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# Economic Feasibility Analysis Based on Optimal Cash Flow Planning on the A. Road Construction Project

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***Cash Flow; Float Time; NPV; BCR; ROI***

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***Abstract***
*Capital resources play an important role in a project. The optimization of working capital effectively and efficiently can have a major effect on achieving the maximum profit value for the contractor. Therefore, controlling cash flow is very important. One alternative that can be used to obtain maximum profit is the right scheduling. This study aims to plan scheduling optimally using the Ms.Poject ap`plication by utilizing float time. Where the utilization of float time uses a scheme with 25% down payment and without down payment. The float time variations used are 0%, 50% and 100%. An economic feasibility analysis was conducted to review the NPV, BCR, and ROI values. From the analysis results, the greatest profitability was obtained in the alternative without a down payment using 100% float. With an NPV value of Rp16,164,849,630, BCR value of 1.0651, and ROI value of 6.51%. It can be concluded that this alternative has maximum profitability.*

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## 1. Introduction

Projects are planned and carried out using resources to achieve predetermined goals and objectives. One resource that plays an important role in a project is capital resources (Sulistyantoro et al., 2017). Capital is a financial resource provided by the owner to the implementing contractor. The optimization of working capital effectively and efficiently can have a major effect on achieving the maximum profit value for the implementing contractor. Therefore, controlling cash flow is very important (Pradnyawati et al., 2020).

Maximum profit is the main goal for every contractor. One alternative that can be used to obtain maximum profit is proper scheduling. In terms of scheduling, there are critical conditions where there is no float and non-critical conditions where there can be a lot of float. With the float owned by each non-critical job, alternative planning for float utilization can be carried out to produce new scheduling with more optimal cash flow planning so that the alternative will get maximum profit (Sulistyantoro et al., 2017).

In terms of scheduling, there are critical conditions where there is Performance represents the efforts of each company to assess and measure every success in generating profits, allowing the company to observe growth, prospects, and potential developments. A company is considered successful if it meets predetermined standards and goals. (Yulinda et al., 2022). Cash flow optimization is reviewed based on economic feasibility analysis. The method used is Discounted Cash Flow (DCF). In making the decision, the final value of several indicators is used, namely NPV (Net Present Value), BCR (Benefit Cost Ratio), and ROI (Return on Investment) (Khairinisa et al., 2020). From the economic feasibility analysis, it will be concluded that maximum profit can be obtained with the right type of scheduling.

The process of compiling a list of jobs to achieve a certain goal or purpose is called scheduling. It also contains information related to the start time and duration of work implementation. In order for a project to run smoothly, there needs to be scheduling. When preparing project scheduling, the relationship between jobs is very much taken into account so that a project can run coherently (Sugiyanto, 2020).

In this research, scheduling using the Ms. Project application needs to be done. The total float for each job will be obtained by planning using the Precedence Diagramming Method (PDM). PDM is one part of network planning. PDM has 4 logical relationships between jobs. There is also the concept of lag (day distance) to simplify the scheduling process (Widiasanti & Lenggogeni., 2013). Among them, finish to start (FS), start to finish (SF), start to start (SS), and finish to finish (FF). Then, float and critical path identification is carried out (Rani, 2016).

Cash flow is a plan for the flow of income (cash in) and expenses (cash out) during the project. With the cash flow, it is hoped that the overall project costs can be controlled so as not to disturb the project's cash balance (Sugiyanto, 2020). Cash flow diagrams are needed to make them easier to analyze.

In the project, there are also retentions and guarantees. The retention value on the project is 5% of the contract value. This 5% retention of payment is done so that the contractor can be responsible and complete the work as agreed. Moreover, if there is a discrepancy between the building and the plan, the contractor is obliged to repair it (Wirahman W et al., 2015). In a construction project, the owner will also ask the contractor to provide a guarantee as a requirement for fulfilling the agreement. Guarantees that must exist in the implementation of a construction project include a performance bond and a maintenance bond. These guarantees can be in the form of a bank guarantee (issued by the bank) or a surety bond (issued by the insurance company) (Siswanto & Sofjan, 2013).

Reviewing the economic aspects to determine whether a development or investment plan is feasible can be measured by several indicators. Each business can be given a feasible assessment by comparing the industry average or predetermined targets (Amrizal & Lisra, 2015). Indicators that are commonly used in analyzing the economic feasibility of development or investment are as follows:

Net Present Value (NPV) is an indicator obtained from estimating the difference between current and future costs and benefits. The NPV indicator is met if its final value is greater than zero. If the NPV value is positive, the project or industry is feasible to implement. But if the NPV value is negative, then the project is not feasible (Giatman, 2011)

The formula used in calculating NPV:

$$\text{NVP} = \sum_{t=1}^{t=n} \frac{(B_t - C_t)}{(1+i)^t} \quad (1)$$

Benefit Cost Ratio (BCR) is a comparison value between the equivalent value of benefits and costs at the same time. Some final decision results based on the BCR value are as follows (Zainuri, 2021):

If BCR ≥ 1, then the investment's benefits are greater than the costs incurred, making the investment plan feasible. If BCR ≤ 1, then the benefits of the investment are smaller than the costs incurred, so the investment plan can be said to be unfeasible and should not be continued.

The formula used in calculating BCR:

$$\text{BCR} = \text{PWOB} / \text{PWOC}$$

$$\text{BCR} = \sum_{t=1}^{t=n} \frac{B_t}{(1+i)^t} : \sum_{t=1}^{t=n} \frac{C_t}{(1+i)^t} \quad (2)$$

Return on Investment is a method used to assess, estimate and evaluate an investment based on net cash flow (Sakinah et al., 2021). ROI is a profitability ratio that measures a company's ability to generate profits with all investment funds in assets used for fish operations (Fadli, 2017).

$$\text{ROI} = \frac{Revenues\ after\ investment - Total\ cast\ invested}{Total\ Cash\ Invested} x100\% \quad (3)$$

**2. Research Methods**

The Jalan A project with a contract value of IDR 240,117,961,303 has a length of 7.431 kilometres starting from STA 6+550 - 13+891. This project has a work duration of 13 months (395 days). Starting on April 1, 2022 until April 30, 2023. The subject of this research is cash flow and scheduling in road construction projects. In this study, the required data is quantitative data, which can be calculated and described through numbers. There are 2 types of data were obtained in this study, namely primary and secondary. Primary data is obtained from direct observation in the field or by conducting interviews/questions and answers to the contractor. Meanwhile, secondary data is physical data processed by the contractor, such as the Cost Budget Plan or commonly called as RAB and S Curve.

In this study, several stages were carried out to obtain optimal cash flow in various conditions. Data processing and analysis are carried out in the following way:

1. Activity scheduling.
   Activity scheduling uses the Ms. Project application with the PDM (Precedence Diagramming Method) method. In this study, the total float on the project is used.

2. Cash flow planning.
   Cash flow planning is done by utilizing the float obtained. Where float will be used with a percentage of 0%, 50%, and 100%, from the use of the float, the total cost per week will be obtained.

3. Making a cash flow diagram.
   The cash flow diagram is made by analyzing the cash flow with a monthly payment system (monthly certificate), both without a down payment and with a 25% down payment.

4. Economic feasibility analysis
   Economic feasibility analysis with NPV (Net Present Value) > 0, BCR (Benefit Cost Ratio) > 1, and ROI (Return On Investment) indicators. If you meet these three indicators, a project can be said to be feasible or not, economical or not.

## 3. Results and Discussion

### Scheduling and Float Identification

The Ms. Project application analyzes the duration and relationship between jobs so that critical and non-critical activities will be identified. There will be no total float in critical activities so that the total float will be 0. But if the activity is not critical, it will appear how much total float.

Table 1. PDM and Total Float Analysis Results with Ms. Project Application

| No | Work Description | Duration | Predecessors | Total Float |
|---|---|---|---|---|
| 1 | **Bill No. 1: General** | **384** | | **0** |
| 2 | Mobilization | 384 | 98FS-7 days; 79FS-4 days; 93FS-7 days; 94FS-7 days; 95FS-7 days; 53FS-4 days; 54FS-4 days | **0** |
| 3 | Traffic Management and Safety | 55 | 4SS | 2 |
| 4 | Test Series | 3 | 4SS | 2 |
| 5 | Occupational Safety and Health | 384 | 4SS | 0 |
| 6 | Boring including SPT and Report | 70 | 4SS | 0 |
| 7 | Dutch CPT including Report | 39 | 4SS | 0 |
| 8 | Quality Management | 384 | 4SS | 0 |
| 9 | **Bill No. 2: Drainage** | **207** | | **0** |
| 10 | Excavation for Drainage Ditches and Waterways | 192 | 26FS+14 days | 0 |
| 11 | Mortared Stonework | 32 | 30FS-24 days | 0 |
| 12 | Porous Drainage or Filter Material | 7 | 31; 46FS+8 days; 47FS+8 | 0 |
| 13 | Perforated or porous Pipe for Subsurface Drainage Works, D 6 inch | 7 | 31; 46FS+8 days; 47FS+8 days | 0 |
| 14 | **Bill No. 3: Earthworks and Geosynthetics** | **298** | | **0** |
| 15 | Common Excavation | 232 | 42SS+15 days; 27SS+15 days; 26SS+15 days; 4FS-13 | 0 |
| 16 | Soft Rock Excavation | 247 | 35SS+14 days | 0 |
| 17 | Rock Excavation | 233 | 36SS+25 days | 0 |
| 18 | Structural Excavation 0 - 2 m depth | 7 | 37SS+44 days | 0 |
| 19 | Common Embankment from Excavation | 182 | 35SS+13 days; 36SS-1 day; 37SS-28 days | 0 |
| 20 | Selected Embankment from Borrow Pit | 14 | 41 | 0 |
| 21 | Grade Preparation | 109 | 39FS-35 days | 0 |
| 22 | Clearing and Grubbing | 70 | | 0 |
| 23 | Selected Tree Removal Diameter 15 - 30 cm, 75 cm, >75 cm | 7 | 35SS+63 days | 0 |
| 24 | Geotextile for Separator, Class 2&3 | 7 | 31FS-15 days; 30FS-7 days | 0 |
| 25 | **Bill No. 5: Granular Pavement and Cement Concrete Pavement** | **88** | | **0** |
| 26 | Aggregate Base Class A | 88 | 41SS+35 days | 0 |
| 27 | **Bill No. 6: Asphalt Pavement** | **90** | | **0** |
| 28 | Prime Coat – Cut Back/Emulsion | 39 | 49FS-14 days; 40SS; 32SS; 33SS; 61 | 0 |
| 29 | Tack Coat – Cut Back/Emulsion | 63 | 56SS+2 days | 0 |

| No | Work Description | Duration | Predecessors | Total Float |
|---|---|---|---|---|
| 30 | Double Surface Dressing Aggregate | 58 | 56SS+25 days | 0 |
| 31 | Bitumnious Material for Surface Dressing | 58 | 56SS+25 days | 0 |
| 32 | Asphaltic Concrete - Wearing Course | 63 | 52SS+7 days | 0 |
| 33 | Asphaltic Concrete - Binder Course | 42 | 51SS+7 days | 0 |
| 34 | Anti Stripping Agent | 62 | 55SS+3 days | 0 |
| 35 | **Bill No. 7: Structure** | **262** | | **0** |
| 36 | Structural Concrete Class Fc' 30 MPa for Bridge Deck | 45 | 66SS; 60FS+7 days; 63FS+28 days; 64FS+28 days; 65FS+28 days; 67FS+7 days | 0 |
| 37 | Structure Concrete Fc' 30 MPA | 123 | 62SS+14 days; 75SS+4 days; 32FF; 33FF | 0 |
| 38 | Structural Concrete Fc' 20 MPa | 46 | 73FF | 0 |
| 39 | Concrete Fc' 10 Mpa | 49 | 74FS-35 days | 0 |
| 40 | PC-I Girder span 16 m, furnished | 18 | 69 | 0 |
| 41 | PC-I Girder span 20&40 m, furnished | 18 | 63SS | 0 |
| 42 | PC-I Girder span 15 m, erection | 7 | 60FS+7 days; 67FS+7 days | 0 |
| 43 | PC-I Girder span 20 m, erection | 7 | 68SS+7 days | 0 |
| 44 | PC-I Girder span 40 m, erection | 14 | 65FS+7 days | 0 |
| 45 | Precast Full Depth Panel, furnished | 7 | 61SS+7 days | 0 |
| 46 | Precast Full Depth Panel, erection | 14 | 59SS | 0 |
| 47 | Reinforcing Steel Plain Bars BjTP 280 | 116 | 62SS+14 days | 0 |
| 48 | Reinforcing Steel Deformed Bars BjTS 280, 420B | 116 | 71SS | 0 |
| 49 | Cast in Place Concrete Pile, 800 mm diameter | 77 | 38FS+7 days; 43FS+27 days; 44FS+27 days; 45FS+27 days | 0 |
| 50 | Sonic Crosshole Logging (CSL) Test on Cast in Place Pile, 800 mm | 14 | 74FS-29 days | 4 |
| 51 | Stone Masonry | 21 | 73FS-21 days | 0 |
| 52 | Non-grouted Rip Rap | 21 | 76SS | 0 |
| 53 | Gabion with Galvanished Wire Mesh | 21 | 77SS | 0 |
| 54 | Expansion Joint Seal Rubber Type 1 | 27 | 83; 70FS+32 days | 0 |
| 55 | Elastomeric Bearing Pad, Synthetic Laminated Rubber 350x280x60 mm | 7 | 78FS-7 days | 0 |
| 56 | Steel Bridge Railing Type 1 | 14 | 80FS+42 days; 66FS+21 | 0 |
| 57 | Bridge Name Plate | 13 | 81; 83SS+7 days | 9 |
| 58 | Deck Drain with accessories | 14 | 81FS-7 days | 0 |
| 59 | Steel Pipe for Drainage with Fitting and Support, 150 mm diameter | 14 | 83SS | 8 |
| 60 | PVC Pipe for Drainage with Fitting and Support, 200 mm diameter | 14 | 84; 82FS-7 days | 8 |
| 61 | **Bill No. 8: Reinstatement and Minor Works** | **58** | | **0** |

| No | Work Description | Duration | Predecessors | Total Float |
|---|---|---|---|---|
| 62 | Stabilization by Vegetation | 35 | 89SS+7 days | 10 |
| 63 | Stabilization by Vegetation of Vetiver System | 48 | 89SS+7 days;87SS | 10 |
| 64 | Trees (Sukun) | 58 | 70FS+7 days | 0 |
| 65 | Pavement Markings Thermoplastic Type | 14 | 88FS-14 days; 57FS-4 days; 85FS+1 day | 8 |
| 66 | Road Signs with Reflector of Engineering Grade, Single | 58 | 89SS | 0 |
| 67 | Guide Posts | 58 | 91SS; 57SS+16 days | 0 |
| 68 | Kilometre Posts | 27 | 92SS+31 days | 0 |
| 69 | Hectometer Posts | 58 | 92SS | 0 |
| 70 | Guard Rail | 58 | 97SS;96SS | 0 |
| 71 | Precast Portland Cement Concrete Curb Type 1 (Mountable) | 58 | 89SS | 0 |
| 72 | Block Paving on Side Walk | 58 | 89SS | 0 |
| 73 | Road Lighting, Single Arm, LED | 41 | 97SS+17 days | 0 |
| 74 | **Schedule of Daywork Rates: 1. Labour** | **384** | | **0** |
| 75 | Foreman, Labour, Skilled Labour | 384 | 4SS | 0 |
| 76 | **Schedule of Daywork Rates: 2. Materials** | **384** | | **0** |
| 77 | Gravel, Portland Cement | 384 | 4SS | 0 |
| 78 | **Schedule of Daywork Rates: 3. Contractor's Equipment** | **384** | | **0** |
| 79 | Dump Truck 3-4 M3 | 384 | 4SS | 0 |

Source: Processed by Researcher

**Identify Weights and Costs for Each Week**

In the secondary data obtained, namely the S Curve, each job has a weight. The original weight, 0% float, is then processed according to the amount of float on the job (see Table 1), with a percentage of 0%, 50%, and 100% float utilization. Each week's weight on the job will affect the costs incurred that week. When expenses are large, income must also be balanced. Therefore, determining weekly weights and costs will be decisive when conducting a cash flow analysis.

Contract value = Rp 240.117.961.303

RAB = Week Weight-1 (%) x contract value
= 0,252 x Rp 240.117.961.303
= Rp 603.931.387

RAP = RAB Week-1 – (10% x RAB Week-1)
= Rp 603.931.387 – (10% x Rp 603.931.387)
= Rp 543.538.249

Table 2. Identify Weights and Costs for Each Week (Cost Budget Plan (RAB) and Implementation Budget Plan (RAP))

| Week- | Float 0% | | Float 50% | | Float 100% | |
|---|---|---|---|---|---|---|
| | Weight (%) | RAP | Weight (%) | RAP | Weight (%) | RAP |
| 1 | 0,252 | Rp543.538.249 | 0,252 | Rp543.538.249 | 0,252 | Rp543.538.249 |
| 2 | 0,230 | Rp496.888.043 | 0,230 | Rp496.888.043 | 0,230 | Rp496.888.043 |
| 3 | 0,378 | Rp817.337.318 | 0,378 | Rp817.337.318 | 0,378 | Rp817.337.318 |
| 4 | 0,403 | Rp870.745.531 | 0,403 | Rp870.745.531 | 0,403 | Rp870.745.531 |
| 5 | 0,000 | Rp0 | 0,000 | Rp0 | 0,000 | Rp0 |
| 6 | 0,884 | Rp1.910.130.272 | 0,884 | Rp1.910.130.272 | 0,884 | Rp1.910.130.272 |
| 7 | 1,144 | Rp2.472.549.846 | 1,144 | Rp2.472.549.846 | 1,144 | Rp2.472.549.846 |

| Week- | Float 0% | | Float 50% | | Float 100% | |
|---|---|---|---|---|---|---|
| | Weight (%) | RAP | Weight (%) | RAP | Weight (%) | RAP |
| 8 | 1,142 | Rp2.467.718.240 | 1,142 | Rp2.467.718.240 | 1,142 | Rp2.467.718.240 |
| 9 | 1,213 | Rp2.621.216.124 | 1,213 | Rp2.621.216.124 | 1,213 | Rp2.621.216.124 |
| 10 | 1,639 | Rp3.542.203.426 | 1,639 | Rp3.542.203.426 | 1,639 | Rp3.542.203.426 |
| 11 | 1,639 | Rp3.542.203.426 | 1,639 | Rp3.542.203.426 | 1,639 | Rp3.542.203.426 |
| 12 | 1,603 | Rp3.463.186.805 | 1,603 | Rp3.463.186.805 | 1,603 | Rp3.463.186.805 |
| 13 | 1,606 | Rp3.469.751.121 | 1,606 | Rp3.469.751.121 | 1,606 | Rp3.469.751.121 |
| 14 | 1,600 | Rp3.457.910.869 | 1,600 | Rp3.457.910.869 | 1,600 | Rp3.457.910.869 |
| 15 | 1,596 | Rp3.450.017.368 | 1,596 | Rp3.450.017.368 | 1,596 | Rp3.450.017.368 |
| 16 | 1,599 | Rp3.454.857.102 | 1,599 | Rp3.454.857.102 | 1,599 | Rp3.454.857.102 |
| 17 | 1,597 | Rp3.450.823.990 | 1,597 | Rp3.450.823.990 | 1,597 | Rp3.450.823.990 |
| 18 | 1,797 | Rp3.884.109.735 | 1,797 | Rp3.884.109.735 | 1,797 | Rp3.884.109.735 |
| 19 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 |
| 20 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 |
| 21 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 |
| 22 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 |
| 23 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 | 1,831 | Rp3.956.458.462 |
| 24 | 1,868 | Rp4.036.449.291 | 1,868 | Rp4.036.449.291 | 1,868 | Rp4.036.449.291 |
| 25 | 1,862 | Rp4.023.620.752 | 1,858 | Rp4.015.545.068 | 1,854 | Rp4.007.469.383 |
| 26 | 2,565 | Rp5.543.876.693 | 2,565 | Rp5.543.876.693 | 2,565 | Rp5.543.876.693 |
| 27 | 2,681 | Rp5.793.760.153 | 2,685 | Rp5.801.835.838 | 2,688 | Rp5.809.911.523 |
| 28 | 2,683 | Rp5.797.888.881 | 2,683 | Rp5.797.888.881 | 2,683 | Rp5.797.888.881 |
| 29 | 2,478 | Rp5.354.203.775 | 2,478 | Rp5.354.203.775 | 2,478 | Rp5.354.203.775 |
| 30 | 2,438 | Rp5.269.064.727 | 2,438 | Rp5.269.064.727 | 2,438 | Rp5.269.064.727 |
| 31 | 2,423 | Rp5.235.724.104 | 2,423 | Rp5.235.724.104 | 2,423 | Rp5.235.724.104 |
| 32 | 2,703 | Rp5.840.768.696 | 2,703 | Rp5.840.768.696 | 2,703 | Rp5.840.768.696 |
| 33 | 2,750 | Rp5.942.535.590 | 2,750 | Rp5.942.535.590 | 2,750 | Rp5.942.535.590 |
| 34 | 2,750 | Rp5.942.535.590 | 2,750 | Rp5.942.535.590 | 2,750 | Rp5.942.535.590 |
| 35 | 2,684 | Rp5.800.065.965 | 2,684 | Rp5.800.065.965 | 2,684 | Rp5.800.065.965 |
| 36 | 2,719 | Rp5.876.428.856 | 2,719 | Rp5.876.428.856 | 2,719 | Rp5.876.428.856 |
| 37 | 2,817 | Rp6.088.068.891 | 2,817 | Rp6.088.068.891 | 2,817 | Rp6.088.068.891 |
| 38 | 3,408 | Rp7.364.633.070 | 3,408 | Rp7.364.633.070 | 3,408 | Rp7.364.633.070 |
| 39 | 2,577 | Rp5.568.381.301 | 2,577 | Rp5.568.381.301 | 2,577 | Rp5.568.381.301 |
| 40 | 3,077 | Rp6.649.326.579 | 3,077 | Rp6.649.326.579 | 3,077 | Rp6.649.326.579 |
| 41 | 2,912 | Rp6.293.767.934 | 2,912 | Rp6.293.767.934 | 2,912 | Rp6.293.767.934 |
| 42 | 2,297 | Rp4.963.708.976 | 2,297 | Rp4.963.708.976 | 2,297 | Rp4.963.708.976 |
| 43 | 1,698 | Rp3.668.852.462 | 1,698 | Rp3.668.852.462 | 1,698 | Rp3.668.852.462 |
| 44 | 1,732 | Rp3.743.669.145 | 1,732 | Rp3.743.669.145 | 1,732 | Rp3.743.669.145 |
| 45 | 1,728 | Rp3.733.415.508 | 1,728 | Rp3.733.415.508 | 1,728 | Rp3.733.415.508 |
| 46 | 1,672 | Rp3.613.541.913 | 1,672 | Rp3.613.541.913 | 1,672 | Rp3.613.541.913 |
| 47 | 1,676 | Rp3.621.439.257 | 1,676 | Rp3.621.439.257 | 1,676 | Rp3.621.439.257 |
| 48 | 1,988 | Rp4.295.996.742 | 1,988 | Rp4.295.996.742 | 1,988 | Rp4.295.996.742 |
| 49 | 2,127 | Rp4.597.562.701 | 2,001 | Rp4.324.104.342 | 1,976 | Rp4.269.412.670 |
| 50 | 1,418 | Rp3.064.750.290 | 1,418 | Rp3.064.750.290 | 1,317 | Rp2.845.983.602 |
| 51 | 1,357 | Rp2.933.103.473 | 1,357 | Rp2.932.117.588 | 1,357 | Rp2.932.117.588 |
| 52 | 1,388 | Rp2.999.904.115 | 1,388 | Rp2.999.904.115 | 1,388 | Rp2.999.411.172 |
| 53 | 1,389 | Rp3.001.349.703 | 1,389 | Rp3.002.335.588 | 1,389 | Rp3.002.499.902 |
| 54 | 1,115 | Rp2.409.414.410 | 1,078 | Rp2.329.029.830 | 1,066 | Rp2.303.782.080 |
| 55 | 1,020 | Rp2.204.055.897 | 1,020 | Rp2.204.055.897 | 0,995 | Rp2.149.247.694 |
| 56 | 0,431 | Rp931.348.946 | 0,595 | Rp1.285.191.886 | 0,647 | Rp1.398.230.678 |
| 57 | 0,095 | Rp205.471.008 | 0,095 | Rp205.471.008 | 0,207 | Rp446.275.156 |

Source: Processed by Researcher

**Cash Flow Identification with 25% Down Payment at Float 100% Utilization**

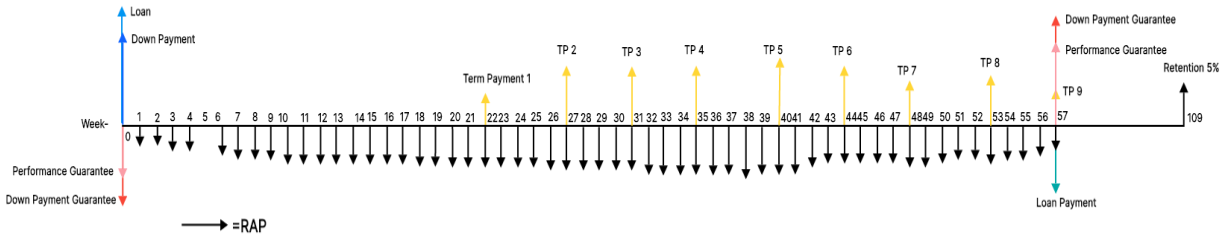


Figure 1. Cash Flow Diagram with 25% Down Payment

**Cash In**

Based on Figure 1, it can be analyzed that this project involves 6 types of cash: loans, down payments, terms payment, return of down payment guarantees, return of performance guarantees, and retention.

When a project is going to run, it needs capital. The capital in this project comes from bank loan funds. In the alternative with 25% down payment, the capital required is 40% of the contract value. The amount of capital value is seen from the cash flow that has been identified, where the capital must be able to make the company's cash, not minus.

A 5% retention (holding) will be charged at each term payment as a maintenance guarantee. The retention will be returned when the maintenance period is complete or during the FHO (Final Hand Over) period. Meanwhile, the performance and down payment guarantees will be returned after the project is completed or during the PHO (Provisional Hand Over) period.

Table 3. Cash In Recapitulation with 25% Down Payment at 100% Float Utilization

| Week- | Description | Cash In | | Total |
|---|---|---|---|---|
| | | Payment | Retention 5% | |
| 0 | Loan 40% contract value | Rp 96.047.184.521 | | Rp 156.076.674.847 |
| | 25% Down Payment | Rp 60.029.490.326 | | |
| 22 | Term Payment | Rp 1.953.357.287 | Rp 97.667.864 | Rp 1.855.689.423 |
| 27 | Term Payment | Rp 23.889.680.325 | Rp 1.194.484.016 | Rp 22.695.196.309 |
| 31 | Term Payment | Rp 24.701.187.672 | Rp 1.235.059.384 | Rp 23.466.128.289 |
| 35 | Term Payment | Rp 25.512.848.867 | Rp 1.275.642.443 | Rp 24.237.206.424 |
| 40 | Term Payment | Rp 34.108.420.092 | Rp 1.705.421.005 | Rp 32.402.999.088 |
| 44 | Term Payment | Rp 23.972.951.057 | Rp 1.198.647.553 | Rp 22.774.303.504 |
| 48 | Term Payment | Rp 16.346.739.804 | Rp 817.336.990 | Rp 15.529.402.814 |
| 53 | Term Payment | Rp 19.269.913.082 | Rp 963.495.654 | Rp 18.306.417.428 |
| 57 | Term Payment | Rp 10.333.372.790 | Rp 516.668.639 | Rp 81.852.092.541 |
| | 5% Performance Guarantee | Rp 12.005.898.065 | | |
| | 25% Down Payment guarantee | Rp 60.029.490.326 | | |
| 109 | Retention | Rp 9.004.423.549 | | Rp 9.004.423.549 |

Source: Processed by Researcher

**Cash Out**

Figure 1 analyzes the fact that this project has four types of cash out: implementation guarantees, advance guarantees, Installments, and Implementation Budget Plan which has been shown in Table 2.

Loan payment on this project is paid during the PHO period or when the project has been completed. Installments with an interest rate of 6.67% are added with a penalty interest of 5% to 12.67%.

Penalty interest is charged on the loan because the loan payment is made at the end of the loan period.

Loan payment = P (1+i)n
= Rp96.047.184.521 $(1 + \frac{12,67}{52})57$
= (Rp110.338.547.762)

Table 4. Cash Out with 25% Down Payment at 100% Float Utilization

| Week- | Description | Cash Out | Total |
|---|---|---|---|
| 0 | 5% Performance Guarantee | (Rp12.005.898.065) | (Rp72.035.388.391) |
| | 25% Down Payment Guarantee | (Rp60.029.490.326) | |
| 57 | RAP | (Rp446.275.156) | (Rp110.784.822.919) |
| | Loan Payment | (Rp110.338.547.762) | |

Source: Processed by Researcher

**Cash Flow Identification without Down Payment In Float 100%**

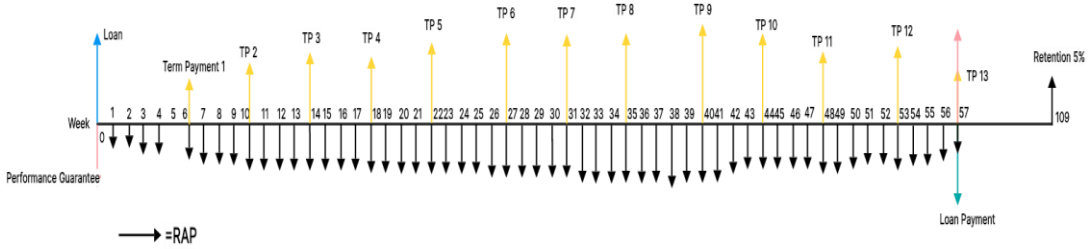


Figure 2. Cash Flow Diagram without Down Payment

**Cash In**

Based on Figure 2, it can be analyzed that this project involves 4 types of cash: loans, terms payment, return of performance guarantee, and retention.

In the alternative without down payment, the capital required is 15% of the contract value. The amount of capital value is seen from the cash flow that has been identified, where the capital must be able to make the company's cash, not minus.

A 5% retention (holding) will be charged at each term payment as a maintenance guarantee. The retention will be returned when the maintenance period is complete or during the FHO (Final Hand Over) period. Meanwhile, the performance and down payment guarantees will be returned after the project is completed or during the PHO (Provisional Hand Over) period.

Table 5. Cash In Recapitulation with 25% Down Payment at 100% Float Utilization

| Week- | Description | Cash In | | Total |
|---|---|---|---|---|
| | | Payment | Retention 5% | |
| 0 | Loan 15% contract value | Rp 36.017.694.195 | | Rp 36.017.694.195 |
| 6 | Term Payment | Rp 3.031.676.823 | Rp 151.583.841 | Rp 2.880.092.982 |
| 10 | Term Payment | Rp 10.524.016.092 | Rp 526.200.805 | Rp 9.997.815.288 |
| 14 | Term Payment | Rp 15.574.827.530 | Rp 778.741.377 | Rp 14.796.086.154 |
| 18 | Term Payment | Rp 15.348.454.809 | Rp 767.422.740 | Rp 14.581.032.069 |
| 22 | Term Payment | Rp 17.503.872.357 | Rp 875.193.618 | Rp 16.628.678.739 |
| 27 | Term Payment | Rp 23.889.680.325 | Rp 1.194.484.016 | Rp 22.695.196.309 |
| 31 | Term Payment | Rp 24.701.187.672 | Rp 1.235.059.384 | Rp 23.466.128.289 |
| 35 | Term Payment | Rp 25.512.848.867 | Rp 1.275.642.443 | Rp 24.237.206.424 |
| 40 | Term Payment | Rp 34.108.420.092 | Rp 1.705.421.005 | Rp 32.402.999.088 |
| 44 | Term Payment | Rp 23.972.951.057 | Rp 1.198.647.553 | Rp 22.774.303.504 |
| 48 | Term Payment | Rp 16.346.739.804 | Rp 817.336.990 | Rp 15.529.402.814 |
| 53 | Term Payment | Rp 19.269.913.082 | Rp 963.495.654 | Rp 18.306.417.428 |

| Week- | Description | Cash In | | Total |
|---|---|---|---|---|
| | | Payment | Retention 5% | |
| 57 | Term Payment | Rp 10.333.372.790 | Rp 516.668.639 | Rp 21.822.602.215 |
| | 5% Performance Guarantee | Rp 12.005.898.065 | | |
| 109 | Retention | Rp 12.005.898.065 | | Rp 12.005.898.065 |

Source: Processed by Researcher

**Cash Out**

Figure 1 analyzes the fact that this project has four types of cash out: implementation guarantees, advance guarantees, Installments, and Implementation Budget Plan which has been shown in Table 2.

Loan payment on this project is paid during the PHO period or when the project has been completed. Installments with an interest rate of 6.67% are added with a penalty interest of 5% to 12.67%. Penalty interest is charged on the loan because the loan payment is made at the end of the loan period.

Loan payment = P (1+i)n
= Rp 36.017.694.195 (1 +$\frac{12,67}{52}$)57
= Rp41.376.955.411

Table 6. Cash Out witout Down Payment at 100% Float Utilization

| Week | Description | Cash Out | Total |
|---|---|---|---|
| 0 | 5% Performance Guarantee | | (Rp12.005.898.065) |
| 57 | RAP | (Rp446.275.156) | (Rp41.823.230.567) |
| | Loan Peyment | (Rp41.376.955.411) | |

Source: Processed by Researcher

**Economic Feasibility Analysis**

Table 7. Recapitulation of NPV, BCR, and ROI Calculation Results

| Description | Without Down Payment | | | 25% Down Payment | | |
|---|---|---|---|---|---|---|
| | NPV | BCR | ROI | NPV | BCR | ROI |
| **Float 0%** | Rp 16.161.047.604 | 1,0650 | 6,504% | Rp 14.802.366.366 | 1,0402 | 4,017% |
| **Float 50%** | Rp 16.162.986.659 | 1,0650 | 6,505% | Rp 14.804.305.421 | 1,0402 | 4,017% |
| **Float 100%** | Rp 16.164.849.630 | 1,0651 | 6,506% | Rp 14.806.168.392 | 1,0402 | 4,018% |

Source: Processed by Researcher

**4. Conclusion**

In the analysis with a 25% down payment from the owner, the greatest profitability was obtained using 100% float. With an NPV value of Rp14,806,168,392, a BCR value of 1.0402, and an ROI value of 4.02%. In the analysis without an advance from the owner, the greatest profitability is obtained in the alternative use of 100% float. With an NPV value of Rp16,164,849,630, a BCR value of 1.0651, and an ROI value of 6.51%. So, the conclusion from the comparison of maximum profitability between alternatives with a 25% down payment and without a down payment is that the alternative without a down payment with 100% float usage shows the highest NPV, BCR, and ROI values.

This is where the alternative has maximum profitability based on the results of the analysis that has been done. Economic Feasibility Analysis. The suggestions from the research that has been done. Namely, further study is needed to analyze the feasibility of construction development profitability by considering escalation at the dollar exchange rate. Additional research is required to explore the feasibility of construction development profitability by comparing materials with a greater percentage of TKDN.

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