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Optimal Capital Structure of PT Adhi Karya (Persero) Tbk

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Abstract - PT Adhi Karya Tbk proposed additional equity to the government in the form of *Penyertaan Modal Negara* (PMN) for 1.98 trillion IDR and plans to issue rights for 1.89 trillion IDR. However, the current capital structure of the firm consists of 40% debt and 60% equity while the construction industry's average is 57% and 43% respectively. Meaning, if the firm receives the additional equity, its capital structure will deviate from the industry. Based on the problem, it has to be analyzed whether the additional equity for PT Adhi Karya Tbk is aligned with its optimal capital structure. Therefore, the firm can have the lowest cost of capital and maximize the firm's value. For the methodology, this research uses capital asset pricing model, Damodaran (2015) cost of debt model, and weighted average cost of capital. Based on the data analysis, the optimal capital structure of PT Adhi Karya Tbk consists of 27% long-term debt and 73% equity with cost of capital 14.526%. The firm has to decrease its additional equity and increase debt by issuing bonds or bank loans.

Keywords - Adhi Karya, Industry Average, Optimal Capital Structure

I. INTRODUCTION

Construction industry significantly contributes to the development process of both developing and developed countries. Based on Badan Pusat Statistik (BPS), the GDP of the construction industry in Indonesia on the basis of current price (*Atas Dasar Harga Berlaku-ADHB*) contributes 10.44% to the national GDP in 2021. The contribution is the fourth highest after industrial processing (19.25%), agriculture (13.28%), and wholesale and retail trade (12.97%). This industry grew 2.81% in 2021 to 1.1 quadrillion IDR from 2020 [1].

Indonesia Government plans to give investment in the form of *Penyertaan Modal Negara* (PMN) to some of the SOEs in 2022 with the total amount of 38.50 trillion IDR. The aim is to support the development of infrastructures and buildings to increase national competitiveness and welfare through SOEs projects [2]. One of the SOEs that will receive PMN from the government is PT Adhi Karya Tbk. This government action obviously will affect the capital structure of the firm.

PT Adhi Karya Tbk is one of the largest state-owned construction companies in Indonesia. This company

was determined as a state-owned company along with the merger with the former Dutch-owned construction company called Associate NV based on the Government Regulation no. 65 in 1961. On March 18th, 2004, PT Adhi Karya made its first Initial Public Offering (IPO) with the issuer code ADHI that was listed in Indonesia Stock Exchange (IDX). The ultimate shareholder of the firm is the Government of Indonesia at 51% of the total number of shares and the rest of it is owned by the public which are each below 5%. PT Adhi Karya Tbk now has control on several subsidiaries, including PT Adhi Persada Properti, PT Adhi Persada Beton, PT Adhi Persada Gedung, PT Adhi Commuter Properti, PT Dumai Tirta Persada, and PT Jalintim Adhi Abipraya. The scope of business of PT Adhi Karya Tbk includes construction, engineering procurement and construction, implementation of railway infrastructure, investment, general trading, procurement services, manufacturing (precast), services in information technology, real estate, agro-industry, property, and hotel. PT Adhi Karya Tbk earns taxable and non-taxable income from these business lines due to the final-tax and non-final tax terms that is applied in Indonesia. Based on the annual report of 2021, PT Adhi Karya Tbk has 2.85 trillion IDR of taxable income and 8.68 trillion IDR of non-taxable income [3]. Meaning, PT Adhi Karya Tbk still gets the tax benefit from the interest expense that is associated with the proportion of taxable income.

In order to support the firm's project operations and performance in 2022, PT Adhi Karya Tbk proposed PMN to the government to increase their equity capital by the amount of 1.98 trillion IDR. The company will allocate the money for several project investments. To avoid the dilution effect to the existing shareholders, the firm and the shareholders decided to also issue rights by the amount of 1.89 trillion IDR. Thus, the total amount of additional equity the firm will receive is 3.87 trillion IDR [4].

Based on the PT Adhi Karya Tbk's annual report in 2021 [3], the capital structure of the company currently consists of the total amount of long-term debt of 2.17 trillion IDR and equity of 3.19 trillion IDR. In other words, PT Adhi Karya Tbk's capital structure consists of 40% of long-term debt and 60% of equity with a long-term debt-to-equity ratio of 67%. Meanwhile, referring to the big 4 construction SOEs in Indonesia which are PT Waskita Karya Tbk, PT Wijaya Karya Tbk, PT Adhi Karya Tbk, and PT Pembangunan Perumahan Tbk, the industry's long-term debt and equity on average is 57% and 43% respectively

with long-term debt-to-equity ratio on average is 154%. By that, if PT Adhi Karya Tbk receives PMN and issues rights, its equity proportion will be considerably larger, while its debt proportion will be substantially lower than the industry average. In other words, the capital structure of PT Adhi Karya Tbk will deviate from the average industry. According to Patel, Zeckhauser, and Hendricks (1991), there is a behavioral perspective that sees industry average as the safety number for a company to follow. This statement is called herd migration which explains birds that travel in groups feel more common [5]. Although capital structure in the industry average has no guarantee that it is at the optimal level, Damodaran (2015) stated that it is far too strong to be ignored [6].

The starting point of modern capital structure theory was M&M Theory, created by Modigliani and Miller in 1958. In M&M's first proposition, it advocates the irrelevance of capital structure in terms of perfect market conditions, which are no tax, transaction cost, bankruptcy cost, and all information is symmetrically available. In other words, there is no difference between unlevered and levered firm in terms of firm's value. However, these assumptions are unrealistic to the real world. In reality, tax exists and adds benefit from debt capital that can lower the cost of capital. By that, Modigliani and Miller proposed a second theory that added the effect of tax which the benefit can minimize the cost of capital [7]. Therefore, identifying optimal capital structure is relevant to maximize the value of a firm.

The optimal capital structure can be reached with the minimum cost of capital. There are two sources of financing of a firm, which are debt and equity. Issuing debt capital creates a cost of debt which is the cost in borrowing the funds to the bondholders for project financing. On the other hand, shareholders that invest in the firm's equity capital require a rate of return to compensate for the risk they bear called cost of equity. The cost of debt is cheaper than the cost of equity because there is a tax shield and bondholders bear less risk than shareholders by having a priority to be paid first. By minimizing these two costs, the firm will reach the lowest level of cost of capital which can lead to the optimal capital structure of the firm, so the firm value will be maximized [6]. These statements are in accordance with Trade-off Theory, which explains that optimal capital structure is reached by trading off the cost and benefit of debt [8].

Based on the problem stated previously, the author decides to make further review regarding the capital structure of PT Adhi Karya Tbk. In 2022, the company will receive PMN from The Ministry of SOE for the amount of 198 trillion IDR and issue rights for the amount of 1.89 trillion IDR that will deviate its capital structure from the industry average. Moreover, the debt proportion of PT

Adhi Karya Tbk, which is lower than the industry, also needs to be analyzed, whether the firm needs to increase the debt to the same level of industry or not. At first, the author needs to find the optimal capital structure for PT Adhi Karya Tbk. Furthermore, if the additional equity from PMN and right issues do not support the optimal mix of debt and equity of PT Adhi Karya Tbk, a feasible strategy needs to be stated for PT Adhi Karya Tbk to reach the optimal capital structure. Thus, PT Adhi Karya Tbk can maximize the value of the firm.

II. METHODOLOGY

There are two steps of analyzing the data in order to achieve the research objectives, which are calculating the current and optimal capital structure of the firm and finding the strategy that should be taken regarding the additional equity to reach the optimal capital structure. In calculating the capital structure, both current and optimal, the author will use capital asset pricing model (CAPM) for cost of equity, Damodaran Cost of Debt Model for cost of debt, and Weighted Average Cost of Capital (WACC) for the cost of capital.

A. Cost of Equity

In order to calculate the cost of equity, CAPM can be used. CAPM accounts beta as non-diversifiable risk in portfolio assets [9]. Below is the equation of cost of equity using this method:

$$\text{Cost of Equity } (r_e) = R_f + \beta_{\text{levered}} \times [E(R_m) - R_f] \quad (1)$$

Means,

R_f = risk-free rate

β_{levered} = Levered beta

R_m = Market return

In order to find the levered beta for the calculation of cost of equity using CAPM, beta and unlevered beta have to be calculated first. The beta in this calculation is estimated by Linear Regression Slope Model using ADHI and JKSE stock return historical data for a 3 years time horizon (2019-2021) on a weekly basis. Afterwards, the regression beta is being unlevered to see the volatility of the return without the financial leverage. The tax associated with debt for PT Adhi Karya Tbk should be adjusted by multiplying it to the proportion of taxable earning to account for the amount of tax benefit the firm able to claim, including for the beta calculation. Below is the equation of unlevered beta:

$$\text{Unlevered Beta } (\beta_u) = \frac{\text{Regression Beta}}{\left[1 + \left(1 - \left(T \times \frac{Et}{Et+Ent}\right)\right) \times \frac{LD}{E}\right]} \quad (2)$$

Means,

T = Corporate tax rate

LD = Total long-term debt

E = Total equity

Et = Taxable earnings

Ent = Non-taxable earnings

After finding unlevered beta, the beta is being re-levered to account for the effect of leverage in each debt level which the formula as follows:

$$\text{Levered Beta } (\beta_l) = \beta_u \times \left[1 + \left[1 - \left(T \times \frac{Et}{Et+Ent}\right)\right] \times \frac{LD}{E}\right] \quad (3)$$

Means,

T = Corporate tax rate

LD = Total long-term debt

E = Total equity

Et = Taxable earnings

Ent = Non-taxable earnings

B. Cost of Debt

Damodaran divides companies into two categories based on the market capitalization for determining the Synthetic Rating Spread Table that will be used, which are large firms with more than 5 billion USD and small firms with less than 5 billion USD market capitalization. Thus, the calculation of the firm's market capitalization is required first. Below is the formula of market capitalization [6]:

Market Capitalization =

Current Share Price x Total Shares Outstanding (4)

Damodaran made a Synthetic Rating Spread to estimate the cost of debt by the default spread that is obtained by the value of the firm's interest coverage ratio [10]. Below is the equation to calculate interest coverage ratio:

$$\text{Interest Coverage Ratio} = \frac{\text{Earnings Before Interest and Tax (EBIT)}}{\text{Interest Expense}} \quad (5)$$

After calculating the firm's interest coverage ratio, both the synthetic rating and the default spread of the firm can be determined by seeing the Damodaran Synthetic Rating Table below. Since PT Adhi Karya Tbk is categorized as a small firm based on its market capitalization, the table below belongs to the firms that have market capitalization below 5 billion USD:

Table 1 - SYNTHETIC RATINGS FOR COMPANIES WITH MARKET CAPITALIZATION <\$5B

If interest coverage ratio is			
Greater Than	Less than or equal	Rating	Spread
12.5	100000	Aaa/AAA	0.67%
9.5	12.5	Aa2/AA	0.82%
7.5	9.5	A1/A+	1.03%
6	7.5	A2/A	1.14%
4.5	6.0	A3/A-	1.29%
4	4.5	Baa2/BBB	1.59%
3.5	4.0	Ba1/BB+	1.93%
3	3.5	Ba2/BB	2.15%
2.5	3.0	B1/B+	3.15%
2	2.5	B2/B	3.78%
1.5	2.0	B3/B-	4.62%
1.25	1.5	Caa/CCC	7.78%
0.8	1.2	Ca2/CC	8.80%
0.5	0.8	C2/C	10.76%
-100000	0.5	D2/D	14.34%

After knowing the default spread, the risk-free rate is added in order to get the pre-tax cost of debt which the equation as follows:

$$\text{Pre - Tax Cost of Debt } (r_d) = \text{Risk - free Rate} + \text{Default Spread} \quad (6)$$

Cost of debt creates tax savings from the interest payment. Therefore, the after-tax cost of debt needs to be calculated to account the benefit effect of the tax rate into the firm's cost of debt [9]. Construction industry in Indonesia bears final tax, which means the tax is deducted directly from the revenue and does not create any tax savings. However, in this case, PT Adhi Karya Tbk as a construction company has both final and non-final tax to deduct since the firm also has a minority percentage of other business lines that bears non-final tax (taxable earning). In regards to this situation, the corporate tax rate has to be adjusted by multiplying it to the proportion of taxable earnings to reflect the tax benefit. Thus, the equation of after-tax cost of debt will be:

$$\text{After - tax Cost of Debt} = r_d \times \left[1 - \left(T \times \frac{Et}{Et+Ent}\right)\right] \quad (7)$$

Means,

r_d = Pre-tax cost of debt

T = Corporate tax rate

Et = Taxable earnings

Ent = Non-taxable earnings

C. Weight of Equity and Debt

- o Weight of Equity

Weight of equity is the percentage of equity within the firm's capital structure. The market value of equity can be determined by market capitalization using (4) because it shows the market value of common stock equity [6]. The

firm's weight of equity can be found within this equation:

$$\text{Weight of Equity } (W_e) = \frac{\text{Total Equity}}{\text{Total Capital}} \quad (8)$$

o Weight of Debt

For the value of debt in this research, the market value of the bonds and the book value of the bank loans are used as the interest-bearing long-term debt. Market value of debt is difficult to calculate since only few firms have all debt in the form of bonds outstanding trading in the market [6], that is the reason the bond loan is obtained by book value. The weight of debt can be calculated using formula below:

$$\text{Weight of Debt } (W_d) = \frac{\text{Total Long-Term Debt}}{\text{Total Capital}} \quad (9)$$

D. Cost of Capital

WACC calculation is a method to find the current and optimal cost of capital. The variables that are used are cost of debt, cost of equity, and weight of debt and equity [9]. There is no preferred stock in PT Adhi Karya Tbk's capital. Previously mentioned, the corporate tax rate of PT Adhi Karya Tbk for the cost of debt has to be adjusted by the proportion of taxable earnings to capture the tax benefit of the firm. Therefore, the equation of WACC for PT Adhi Karya Tbk will be:

$$WACC = W_d \times \left[r_d \times \left[1 - \left(T \times \frac{E_t}{E_t + Ent} \right) \right] \right] + (W_e \times r_e) \quad (10)$$

III. RESULTS

A. Key Assumptions

An assumption for several variables needs to be made as a basis for the entire calculation of PT Adhi Karya Tbk's capital structure. Below are the variables:

1. Risk-Free Rate

The author used Indonesia's 10 years government bond yield to maturity for the risk-free rate which is 6.38%. It is because according to Damodaran, long-term government bond has riskless asset due to the low to zero probability of default and it is the most common used for corporate finance [6].

2. Market Risk Premium

The author generated market risk premium by finding market return (JKSE) then subtracting the risk-free rate, resulting in 5.18% risk premium. The market return is obtained by compounded annual growth rate (CAGR) as geometric return from 1991-2021. The geometric return is used to get expected return over long periods which is

suitable for capital structure that associated with long-term investment [6]. The author used 30 years time horizon to get the maximum reduction of standard error of risk premium [6].

3. Corporate Tax Rate

The author used 19% corporate tax rate. It is according to the annual report of PT Adhi Karya Tbk in 2021.

4. PT Adhi Karya Tbk's Beta

The author used linear regression counting using ADHI against JKSE stock return to calculate PT Adhi Karya Tbk's beta [9], resulting in 2.59. Within the calculation, the author used 3 years time horizon (2019-2021) to minimize the standar error [11] and on weekly basis to get more stable result [12].

B. Current Capital Structure

1. Current Cost of Equity

The variables needed for the calculation are risk-free rate, market return, and beta of PT Adhi Karya Tbk to calculate cost of equity using (1). The risk-free rate is 6.38% from the yield-to-maturity of a 10 years government bond. Meanwhile, the market return is found by Compounded Annual Growth Rate method from Jakarta Composite Index (JKSE) stock return from 1991 to 2021 which results in 11.68%. Thus, subtracting the market return to the risk-free rate, the market risk premium will be 5.18%. On the other hand, the beta of PT Adhi Karya Tbk is the slope obtained by linear regression method. Therefore, the calculation of the cost of equity is:

$$\begin{aligned} \text{Cost of Equity } (r_e) &= 6.38\% + 2.59 \times (11.56\% - 6.38\%) \\ &= 19.79\% \end{aligned}$$

2. Current Cost of Debt

The ratings from PT Pefindo in PT Adhi Karya Tbk annual report of 2021 is A-. Thus, based on the Damodaran Synthetic Rating Spread Table (see Table 1), the default spread for A- is 1.29%. Adding up the risk-free rate, the firm's current cost of debt is 7.67% using the Damodaran Cost of Debt Model. The calculation as follows using (6)

$$\begin{aligned} r_d &= 6.38\% + 1.29\% \\ r_d &= 7.67\% \end{aligned}$$

Following the Damodaran method, the second iteration is needed to assure the number of the cost of debt that has been calculated before is appropriate already. Firstly, the amount of interest expense is obtained by multiplying the total debt to the the prior calculated cost of debt.

$$\begin{aligned} \text{Interest Expense} &= 2,150,390,880,639 \times 7.67\% \\ &= 164,848,964,910 \end{aligned}$$

After that, the firm's Earning Before Interest and Tax (EBIT) is divided with that amount of interest expense to get an interest coverage ratio using (5). Then, looking at the Damodaran Synthetic Rating Spread Table (Table 1), the company default spread can be determined based on the value of interest coverage ratio.

$$\text{Interest Coverage Ratio} = \frac{1,307,568,303,103}{164,848,964,910} = 7.93$$

From the amount of 7.93 interest coverage ratio, it can be seen from the table (see Table 1) that the company's default spread is 1.03%. Finally, the cost of debt is counted by summing up the risk-free rate and the default spread. Below is the calculation for cost of debt in the second iteration using (6):

$$\begin{aligned} r_d &= 6.38\% + 1.03\% \\ r_d &= 7.41\% \end{aligned}$$

Since the value of cost of debt in the second iteration is different from the first one, the third iteration is needed to obtain. The steps are the same with the second iteration. The interest expense is obtained by multiplying the firm's total debt with the cost of debt in the second iteration.

$$\begin{aligned} \text{Interest Expense} &= 2,150,390,880,639 \times 7.41\% \\ &= 159,257,948,620 \end{aligned}$$

Then, we find the interest coverage ratio by dividing EBIT that is multiplied to the interest expense using (5), which results in 8.21.

$$\text{Interest Coverage Ratio} = \frac{1,307,568,303,103}{159,257,948,620} = 8.21$$

By knowing that, the company default spread can be found by looking at the Damodaran Synthetic Rating Spread Table (see Table 1), which results in 1.03%. By adding up the risk-free rate, below is the result of the third iteration of cost of debt using (6):

$$\begin{aligned} r_d &= 6.38\% + 1.03\% \\ r_d &= 7.41\% \end{aligned}$$

As the result is the same with the second iteration, it can be concluded that the current cost of debt of PT Adhi Karya Tbk is 7.41%. After knowing the cost of debt, the effect of tax needs to be included. Thus, the next step is to find the after-tax cost of debt by multiplying the cost of debt to $(1 - \text{Tax Rate})$. The tax used in this calculation is the marginal tax rate that is applied to PT Adhi Karya Tbk in 2021, which is 19%. However, as PT Adhi Karya Tbk has both non-taxable earnings and taxable earnings due to final-tax and non-final tax terms, the tax has to be

multiplied to the proportion of taxable earnings to reflect the amount of tax benefit. The calculation of the firm's current after-tax cost of debt can be seen as follows using (7):

$$\begin{aligned} \text{After - Tax Cost of Debt} &= 7.41\% \times \left[1 - \left(19\% \times \frac{2,848,777,265,003}{11,530,471,713,036} \right) \right] \\ \text{After - Tax Cost of Debt} &= 7.06\% \end{aligned}$$

3. Current Weight of Equity and Debt

o Weight of Equity

The weight of equity is obtained by dividing the market value of equity to the total capital of a firm. Using (8), the result will be:

$$\begin{aligned} \text{Weight of Equity} &= \frac{3,186,960,191,520}{5,337,351,072,159} \times 100\% \\ &= 60\% \end{aligned}$$

o Weight of Debt

The weight of debt is calculated by dividing the firm's total interest-bearing long-term debt to the total capital, which shown in the calculation below using (9):

$$\begin{aligned} \text{Weight of Debt} &= \frac{2,150,390,880,639}{5,337,351,072,159} \times 100\% \\ &= 40\% \end{aligned}$$

4. Current Cost of Capital

After generating the firm's current cost of debt, cost of equity, and weight of debt and equity, the current cost of capital value can be obtained by using (10). The calculation can be seen as below:

$$\begin{aligned} WACC &= (40\% \times \left[7.41\% \times \left[1 - \left(19\% \times \frac{2,848,777,265,003}{11,530,471,713,036} \right) \right] \right] \\ &\quad + (60\% \times 19.79\%) \\ WACC &= 14.66\% \end{aligned}$$

C. Optimal Capital Structure of PT Adhi Karya

1. Optimal Cost of Equity

The optimal cost of equity will be calculated using CAPM, from the debt level of 0% to 90% in 10% margin as the scenario. However, it is required to find the unlevered beta first to be re-levered for every debt level. Using (2), the unlevered beta will be:

$$= \frac{\text{Unlevered Beta } (\beta_u)}{2.59} \left[1 + \left[1 - \left(19\% \times \frac{2,848,777,265,003}{11,530,471,713,036} \right) \right] \times \frac{2,150,390,880,639}{3,186,960,191,520} \right]$$

$$\text{Unlevered Beta } (\beta_u) = 1.58$$

The beta used in the formula above is obtained by linear regression beta in 3 years time horizon on a weekly basis. Meanwhile, for the tax, it is still necessary to multiply the corporate tax by the proportion of taxable income since it reflects interest expense's tax benefits.

After generating unlevered beta, it has to be re-levered for each debt level using (3). Taking 10% debt level to be calculated, the levered beta will be:

$$\begin{aligned} \text{Levered Beta } (\beta_l) &= 1.58 \times \left[1 + \left[1 - \left(19\% \times \frac{2,848,777,265,003}{11,530,471,713,036} \right) \right] \times \frac{10\%}{90\%} \right] = 1.74 \end{aligned}$$

As the debt level rises, the levered beta rises with it, as the risk of borrowing more money is represented by levered beta. Below is the calculation of CAPM using (1) for each debt level in 10% margin:

Table 2 - OPTIMAL COST OF THE EQUITY (10%)

Debt Level	Tax (Taxable Income)	Levered Beta	Cost of Equity
0%	4.69%	1.58	14.54%
10%	4.69%	1.74	15.40%
20%	4.69%	1.95	16.48%
30%	4.69%	2.22	17.87%
40%	4.69%	2.58	19.72%
50%	4.69%	3.08	22.32%
60%	4.69%	3.83	26.21%
70%	4.69%	5.08	32.69%
80%	4.69%	7.58	45.65%
90%	4.69%	15.09	84.55%

90% 4.69% 15.09 84.55%

From the table above, it can be seen that the cost of equity is rising as the debt level increases. It is a reflection of the fact that shareholders require higher compensation in exchange for taking on more risk since the company borrows more money from bondholders or creditors. Thus, the higher the company's debt, the higher the cost of equity it must pay.

2. Optimal Cost of Debt

The Damodaran Cost of Debt Model is used to calculate the optimal cost of debt. The steps are similar to the

calculation of the current cost of debt. First of all, each debt level is multiplied by the total capital to earn the total debt. Afterwards, the interest coverage ratio must be found in order to obtain the synthetic rating and the default spread from the table (see Table 1).

The Damodaran Cost of Debt Model is used to calculate the optimal cost of debt. The steps are similar to the calculation of the current cost of debt. First of all, each debt level is multiplied by the total capital to earn the total debt. Afterwards, the interest coverage ratio must be found in order to obtain the synthetic rating and the default spread from the table (see Table 1). Starting from 0% debt level, there is no interest expense which results in a highest synthetic rating of AAA and a lowest default spread of 0.67% (see Table 1). Then, the risk-free rate (6.38%) is added to the default spread, resulting in 7.05% cost of debt. This cost of debt number will be used to find the interest expense in the next debt level, 10% debt, by multiplying it to the total debt in 10% level of debt. The previous cost of debt is used as the interest rate in the next debt level as a notion since we do not have the actual interest rate for this debt level. Afterwards, interest coverage ratio can be obtained by dividing the EBIT to that amount of interest expense. The interest coverage ratio in the 10% debt level is 34.77, generating a rating of AAA and 0.67% of default spread. Adding the risk-free rate to the default spread, the cost of debt in the 10% debt level is 7.05%. Since the value is the same as the 0% debt level, it means that the number of the cost of debt is appropriate. However, there will be a case that the certain debt level's cost of debt turns to be different with the previous cost of debt. In this case, the second iteration needs to be obtained to assure that the cost of debt in the first iteration is already in the appropriate number. If the second iteration results in a different number from the first one, then the third iteration is required. In this calculation, 30% debt level shows different number from 20% debt level. Thus, the second iteration of the 30% debt level needs to be obtained by first finding the interest expense by multiplying the cost of debt in its first iteration to the 30% level of total debt. Then the steps mentioned before are applied again to generate the cost of debt for the second iteration. If the result is the same with the first iteration, then it is an appropriate number of the cost of debt for that debt level and the cost of debt at the next debt level can be calculated. All these steps are repeated until the 90% debt level.

After calculating all the cost of debt from 0% until 90% level of debt, the effect of tax has to be accounted for to value its benefits in each debt level. The tax rate of PT Adhi Karya Tbk for calculating the cost of debt is 4.69% since the corporate tax rate (19%) has to be multiplied by the proportion of its taxable earnings due to the existence of both final and non-final tax terms within the

firm's overall income. Using (7), the after-tax cost of debt can be determined. The value will be lower than the pre-tax cost of debt due to the tax benefit. The summarized calculation of each debt level can be seen as the following table:

Table 3 - OPTIMAL COST DEBT (10%)

Debt Level	Interest Coverage Ratio	Default Spread	Pre-Tax Cost of Debt	After-Tax Cost of Debt
0%	10,000	0.67%	7.05%	6.72%
10%	34.77	0.67%	7.05%	6.72%
20%	17.38	0.67%	7.05%	6.72%
30%	11.35	0.82%	7.20%	6.86%
40%	8.27	1.03%	7.41%	7.06%
50%	6.52	1.14%	7.52%	7.16%
60%	5.33	1.29%	7.67%	7.31%
70%	4.57	1.29%	7.67%	7.31%
80%	3.69	1.93%	8.31%	7.92%
90%	3.19	2.15%	8.53%	8.13%

3. Optimal Capital Structure

After generating the cost of debt and cost of equity in each level of debt, the cost of capital can be estimated. The cost of capital will be calculated using (10), the WACC method. Below is the calculation for cost of capital in 10% debt level margin:

Table 4 - OPTIMAL COST OF CAPITAL (10%)

Debt Level	Pre-Tax Cost of Debt	After-Tax Cost of Debt	Cost of Equity	Cost of Capital
0%	7.05%	6.72%	14.54%	14.538%
10%	7.05%	6.72%	15.40%	14.534%
20%	7.05%	6.72%	16.48%	14.529%
30%	7.20%	6.86%	17.87%	14.568%
40%	7.41%	7.06%	19.72%	14.658%
50%	7.52%	7.16%	22.32%	14.740%
60%	7.67%	7.31%	26.21%	14.866%
70%	7.67%	7.31%	32.69%	14.921%
80%	8.31%	7.92%	45.65%	15.464%
90%	8.53%	8.13%	84.55%	15.768%

From the calculation above, the lowest cost of capital of PT Adhi Karya Tbk is in the range of 20% to 30% debt level. Although it seems like the cost of capital in 30% debt level is higher than 10%, the cost of capital is still decreasing after 20% debt level in 1% margin, making the lowest cost of capital is within the range of 20% to 30% debt level. It reflects that the corporation will gain from debt only until a specific level of debt is reached, at which point the benefit equals the cost, as discussed in the Trade-Off Theory. In addition, because of the relatively low interest expense that can be claimed as tax deduction due to the proportion of taxable income, the after-tax cost of debt takes only a modest amount of tax benefits.

After finding the range of the lowest cost of capital, the calculation of 1% margin of debt level for cost of debt, cost of equity, and cost of capital can be conducted. It is to get a detailed number of the cost of capital that will maximize the firm's value.

o Cost of Equity (1% Margin)

The following table below is the summarized result of cost of equity in 1% with the same method and process as the cost of equity in 10% debt level margin:

Table 5 - OPTIMAL COST OF EQUITY (1%)

Debt Level	Tax (Taxable Income)	Levered Beta	Cost of Equity
20%	4.69%	1.95	16.48%
21%	4.69%	1.97	16.61%
22%	4.69%	2.00	16.73%
23%	4.69%	2.02	16.86%
24%	4.69%	2.05	16.99%
25%	4.69%	2.08	17.13%
26%	4.69%	2.10	17.27%
27%	4.69%	2.13	17.42%
28%	4.69%	2.16	17.56%
29%	4.69%	2.19	17.72%
30%	4.69%	2.22	17.87%

Based on the previous table, as stated before, the risk of borrowing more money is reflected by the increasing of the levered beta. It results in a higher cost of equity since shareholders will demand higher return to compensate for the risk they bear due to the bigger amount of debt.

o Cost of Debt (1% Margin)

Using the same method and steps as the cost of debt within 10% debt level margin, below is the summarized result of cost of debt within 1% margin:

Table 6 - OPTIMAL COST OF CAPITAL (1%)

Debt Level	Pre-tax Cost of Debt	After-tax Cost of Debt	Cost of Equity	Cost of Capital
20%	7.05%	6.72%	16.48%	14.5293%
21%	7.05%	6.72%	16.61%	14.5288%
22%	7.05%	6.72%	16.73%	14.5284%
23%	7.05%	6.72%	16.86%	14.5279%
24%	7.05%	6.72%	16.99%	14.5275%
25%	7.05%	6.72%	17.13%	14.5271%
26%	7.05%	6.72%	17.27%	14.5266%
27%	7.05%	6.72%	17.42%	14.5262%
28%	7.20%	6.86%	17.56%	14.5658%
29%	7.20%	6.86%	17.72%	14.5668%
30%	7.20%	6.86%	17.87%	14.5678%

Based on the table above, it can be seen that the pre-tax cost of debt value is the same from 20% to 27% debt level. It happens because each debt level's interest coverage ratio results in the same rating, AAA, with a default spread of 0.67% (see Table 1). However, starting

from 28%, the pre-tax cost of debt is increased due to the lower number of interest coverage ratio. Meaning, the firm is riskier by being less likely to cover the interest expense of its outstanding debt with their EBIT. Afterwards, the tax advantage effect is taken into account, resulting after-tax cost of debt is lower than the pre-tax cost of debt.

o Optimal Capital Structure (1% Margin)

After generating cost of debt and cost of equity within 1% debt level margin, the cost of capital can be calculated. The calculation of cost of capital using (10) can be seen in the following table:

Table 7 - OPTIMAL COST OF CAPITAL (1%)

Debt Level	Interest Coverage Ratio	Default Spread	Pre-Tax Cost of Debt	After-Tax Cost of Debt
20%	17.38	0.67%	7.05%	6.72%
21%	16.56	0.67%	7.05%	6.72%
22%	15.80	0.67%	7.05%	6.72%
23%	15.12	0.67%	7.05%	6.72%
24%	14.49	0.67%	7.05%	6.72%
25%	13.91	0.67%	7.05%	6.72%
26%	13.37	0.67%	7.05%	6.72%
27%	12.88	0.67%	7.05%	6.72%
28%	12.16	0.82%	7.20%	6.86%
29%	11.74	0.82%	7.20%	6.86%
30%	11.35	0.82%	7.20%	6.86%

Based on the calculation, the optimal mix of debt and equity for PT Adhi Karya Tbk is 27% of debt and 73% of equity. Considering the 6.72% of after-tax cost of debt and 17.42% of equity within that proportion, using WACC method, the lowest cost of capital that will maximize the value of PT Adhi Karya Tbk is 14.5262%. As the appropriate amount of debt and equity successfully increases a firm's value, it represents the Trade-off Theory. In addition, it supports M&M second theory which states that tax rate can give benefit in issuing debt, making levered firms have more value than unlevered firms.

D. Financing Strategy for PT Adhi Karya Tbk

Based on the calculation before, PT Adhi Karya Tbk's value will be maximized by having 27% debt and 73% equity as its capital structure, resulting in 14.5262% cost of capital. Meanwhile, the proportion of PT Adhi Karya Tbk's current capital structure before receiving the additional equity through PMN and rights issues is 40% of debt and 60% of equity.

However, given the additional equity in total of 3.87 trillion IDR, the proportion of capital structure of PT Adhi Karya Tbk will be 23% of debt and 77% of equity. Meaning, the weight of debt is lower and the weight of equity is higher than the optimal proportion. Since there is a gap between the optimal capital structure and the capital structure that has included the additional equity, financing strategies

have to be stated for PT Adhi Karya Tbk to reach the optimum number.

Table 8 - CAPITAL STRUCTURE AFTER ADDITIONAL EQUITY

Variable	Current Capital Structure	Optimal Capital Structure	The Gap
Weight of Debt	23%	27%	4%
Weight of Equity	77%	73%	-4%
Debt	2,150,390,880,639	2,485,984,789,483	335,593,908,844
Equity	7,056,960,191,520	6,721,366,282,676	(335,593,908,844)
Total Capital	9,207,351,072,159	9,207,351,072,159	

In regards with the table above, the amount of optimal debt is calculated by multiplying the optimal weight of debt (27%) to the total capital after additional equity (9,207,351,072,159 IDR), which results 2,485,984,789,483 IDR. The same goes to the amount of optimal equity, the optimal weight of equity (73%) is multiplied by the total capital after additional equity, resulting in 6,721,366,282,676 IDR.

Based on the table above, it can be concluded that in order for PT Adhi Karya Tbk to reach the optimal capital structure, PT Adhi Karya Tbk has to decrease its additional equity capital for 335,593,908,844 IDR and issue long-term debt for 335,593,908,844 IDR. This will decrease its cost of capital from 14.66% to 14.53% which will maximize the firm's value. For decreasing the additional equity, as the firms want to avoid the dilution effect by keeping the proportion of government shares 51% and public shares 49%, the deduction allocation will be decreasing PMN for 171,152,893,511 IDR and decreasing rights issues for 164,441,015,334 IDR as shown in the following table:

Table 9 - AMOUNT TO DECREASE FOR EQUITY CAPITAL

Ownership	Shares	Amount to Decrease
Government Indonesia	51%	171,152,893,511
Public	49%	164,441,015,334
Total additional equity to decrease		319,884,943,339

IV. DISCUSSION

Patel, Zeckhauser, and Hendricks (1991) mentioned a behavioral perspective using birds and wildebeest as the analogy of managers that have a tendency to follow their peers or industry in financing decisions. As it is done by group, they note that as a safety number. For instance, even if the debt turns out to be excessive, a management who chooses to take on a considerable amount of debt only because other companies in the sector have done so is unlikely to be fired [5]. However, in this case, PT Adhi

Karya Tbk will receive the additional amount of equity capital that will make the firm deviate from the industry average, not align. As according to Damodaran (2015) the industry average of capital structure is too strong to be ignored [6], the optimal capital structure of PT Adhi Karya Tbk needs to be conducted to assure that the action of additional equity is appropriate. After conducting the analysis, it turns out that the additional equity will shift PT Adhi Karya Tbk to be near its optimal capital structure. The current capital structure of PT Adhi Karya Tbk given the additional equity will be 23% of debt and 77% of equity, while the optimal capital structure based on the analysis above is 27% of debt and 73% of equity. In other words, the optimal capital structure for PT Adhi Karya Tbk is not within the range of industry average, which consists of debt 57% and equity 43%. Therefore, it is proper for PT Adhi Karya Tbk to deviate from the industry average since it is not at the optimal level for the firm.

As mentioned before, PT Adhi Karya Tbk has both taxable and non-taxable earnings from its business lines due to the implementation of final and non-final tax based on the laws of tax income in Indonesia. Nonetheless, PT Adhi Karya Tbk's taxable earning is only 24.71% compared to the non-taxable earning which is 75.29%. Based on article 27 paragraph (2) PP 45/2019 law [13], the interest expense should be allocated based on the proportion of taxable and non-taxable earnings. Meaning, the tax benefit that can be gained from issuing the debt will not be that high since the interest expense that is tax-deductible is only 24.71% from the total interest expense. In regards to the analysis before, it is aligned to PT Adhi Karya Tbk's optimal capital structure at 23% debt level, which is quite low since the benefit from debt is not that high. Moreover, the result of cost of capital calculation in the range of 0% to 30% of debt level is also very close (see Table 3), which indicates that having almost no debt is giving the firm the lowest cost of capital due to the lack of tax benefit. The use of debt is not giving a significant impact to the reduction of the firm's cost of capital since the income of construction business is charged to final-tax. It can be seen in the result of the optimal capital structure analysis, even the optimal capital structure suggests the firm to shift to the mix of 27% debt and 73% equity, the cost of capital is only reduced to around 0.1%. Meaning, the shareholders wealth only increases slightly by shifting to the optimal capital structure. It is in accordance with Trade-off Theory, which explains that a firm will only borrow money until the benefit of issuing debt offsets its costs.

V. CONCLUSION

The scope of the research is to calculate the optimal combination of debt and equity as the capital structure for PT Adhi Karya Tbk. This work aims to maximize the value of the firm and to assess the equity financing from the government in the form of PMN and corporate plan

to issue rights, whether it is an appropriate decision for the firm's optimal capital structure considering it deviates from industry average. For the data in this research, the author used secondary data.

PT Adhi Karya Tbk current capital structure's proportion consists of 40% debt and 60% equity. Within this current mix of debt and equity, the cost of capital of PT Adhi Karya Tbk is 14.66%. If the amount of additional equity from PMN and rights issues as much as 3.87 trillion IDR is added, the current capital structure proportion of PT Adhi Karya Tbk will be 23% of debt and 77% of equity. Meanwhile, in order to reach the optimal capital structure, the mix of debt and equity should be 27% and 73% respectively. By doing so, PT Adhi Karya Tbk can lower its cost of capital to 14.53% and maximize the value of the firm. Thus, there is a gap between the current and the optimal capital structure.

In order to achieve the optimal capital structure, the managerial implementations that has to be made are decreasing the amount of equity capital that the firm planned to raise for 335,593,908,844 IDR and acquiring that amount by debt capital instead. As PT Adhi Karya Tbk wants to avoid the dilution effect by keeping the ownership proportion of 51% Indonesia Government and 49% public, the amount of equity capital should be decreased based on that proportion. In other words, in decreasing the equity capital to reach the optimal capital structure, PT Adhi Karya should decrease the amount of PMN they will receive for 171,152,893,511 IDR and rights issues for 164,441,015,334 IDR. Meanwhile, to increase the debt level, PT Adhi Karya Tbk should issue more debt, whether by issuing bonds or bank loans.

By referring to the optimal capital structure analysis above, it is appropriate for PT Adhi Karya Tbk to deviate from the industry average by increasing their equity proportion and decreasing their debt proportion given the current capital structure before the additional equity. Although industry average is often to be considered as a benchmark, PT Adhi Karya Tbk should not see the industry average as its target capital since it does not align with the firm's optimal capital structure. PT Adhi Karya Tbk should do their own assessment of capital structure to assure its optimal level.

For further research, the author suggests to analyze the effect of final-tax income to the optimal capital structure of construction and real estate industry in Indonesia. Because based on the analysis in this paper, the final-tax income term minimizes the tax benefit that the PT Adhi Karya Tbk able to gain as it is charged directly to the revenue that the firm gets. As a result, the cost of capital is not decreased in a significant way for a lower debt ratio. Therefore, it has to be analyzed whether the optimal capital structure is relevant in this industry.

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