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Capital Cost and Profitability in Heavy Machinery Rental Companies for Large Mining

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Abstract- The purpose of this study is to determine the weighted average cost of capital and profitability in the sample: Zamine Perú S.A.C. - Cajamarca, implementing a quantitative, non-experimental, and longitudinal approach, since it is intended to expose the cost of capital variable by applying the methodologies of the Capital Asset Pricing Model (CAPM) and the Weighted Average Cost of Capital (WACC), and the profitability variable by applying the methodologies of the Economic Value Added (EVA) and the Free Cash Flow (FCF). It was determined that even though this type of company works with a high percentage of debt, which affects the reduction of profitability, it also considerably reduces the cost of capital, so it remains a conservative and profitable company.

Keywords. *Cost of capital, profitability, CAPM, WACC, EVA, IRR.*

I. Introduction

In Latin America, project evaluation has been linked to the discipline of finance, and its influence is highlighted in the use of tools with a financial approach. Thus, when talking about project evaluation, it is related to profitability analysis, making use of indicators such as the Net Present Value, the Internal Rate of Return (IRR), and, in some cases, the Economic Value Added (EVA) is mentioned. [1]

Therefore, companies must be constantly adapting, so they make strategic plans to achieve success according to the proposed business objectives. Commercial and service companies try strategic plans to pursue the long-term generation of Economic Value Added (EVA) as a measure of managerial management so that it contributes to the benefit of shareholders and stakeholders by Ledesma, (2018) cited in Alvear Chávez et al., (2022) [2]. Likewise, companies seek long-term profitability and sustainability. Therefore, project investments must comply with these two purposes. The main reason for evaluating the profitability of an investment, whether private or social, must be determined in advance to know whether it will generate profits for investors at the end of a certain time horizon previously defined. [3]

On the other hand, according to Zúñiga Jara et al. (2011) [3], in the evaluation of projects of private companies, it is suggested to use the net present value (NPV) criterion as an economic measure of convenience. To make investment decisions, the procedure consists of three steps: to estimate the cash flows coming from the project, to calculate the discount rate (i.e., the weighted average cost of capital, WACC), and, finally, to estimate the NPV by using the correct definition of flows and rates. The Weighted Average Cost of Capital (WACC) is used in financing various applications, including capital budget analysis, EVA calculations, and business valuation [4].

Other concepts on which this research is based are: (1) the risk-free rate (Rf), which allows knowing the minimum return an investor expects when distributing her or his money in risk-free investments. To compensate the different investors for the additional risk involved in holding equity investments, the capital market expects a return with a premium rate above this risk-free rate of assets [5].

(2) Market risk is an indicator that measures the possibility of suffering losses in financial markets. It represents a control and audit tool that obtains data on the slope of risk in the investments made. For this reason, it is measured primarily by the senior management of a company's financial sector [6].

$$R_p = \sum_{i=1}^{n} W_i * R_i$$

Where:
Rp: portfolio yield
Ri: return on assets "i"
Wi: portfolio ratio, at market value, invested in the asset "i".
n: number of different assets.

Fig. 1. Calculation of market risk
Retrieved from Salinas Ávila (2009) [7].

(3) The country-risk premium is usually estimated as the difference between the yields of long-term (e. g. 10-year) sovereign bonds issued by a developed country (generally the United States) and the emerging country concerned [8].

The CAPM was created by William Sharpe, John Lintner, and Jan Mossin, and was developed to determine the expected rate of return of an asset by calculating the risk, separating it into two types of risk: systematic and unsystematic. Consequently, the CAPM model is used to set the cost of capital thanks to its calculation [9].

To use the CAPM model it is important to determine the (4) beta coefficient to use it as a deduction of the opportunity cost of capital since it considers the systematic risk, i.e., the risk related to market fluctuations and general economy within the interest rate, which allows for a better evaluation of investment projects [10].

(5) Income tax (Tax.) is one of the most important taxes within tax systems worldwide. History indicates that its structure and application have evolved gradually, adapting its applicability to the new requirements of international trade and finance [11].

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Financial Statements are reports that show the situation of the firm and what happened during a certain period within it. The most used ones are the Statement of Financial Position and the Income Statement [12].

The Net Present Value (NPV) of a project is the current/present value of the net cash flows of a proposal, where net cash flows are understood as the difference between periodic revenues and expenses. To update these net cash flows, a discount rate called the expectation or alternative/opportunity rate is used, which is a measure of the minimum profitability required by the project, which allows recovering the investment, covering costs, and obtaining benefits (Fig. 2.) [13].

$$VAN = \sum_{t+1} \frac{Ft}{(1+k)^t} - I_0$$

Where:

VAN = Net Present Value
Ft = Expected cash flows from time zero to time t
K = Cost of capital or discount rate
Io = Initial investment at time zero

Fig. 2. Calculation of NPV
Retrieved from Altuve G. (2004) [14].

The cost of capital is the required return of the company on the equity capital invested, so it should reflect the average cost of all the dissimilar sources of long-term financing that have been used by Mascareñas, Innovación Financiera, 1999 cited in Ibáñez et al., (2017) [15]. Likewise, it is the minimum rate of return that the company's investments must provide to maintain, at least equal, the value of the organization's shares in the capital markets [16].

$$k_e = r_f + \beta * [r_m - r_f] + RP$$

Where:

Ke = Cost of equity
rf = Risk-free rate
B = Market beta
rm = Market risk
RP = Country risk

Fig. 3. Cost of Capital Calculation
Retrieved from Cabrejos Polo (2003) [16].

The indicator par excellence to measure this cost of capital is the weighted average cost of capital (WACC) rate since it allows valuing a company and projecting valuation scenarios to establish strategies by the entity's management to avoid the materialization of unfavourable scenarios [17].

$$WACC = Kd * \frac{D}{D+E} + Ke * \frac{E}{D+E}$$

Where:

Kd = After-tax cost of debt (known tax rate T)
Ke = Cost of equity, which is approximated using the C.A.P.M. model
D/D+E = Optimal leverage structure, based on industry average.

Fig. 4. Calculation of WACC
Retrieved from Villarreal Navarro (2005) [18].

In this context, the following research question was formulated in this study: What is the weighted average cost of capital and profitability of the company Zamine Perú S.A.C. - Cajamarca? Therefore, it was proposed to determine the weighted average cost of capital and profitability of the company Zamine Perú S.A.C. - Cajamarca, 2020. Concerning the hypothesis of this research, it is expected that the weighted average cost of capital will be lower than the rate of profitability of the company Zamine Perú S.A.C. - Cajamarca.

II. METHODOLOGY

It is a quantitative research study. It uses data collection with numerical measurement in the process of interpreting the information obtained by the company. The design is non-experimental since it is performed without manipulating variables deliberately, and longitudinal or evolutionary; it also analyzes changes over time (Hernández S. & Fernández C., 2014) [19].

According to the National Superintendency of Customs and Tax Administration by SUNAT (2021) [20], currently, there are more than 130 companies in the heavy machinery rental business in general. The sample is the group of individuals taken from the population to study a statistical phenomenon (Tamayo & Tamayo, 1998) [21]. By the research nature, the population and the sample are formed by the company based on the balance sheet documents of the company ZAMINE PERÚ S.A.C.

For the inclusion criteria, the date range of the documents was considered (dated between 2016 and 2019) and the area the documents belong to (Accounting, Finance, and Financial Statements: Balance Sheet, Income Statement). Likewise, the exclusion criteria considered were those external documents from the accounting and finance area, and Cash Flows from years before 2016.

The technique used is documentary analysis, considered as the set of operations aimed at representing the content and form of a document to facilitate its consultation or retrieval, or even to generate a product that serves as a substitute (García, 1993) [22], and the documentary analysis guide was considered as the instrument, so a date for data collection was agreed with the company's manager. Thus, the Financial Statements and the Profit and Loss Statement of the company ZAMINE PERÚ S.A.C between 2016 and 2020 were compiled; then, the Income Statement (Annex 1), the Statement of Financial Position (Annex 2), and the Free Cash Flow (Annex 3) were projected to 6 years, as specified in the assumption sheet for the short- and long-term projections. Projections were made under the assumptions of the Documentary Guide attached in Table 1.

TABLE 1.
Documentary Guide

N°	DIMENSION	QUANTITATIVE VARIABLES	SOURCE	VALUE	TYPE	YEAR
1	Net Present Value (NPV)	Growth rate, (g.1)	Zamine Perú SAC	10	Percentage	2019
2	Net Present Value (NPV)	Growth rate, (g.2)	Central Reserve Bank of Peru (BCRP)	2.38	Percentage	2019
3	Cost of debt (Kd)	Debt interest rate	Zamine Perú SAC	1.38	Percentage	2019
4	Cost of Capital (Ke), Net Present Value (NPV)	Income tax rate (Tax.)	National Superintendency of Customs and Tax Administration (SUNAT)	29.50	Percentage	2019
5	Cost of Capital (Ke)	Risk-free rate (rf)	Investing.com	1.27	Percentage	2019
6	Cost of Capital (Ke)	Market risk premium (rm - rf)	Yahoo! Finance	6.99	Percentage	2019
7	Cost of Capital (Ke)	Beta "B"	Damodarán OnLine	1.05	Units	2019
8	Cost of Capital (Ke)	Country Risk (CR)	Damodarán OnLine	1.16	Percentage	2019

Note: The short-term growth rate used has a confidence interval of 95% and a margin of error of 5%. The risk-free rate was obtained in relation to the U.S. sovereign bond for 2019 (AAA+ risk rating). As for market risk, this was obtained from the Standard and Poor's 500 (S&P 500) annual average return, which represents a rate of return of 8.26%. The market beta was obtained from the New York University Stern School of Business (2021), calculated by Aswath Damodaran for the Machinery industry. Finally, for country risk, we have worked on the risk represented by investments in Peru, which amounts to a total score of 1,160 units, which is 1.16% in percentage value.

Finally, the process for obtaining results involves the calculation of two variables: the first one is the cost of capital. To find this result, the Weighted Average Cost of Capital (WACC) was calculated using the Capital Asset Pricing Model (CAPM) methodology. For this, it is important to calculate mainly the cost of equity (ke) and the cost of debt (kd); then, to attach the results found through the documentary analysis of the following variables: risk-free rate (rf), free-market rate (rm), tax rate in Peru (Tax), and, finally, country risk rate (CR).

Concerning the second variable, which was to measure the profitability of the sample, the internal rate of return was calculated. For this purpose, two methodologies were applied: the first one sought to find the present value of the company, and, for this purpose, the methodology used was the Economic Value Added (EVA). The second sought to project the cash flows of the sample. For this purpose, the Adjusted Free Cash Flow (FCF) methodology was used. For both methodologies, a perpetuity projection was made considering the historical data of the financial statements of the sample with a background of five years in the past and a projection of five to six years in the future.

III. Results

To find the cost of capital variable, three calculations were made (1, 2, and 3), which are detailed in the following paragraphs.

The first (1) calculation to be made is the cost of equity in the sample, using the data of items 4, 5, 6, 7, and 8 attached in Table 1, in the CAPM formula shown in Figure 3, to obtain the following equation (Fig. 5):

$$k_e = r_f + \beta * [r_m - r_f] + RP \dots (Fig. 3)$$

$$k_e = 1.5\% + 1.05 * [8.26\% - 1.27\%] + 1.60\%$$

$$k_e = 9.77\%$$

Fig. 5. Cost of Equity Equation (Ke)
The United States has been considered over Canada, even though both countries have AAA+ risk ratings.

The second (2) calculation is the financing cost of the sample. To determine this variable, the financial solvency ratio formula is used considering the financial expenses in the sample, which amount to US$196,499, and then they are divided by the adjusted net liabilities, which amount to US$14'242,100. This is summarized in the following equation (Fig. 6):

$$K_d = \left|\frac{Financial\ Expenses}{Adjusted\ Net\ Liabilities}\right| * 100$$

$$K_d = \left|\frac{-134{,}812 + -61{,}686}{14'242{,}100}\right| * 100$$

$$K_d = 1.38\%$$

Fig. 6. Cost of Debt Equation (Kd), it has been considered to work with absolute values, since, in general, the presentation of debt financial statements in the income statement is made with negative numbers and, to obtain the cost of debt (Kd), it is only necessary to enter the absolute values in the formula execution.

The third (3) calculation is the Weighted Average Cost of Capital (WACC), after obtaining the variables in Figures 5 and 6. The results of these are replaced in the WACC equation (Figure 4). The result of this equation is 3.94% as shown in the figure below (Fig. 7):

$$WACC = \%D * K_d * (1 - Tax) + \%P * K_e \dots (Fig. 4)$$

$$WACC = 66.24\% * 1.38\% * (1 - 29.50\%) + \cdots$$

$$\dots + 34.76\% * 9.77\%$$

$$WACC = 3.94\%$$

Fig. 7. Cost of Capital (WACC)
For the results of this equation, the level of income tax in Peru has been considered, which amounts to 29.5%; the percentage of debt in the liabilities of the sample has also been considered (66.24%), which is calculated by dividing the total liabilities by the total assets. Finally, the percentage of debt in the equity of the sample has been considered (34.76%), which is calculated by dividing total equity by total assets.

This result of 3.94% as the weighted average cost of capital is exceptionally low compared to the traditional result of this indicator. In the case of the research entitled "The impact of the WACC on the valuation of companies", Ibáñez, Noriega & Gualdrón, p. 12 (2017) [15] explain in table 5 that, the higher the percentage of equity, the higher the cost of capital. This explains the low result of the sample of this research by maintaining a proportion of equity relatively lower than normal (34.76%) [2] [4] [5] [18].

To find the profitability variable, only two calculations were made (4 and 5), which are detailed in the following paragraphs.

The fourth (4) calculation is the net present value (NPV) of the sample. For this purpose, the Income Statement has been projected based on the short-term growth rate (g.1), which amounts to 10% (Table 1). The Statement of Financial Position has been projected based on the long-term growth rate (g.2), which amounts to 2.38% (table 1) according to the average data of Peruvian inflation in 2019. These financial statements are described in greater detail in Annex 1 and Annex 2.

Once the WACC has been calculated, it will be used as the discount rate to discount the projected free cash flow. Subsequently, the corresponding sum will be added as shown in Figure 3 to calculate the economic value added (EVA). The results are attached in Annex 3, after having projected the main financial statements of the sample. The NOPAT is calculated, dividing the Total Net Assets to obtain the ROIC. This result is then added to the NPV formula shown in Figure 2. The results are shown in Annex 4.

Once the present value projection is obtained in Annex 4, these cash flows are discounted to find their present value after summing all the projections. This result indicates that the NPV of the sample is US$101,427,005. To this, the Total Net Assets amounting to US$27,184,206 are added, resulting in the Net Present Value of the company according to the EVA and Discounted Free Cash Flow (DFCF) methodology, which amounts to a total net present value of US$128,611,211. This result is attached in Annex 5, where both methodologies conclude with the same net present value.

The last calculation (5) to be made is the internal rate of return (IRR), to compare it with the minimum rate of return for the investor in this company. This minimum rate is represented through the weighted average cost of capital (WACC) shown in Figure 7, which results in a total of 3.94%. Regarding the IRR calculation, the result after equating the NPV rate to zero "0.00" is 8.67%, as shown in the following equation (Fig. 8):

$$VAN = \sum_{t=10} \frac{F_t}{(1+TIR\%)^t} - I_0$$

$$128'611{,}211 = \frac{882{,}164}{(1+TIR\%)^1} + \frac{1'250{,}670}{(1+TIR\%)^2} + \frac{719{,}744}{(1+TIR\%)^3} + \frac{-268{,}773}{(1+TIR\%)^4} + \frac{2'198{,}992}{(1+TIR\%)^5} + \frac{2'222{,}626}{(1+TIR\%)^6} + \cdots$$

$$\ldots + \frac{2'273{,}074}{(1+TIR\%)^7} + \frac{2'352{,}997}{(1+TIR\%)^8} + \frac{2'462{,}284}{(1+TIR\%)^9}\frac{2'599{,}012}{(1+TIR\%)^{10}} - 27'184{,}206 = 0$$

$$TIR\% = 8.67\%$$

Fig. 8. Internal rate of return in perpetuity, for calculating the IRR in this equation, it has been considered to work as perpetuity. Therefore, the cash flows have been projected until the discount rate reaches zero. The total cash flows are shown in Annex 3.

The internal rate of return is 8.67%, a conservative indicator. This result is because the company has a high-debt policy. This benefits the company's risk rating because it not only remains sustainable over time but also drastically reduces tax payments. However, it also leads to a reduction in profitability margins. This is better appreciated in the research of "The use of the net present value and the internal rate of return for the valuation of investment decisions" (Altuve, 2004, p. 13) [23], who in his second methodology applies the traditional method of E. Schneider for the internal rate of return because the projected cash flows are positive. There is a negative initial investment in the project and a known time horizon, being the methodology that best fits the sample of this research, where the result is equally conservative.

IV. Conclusion

Based on the results obtained, it can be concluded that the Cost of Equity of the sample is lower than the rate of return. This is because the risk represented by the company's assets has been reduced to a great extent thanks to the debt ratio, which is three times higher than the assets of Zamine Perú SAC.

Finally, the valuation of the sample according to the two methodologies presented (NPV and EVA) coincide with a positive result in favour of the company Zamine Perú SAC, even though the cash flows were unfavourable in the year 2020 due to the consequences of the global pandemic. Despite this, the result was not considerably reduced, due to the low capital risk of this company.

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ANNEXES

Annex N° 1. Income Statement 2016 – 2020.

NET SALES	2016	2017	2018	2019	2020
(+) TOTAL NET SALES	16,327,563	6,074,025	7,081,430	5,792,304	2,389,636
(+) TOTAL OPERATING COST	- 13,977,404	- 3,905,021	- 4,367,881	- 3,809,479	- 1,786,070
(=) GROSS MARGIN	2,350,159	2,169,004	2,713,550	1,982,825	603,566
(+) RESULT BEFORE INCOME TAX	4,966,648	4,943,560	5,653,330	5,095,939	3,898,864
(=) NET GAIN/(LOSS)	**2,634,522**	**2,504,664**	**3,102,074**	**2,426,438**	**1,104,918**

Annex N° 2. Balance Sheet 2016 – 2020.

ASSETS	2016	2017	2018	2019	2020
(+) Total current assets	25,653,316	26,263,865	26,888,945	27,528,902	28,184,090
(+) Total non-current assets	898,947	920,341	942,246	964,671	987,630
(=) TOTAL ASSETS	**26,552,263**	**27,184,206**	**27,831,191**	**28,493,573**	**29,171,720**

CURRENT LIABILITIES	2016	2017	2018	2019	2020
(+) Total current liabilities	18,861,945	19,394,160	19,939,041	20,496,890	21,068,016
(+) Total Equity	7,690,317	7,790,047	7,892,150	7,996,683	8,103,704
(=) CURRENT LIABILITIES + EQUITY	**26,552,263**	**27,184,206**	**27,831,191**	**28,493,573**	**29,171,720**

Annex N° 3. Adjusted Free Cash Flow 2016 – 2020 (Part 1 of 2)

Free Cash Flow	2016	2017	2018	2019	2020
NOPAT	1,656,862	1,529,148	1,913,053	1,397,891	425,514
(-) Net investment	631,944	646,984	662,382	678,147	694,287
(=) Free Cash Flow - FCF	**1,024,918**	**882,164**	**1,250,670**	**719,744**	**- 268,773**

Annex N° 3. Adjusted Free Cash Flow 2016 – 2020 (Part 2 of 2)

Free Cash Flow	2021	2022	2023	2024	2025	2026
NOPAT	2,909,803	2,950,355	3,018,123	3,115,777	3,243,219	3,398,532
(-) Net investment	710,811	727,728	745,048	762,780	780,935	799,521
(=) Free Cash Flow - FCF	**2,198,992**	**2,222,626**	**2,273,074**	**2,352,997**	**2,462,284**	**2,599,012**

Annex N° 4. Economic Value Added 2017 – 2020 (Part 1 of 2)

ACCOUNTS	2016	2017	2018	2019	2020
Operating Profit	2,350,159	2,169,004	2,713,550	1,982,825	603,566
NOPAT	1,656,862	1,529,148	1,913,053	1,397,891	425,514
Total assets	**26,552,263**	**27,184,206**	**27,831,191**	**28,493,573**	**29,171,720**
(-) Non- ope**rative** assets	-	-	-	-	-
(-) Non- ope**rative** liabilities	-	-	-	-	-
(=) Total net assets	**26,552,263**	**27,184,206**	**27,831,191**	**28,493,573**	**29,171,720**
Economic Value Added					
ROIC	6.24%	5.63%	6.87%	4.91%	1.46%
WACC	3.94%	3.94%	3.94%	3.94%	3.94%
(=) EVA	**609,949**	**457,318**	**815,713**	**274,435**	**- 724,680**

Annex N° 4. Economic Value Added 2017 – 2020 (Part 2 of 2)

ACCOUNTS	2021	2022	2023	2024	2025	2026
Operating Profit	4,127,380	4,184,900	4,281,025	4,419,542	4,600,310	4,820,613
NOPAT	2,909,803	2,950,355	3,018,123	3,115,777	3,243,219	3,398,532
Total assets	**29,866,007**	**30,576,818**	**31,304,546**	**32,049,594**	**32,812,375**	**33,593,309**
(-) Non-ope**rative** assets	-	-	-	-	-	-
(-) Non- ope**rative** liabilities	-	-	-	-	-	-
(=) Total net assets	**29,866,007**	**30,576,818**	**31,304,546**	**32,049,594**	**32,812,375**	**33,593,309**
Economic Value Added						
ROIC	9.74%	9.65%	9.64%	9.72%	9.88%	10.12%
WACC	3.94%	3.94%	3.94%	3.94%	3.94%	3.94%
(=) EVA	**1,732,234**	**1,744,759**	**1,783,834**	**1,852,113**	**1,949,479**	**2,074,002**

Annex N° 5. Current Economic Value Added 2017 – 2021 (Part 1 of 2)

Current Economic Value Added	2017	2018	2019	2020	2021
Discount factor	0.96	0.93	0.89	0.86	0.82
VP. FCF	848,701	1,157,587	640,906	- 230,254	1,812,386
VP. EVA	439,970	755,002	244,375	- 620,824	1,427,689
Firm value according to DFC	**128,611,211**				
Firm value according to EVA	**128,611,211**				

Annex N° 5. Current Economic Value Added 2017 – 2021 (Part 2 of 2)

Current Economic Value Added	2022	2023	2024	2025	2026
Discount factor	0.79	0.76	0.73	0.71	45.18
VP. FCF	1,762,378	1,734,010	1,726,890	1,738,549	117,420,059
VP. EVA	1,383,465	1,360,794	1,359,286	1,376,472	93,700,776