VI | STRUCTURAL WORKS | | | | | | | | |
| 1 | Ground Floor | F | 12 | 12 | 8 | 20 | 20 | 0 | 0 |
| 2 | Lower Ground | G | 14 | 20 | 5 | 25 | 25 | 6 | 6 |
| 3 | Mezzanine | H | 25 | 25 | 3 | 28 | 33 | 0 | 5 |
| 4 | 1st floor | I | 20 | 20 | 5 | 25 | 25 | 0 | 0 |
| 5 | 1st floor (parking area) | J | 28 | 33 | 2 | 35 | 35 | 5 | 5 |
| 6 | 2nd floor | K | 25 | 25 | 5 | 30 | 30 | 0 | 0 |
| 7 | 3rd floor | L | 30 | 30 | 5 | 35 | 35 | 0 | 0 |
| 8 | Chiller room and ring beam | M | 35 | 35 | 1 | 36 | 40 | 0 | 4 |
| 9 | Roof and ring beam | N | 36 | 40 | 1 | 41 | 41 | 4 | 4 |
| 10 | Power house | O | 35 | 35 | 1 | 41 | 41 | 5 | 5 |
| 11 | Roof cover work and structural steelwork | | | | | | | | |
| A | Canopy front | P | 35 | 35 | 2 | 37 | 37 | 0 | 0 |
| B | Steel roof | Q | 37 | 37 | 4 | 41 | 41 | 0 | 0 |
| C | Upper deck (motor parking) | R | 28 | 33 | 1 | 41 | 41 | 12 | 12 |
| VII | ARCHITECTURE WORKS | | | | | | | | |
| 1 | Mansory works | S | 35 | 35 | 5 | 40 | 43 | 0 | 3 |
| 2 | Waterproofing works | T | 40 | 43 | 2 | 42 | 44 | 0 | 2 |
| 3 | Tile and granite works | U | 42 | 44 | 1 | 47 | 47 | 4 | 4 |
| 4 | Metal work | V | 35 | 35 | 1 | 36 | 42 | 0 | 6 |
| 5 | Plastering works | W | 35 | 35 | 5 | 40 | 43 | 0 | 3 |
| 6 | Doors and windows (w/o shutter) | X | 35 | 35 | 1 | 40 | 43 | 4 | 7 |
| 7 | Glass works/facade | Y | 36 | 42 | 1 | 42 | 44 | 5 | 7 |
| 8 | Painting works | Z | 40 | 43 | 1 | 42 | 44 | 1 | 3 |
| 9 | Ceiling and partition | AA | 42 | 44 | 1 | 47 | 47 | 4 | 4 |
| 10 | Toilet & sanitary equipment | AB | 42 | 44 | 1 | 47 | 47 | 4 | 4 |
| 11 | Ceramic tile installation | AC | 42 | 44 | 3 | 47 | 47 | 2 | 2 |
| 12 | Floor hardener & epoxy | AD | 36 | 43 | 2 | 42 | 44 | 4 | 6 |
| 13 | Rolling doors | AE | 42 | 44 | 1 | 47 | 47 | 4 | 4 |
| VIII | MECHANICAL , ELECTRICAL, PLUMBING WORKS | | | | | | | | |
| 1 | Heating, Ventilation, Air-Conditioning works (HVAC w | AF | 45 | 45 | 2 | 47 | 47 | 0 | 0 |
| 2 | Plumbing works | AG | 12 | 12 | 4 | 35 | 35 | 19 | 19 |
| 3 | Electrical works | AH | 41 | 41 | 4 | 45 | 45 | 0 | 0 |
| 4 | Vertical transportation | AI | 42 | 46 | 1 | 47 | 47 | 4 | 4 |
| 5 | Generator | AJ | 41 | 41 | 1 | 42 | 46 | 0 | 4 |

**Table 4.** Time Chart of Project Implementation



**Picture 4.** Network Development Project

## V. CLOSE

### 5.1. Conclusion

The conclusions of the research results are as follows:

1. Basically, a project must have good management so as to produce economic development, efficient, and good quality. To get it required certain methods tailored to the project.
2. Analysis of unit price for research using the coefficient of analysis obtained from **"Lampiran Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat, Nomor 28/PRT/M/2016, Tentang Analisis Harga Satuan Pekerjaan Bidang Pekerjaan Umum"** and calculation which is adjusted with job name, necessary, and requirement. From the price analysis for the part of the Transmart Carrefour development project structure, it costs Rp 223,363,901,783.98.
3. From the analysis of the unit cost of construction work of Transmart Carrefour project resulted the work plan time is 282 days or 47 weeks.
4. To analyze the time using the CPM method (Critical parh Method) which aims to know the work that is critical, measurement and installation of bouwplank, piling works, tie beam & pile cap works, groud floor, 1st floor, 2nd floor, 3rd floor, canopy front, steel roof, Heating, Ventilation, Air-Conditioning works (HVAC works), and Electrical works.

### 5.2. Recommendation

1. Basically for project management planning needed a work experience and see the conditions in the project, such as weather, distance, and facilities and infrastructure.
2. To determine the unit price required an evaluation of prices adjusted with government and private, the unit price includes the price of workers, materials, and equipment rental.
3. Necessary identification of issues that are possible will occur in the project, aiming to prevent any delay in time and cost.
4. For critical work required a full attention because it can affect the duration of the project.

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