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Strategic Investment Decision-Making: A Comprehensive Evaluation of Project Aspire and Project Wolf Utilizing Investment Appraisal Techniques and Financial Source Impact on Weighted Average Cost of Capital

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Abstract

This study navigates the field of strategic investment decision-making by undertaking a detailed evaluation of two prospective enterprises submitted to AYR Co., Project Aspire and Project Wolf. To evaluate the most profitable alternative for investors, the evaluation includes investment appraisal methodologies such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period. Also, the study investigates the effect of financial sources, namely equity and debt financing, on the Weighted Average Cost of Capital (WACC). The analysis reveals that both projects have beneficial NPVs, appropriate IRRs, and comparable payback durations. Despite the proximity of financial measurements, Project Wolf stands out with a higher IRR, indicating that it has the potential to outperform AYR Co.'s normal return. In making the ultimate investment decision, the research takes into account risk, necessary return, and non-financial variables. Furthermore, the review examines the implications of selecting between equity and debt financing. While both approaches offer benefits and drawbacks, the study reveals that debt financing may be preferable if the interest rate is 10% or below. The WACC analysis under various financing scenarios shows that the source of money has no major impact on the WACC. Finally, the analysis suggests investment in Project Wolf due to its competitive financial performance and attractive IRR. Moreover, if the interest rate remains lower or equal to ten percent, it encourages exploring debt financing, providing insights for AYR Co. in making enlightened strategic investment decisions.

Keywords: *Strategic Investment; Project Aspire and Project Wolf; Weighted Average Cost of Capital*

1.0 Introduction

The investment of present financial resources to generate larger future profits is described as an interest. It is concerned with what is known as uncertainty domains. As a result of this description, the significance of time and the future appears to become two essential factors in investing. As a result, any information that may aid in forming a

vision of the degrees of confidence in the future status of investment is crucial (Investment, 2021). Two enticing investment concepts, Project Aspire and Project Wolf have been presented to AYR Co., one of which will be chosen based on the likelihood of a larger return than the other. This examination plans to use certain notable venture assessment techniques to assess which speculation would offer the most benefit to investors, just as to recommend which type of subsidizing would be ideal among obligation and value financing.

To begin, this study calculates the Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period of operations Aspire and Wolf. This is determined using available data on fuel consumption, estimated income, material expenses, tax collection, and other anticipated expenditures. Furthermore, a percentage of hazard evaluation is applied to the suggestions to position the extended values in relation to the chance of an incident. The study then goes on to create a basic correlation of the results from the speculative evaluation calculations mentioned above. Along with some extremely well-informed suppositions and other non-monetary considerations, the study creates a simple connection between the two jobs in question and determines which one provides more value to AYR Co. stockholders. Lastly, after distinguishing the decision speculation, the report concludes by examining the effects of using either value financing or obligation financing on the organization's Weighted Average Cost of Capital (WACC) and the profit from the value of the investors to make the best decision.

Task Yearn and Undertaking Wolf both exhibit good Net Present Qualities, reasonable Inward Rates of Return, and short Restitution Periods within a comparable range, according to the research. Although AYR Co. has an alarmingly high obligation value proportion, an examination of the decision to use either value financing or obligation financing to subsidize the chosen project also shows that the choice is heavily influenced by the cost of obligation, which is the loan cost charged by the moneylender.

2.0 Investment Appraisal Techniques

Payback period, internal rate of return, net present value, accounting rate of return, and profitability index are some of the investment assessment methodologies used. They're mostly used to assess how well a new project is performing (Borad, 2021). Before starting any new project, the first question that comes to mind is, "Is it feasible or beneficial?" These methods provide excellent answers to this question. Each approach looks at the topic from a different perspective and offers a unique viewpoint (Borad, 2021).

Because investment appraisal is a form of fundamental analysis, it may tell a trader if a firm or business has long-term potential based on future initiatives and efforts' profitability. When an organization chooses a large series of quality investment initiatives, there are a greater risk of revenue, cost, and cash flow issues. Before buying a company's shares, a trader should consider this factor (IG, 2021). The Payback period, internal rate of return, the net present value of Project Aspire and Project Wolf have been computed and are given here.

2.1 Payback Period

The Payback period is all about capital planning in the corporate world. One of the most important concepts that every company financial inspector should understand is how to value various speculations or operational operations. The investigator must devise a reliable strategy for determining the most beneficial work or endeavour to undertake. The compensation time is one method that company financial gurus do this (Ss.kln.ac.lk. 2021).

The attractiveness of a bet is inextricably linked to the length of time it takes to recover your investment. More restricted remunerations imply more intriguing possibilities. The restitution time frame is used by financial backers and directors to make quick judgments about their businesses (Ss.kln.ac.lk. 2021). The concept of a restoration phase is commonly used in financial and capital planning. However, it has also been used to determine the cost of energy efficiency innovation investment funds. It may, for example, be used by mortgage holders and businesses to calculate the profit from energy-efficient technologies such as solar-powered boards and protection, as well as support and redesigns. On the other hand, the restitution period disregards the changing worth of money over time. It's calculated by multiplying the number of years it'll take to regain the assets contributed by the number of years it'll take to reclaim the assets (Ss.kln.ac.lk. 2021). According to the schedules in the tables below the payback times for investments in Project Aspire and Project Wolf are 3.63 and 3.14 years, respectively. This corresponds to approximately 3 years and 8 months and 3 years and 2 months, respectively.

According to WallStreetMojo, (2021) one disadvantage of using the payback period would be that it does not account for the Value of money. This technique ignores the reality that a dollar now is worth far more than a dollar promised in the future.

2.2 Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is the rate of return used to make a developer's net present value (NPV) zero. To put it another way, it's the projected yearly compounding return on investment on a project's cost. Expected cash flows for a project or investment are supplied when computing IRR, and the NPV is set to zero. In other words, the original cash investment for the first period will be equivalent to the value of the investment portfolio's future cash flows (Corporate Finance Institute, 2021). According to the NPV profiles in tables 3 and 4, the IRR for Project Aspire and Project Wolf is 12.7 percent and 15.6 percent, respectively. Appendices include detailed computations.

2.3 Net Present Value (NPV)

The difference between the current value of cash inflows and withdrawals over some time is known as net present value (NPV). The net present value (NPV) is a calculation used in corporate finance and investment management to determine the sustainability of a proposed income-generating asset (Pike and Neale, 2009). The net present value (NPV) analysis according to Corporate Finance Institute (2021) is used to assess the value of an investment, a project, or any sequence of cash flows. It is a comprehensive statistic since it includes all revenues, expenditures, and capital costs connected with a given investment in its Free Cash Flow (FCF). It is considered a drawback that NPV cannot be used to compare projects of various sizes. The net present value (NPV) is an absolute number, not a percentage. As a result, the NPV of larger projects will invariably be higher than that of smaller ventures. NPV has the drawback of not being able to compare projects of various sizes. The net present value (NPV) is an absolute amount, not a percentage. As a result, the NPV of larger projects is invariably higher than that of smaller enterprises (Thakur, 2021). According to the anticipated cash flow statements in Table 5 (five) and 6 (six), the NPV for Project Aspire and Project Wolf is $170,506 and $305,216, respectively. Detailed computations are in the appendices.

3.0 Evaluation of Investment Choices

The amount of risk entangled, the expected return by the management of the company, the investment's destination, biodegradability, as well as environmental standards are illustrations of other factors that must be considered before making a conclusive statement upon what investment, whether any, to somehow get associated in.

3.1 Final Investment Decision Factors

Projects Aspire and Wolf have been evaluated using discounted (NPV) and non-discounted (IRR and Payback Period) methodologies, and these are the criteria being considered, Risk, Require Return, and Non-Financial Considerations are the additional variables that have been considered before the suggestion for the ultimate investment choice.

3.1.1 Risk

According to Invest19 (2020) when people invest within their risk tolerance, they have a better chance of achieving their financial objectives. For example, if you have a high-risk tolerance, you may build a sizable portfolio by investing in small- and mid-cap companies over a lengthy period. Blue-chip stocks, on the other hand, might be beneficial if you have a modest risk appetite. Everyone seems to have a distinct hunger, either for food, risk-taking, or disposition. Most aren't willing to take big risks in exchange for extras. As a result, each investor should assess their risk appetite to ensure that stock investments are in line with the investor's financial objectives.

The Weighted Average Cost of Capital (WACC), which is the least amount of return necessary to fulfil the yearnings of AYR Co. shareholders, has been utilized as the discount rate to estimate the NPV in previous assessments. Such value is suitable for a low-risk project such as Project Aspire, in which the money will be used to expand the current company, with a concentration on existing clients and maybe some new ones. The risk is much higher for a higher-risk company, such as Project Wolf, which intends to deploy new items to attract new customers.

When using the subjective method, a 50% mark-up was applied to the WACC, resulting in a 15% increase in the discount rate. Assuming that the 10 percent and 15% discount rate scenarios have a 50:50 chance of occurring:

The Expected NPV for Project Wolf = P1X1 + P2X2 (UNICAF/USW, 2021)
Where P1 = Probability of 10% Outcome = 0.5
P2 = Probability of 15% Outcome = 0.5
X1 = NPV at 10% Discount Rate = $305,216 (Appendix 7.2 - ix)
X1 = NPV at 15% Discount Rate = $33,682 (Appendix 7.2 - x)
Expected NPV for Project Wolf = (0.5 305,216) + (0.5 33,682)
= 152,608 + 16,841
= $169,449

3.1.2 Required Return

The required rate of return (RRR) according to Pike and Neale, (2009) is the minimal profit (return) that an investor must seek or get in exchange for taking on the risk of investing in a stock or other form of instrument. The required rate of return is also used to determine how lucrative a project is in comparison to the expense of funding it. The required rate of return indicates the degree of risk obligation to report to a certain project or investment. The higher the rate of return, the longer it lasts. Because AYR Co.'s necessary return has not been specified in this situation, comparing it to the IRR to make a more informed conclusion is impossible.

3.1.3 Non-Financial Considerations

There are several non-monetary factors to examine before a financial endeavour can be judged fair. The scope of the new endeavour is important; for example, the risk associated with contributing overseas is not the same as that associated with another enterprise on comparable shores. Even within the same country, buyer characteristics differ from one region to the next.

Environmental factors are also important when making business decisions in the modern world; partners must understand the types of emissions that plants and machinery emit, how mechanical garbage removal is handled, and the overall impact of day-to-day operations on the workers' and clients' health and safety, as well as the environment as a whole.

Moreover, while making critical decisions like these, political considerations should be considered. Is the investment pool politically skewed and unaccountable? What is the reasonable gathering from political force representatives in the area of the anticipated speculation if they are? Is there any present or anticipated political unrest in the vicinity? Before authorizing any conceivable conjecture, such questions should be asked and satisfactorily answered. Finally, the legal requirements of the enterprise aim should be well understood to avoid legal battles that might jeopardize the organization's advantages.

3.2 Recommended and Justified Investments

Following accounting for risk evaluation, Task Try has a higher NPV of $170,506 compared to $169,449 for Undertaking Wolf, implying that the Aim Venture would provide more value to investors than the other rival. In any event, the difference in NPV between the two values is insignificant, especially when there is a 50% chance of a lower markdown rate. However, Task Wolf has a greater IRR of 15.6 percent than the other endeavor, which was set at 12.7 percent. This means that the Wolf Venture has a better chance of succeeding than its Try partner in exceeding AYR Co.'s typical return. Due to the shorter Recompense Time duration, investors will recoup capital interest in Undertaking Wolf faster than they would if their assets were sunk in Venture Try. The calculations from the investment assessment methodologies described in this study are summarized in Table 7.

Based on a comprehensive assessment of the merits and downsides of each job, the board is advised to give money to Project Wolf because it will perform similarly to Project Aspire in the best-case scenario and considerably better in the worst-case scenario. The differences in NPV and Compensation Period between the two jobs are modest, but the difference in IRR is significant.

4.0 Financial Source

Unless a successful businessman in most need of funds, typically usually has two options: debt or equity financing. Debt financing is borrowing money from a third party and pledging to repay it with interest at a later date. Whenever anyone invests income or property in a company in return for a portion of ownership, this is referred to as dividend payments. According to an individual's requirements, each offers advantages and disadvantages (Marsh, 1982).

4.1 Equity Vs Debt Financing

Table 8 highlights the differences between equity and debt financing (Bond Street, 2021):

4.2 Cost Of Capital

The cost of capital is based on the cost of money used to support and financing an organization's operations. The cost of capital is frequently split into two categories: debt and equity financing. The corporation's obstacle rate is determined by its cost of capital. The cost of capital is the minimal rate of return required for a firm to be competitive or produce value. Every business has its own capital cost. The cost of capital is influenced by a variety of factors, including the company's operational history, revenue, and financial health (Cleverism. 2021).

The latest paid income, the expected dividend for the previous tax year, the market capitalization, the manufacturer's overall growth, and the form's risk premium are all unavailable in the case of AYR. Co., making precise figures impossible to calculate. In general, a loan has a lower cost of capital than ownership.

4.3 Source Of Finance Effects on WACC

The NPV grows when the discount rate falls, as seen in tables 9 and 10. Because the WACC is the risk-free investment discount rate, lowering it leads to an increase in cash flow, which raises the NPV and profits. The following formula is used to determine the WACC:

WACC = [(E/V) RE] + [(D/V) RD (1-TC)]
Where E = Market Value of the Equity of the Company
D = Market Value of the Debt of the Company
V = Total Market Value of the Company, i.e D + E
RE = Cost of Equity ; RD = Cost of Debt; TC = Rate of Corporate Tax

(Ross, S.A., Westerfield, R.W. and Jordan B.D. 2017)

The debt-to-equity ratio, or D/E, will be affected by the decision to fund these initiatives with debt or equity. When debt is utilized, the debt-to-equity ratio rises as debt rises relative to static equity capital; when equity is used, the debt-to-equity ratio falls as equity rises compared to stable capital.

Adjusting the WACC equation above to make RE the objective of the calculation and omitting corporation tax for ease of use:

RE = RA + [(RA – RD) (D/E)]
(Ross, S.A., Westerfield, R.W. and Jordan B.D. 2017)
Where RA = Required return on the overall assets of the company

To investigate the impact of the source of funding, WACC was computed using three scenarios, each with an 8% cost of debt: I before funding, ii) equity capital, and iii) debt financing. The data show that the WACC stayed about 9% while using both equity and debt financing, suggesting that the source of funding did not affect the WACC.

4.4 Source of Finance Effect on Shareholders and Lenders

The return on equity (ROE) for Year 1 of Project Wolf was computed using different interest rates, as shown in Table 10 below, to determine the impact of the source of funding on shareholders.

For simplicity, the earnings before interest and taxes (EBIT) were computed using the net operating cash flow from table 5, assuming that taxation is due in the same year. Beginning with a rate of interest of 8%, the findings indicated that the ROE using financial leverage, 3.09 percent, will be greater than the ROE using equity financing, 3.02 percent, which will be the same for all exchange rate figures since the capital structure does not need any extra interest charges. When the interest ratio is increased by 1% at a time, the findings revealed that perhaps the ROE utilizing debt financing gradually decreased until it reached a break-even point of 3.02 percent, when it was equivalent to the ROE using equity financing. At the break-even point, the equivalent interest rate was 10%. Interest rate hikes resulted in worse ROEs than equity capital. This illustrates that debt financing provides better shareholder value than equity capital when the cost of debt is less than 10%; when the cost of debt is greater than 10%, financial leverage is preferred.

5.0 Conclusion

After applying Project Wolf's risk assessment as a consequence of the appeal to a new client base, the study indicates that both Project Aspire and Project Wolf have positive Net Present Values that are within proximity to each other. Both projects' payback periods are within a few months of one another. The Internal Rate of Return, which anticipates a return of nearly 3% greater than the Aspire project and more than 5% higher than the company's Weighted Average Cost of Capital, is the determining evaluation tool. As a result of this, as well as the likelihood that the expected cash flow surpasses the risk-based conservative forecast, therefore it is recommended that the board of AYR Co. invest in Project Wolf rather than Project Aspire. Furthermore, It is believed that this project should be funded using debt if the interest rate is less than or equal to ten percent; if the alternative debt financing alternatives have interest rates higher than ten percent, financial leverage should be employed alternatively.

6.0 Reference

Bond Street 2021. 'Understanding Debt vs Equity Financing'. Available at: <https://bondstreet.com/understanding-debt-vs-equity-financing/> [Accessed: June 19, 2021].

Borad, S., 2021. Investment Appraisal Techniques. [online] eFinanceManagement. Available at: <https://efinancemanagement.com/investment-decisions/investment-appraisal-techniques#:~:text=Investment%20appraisal%20techniques%20are%20payback,performance%20of%20a%20new%20project.&text=Each%20technique%20evaluates%20the%20project,and%20provides%20a%20different%20insight.> [Accessed 16 June 2021].

Cleverism. 2021. How to Calculate the Cost of Capital for Your Business. [online] Available at: <https://www.cleverism.com/calculate-cost-capital-business/#:~:text=First%2C%20you%20can%20calculate%20it,and%20the%20company's%20tax%20rate.> [Accessed 19 June 2021].

Cma.org.sa. 2021. Investment. [online] Available at: <https://cma.org.sa/en/Awareness/Publications/booklets/Booklet_1.pdf> [Accessed 16 June 2021].

Corporate Finance Institute. 2021. Internal Rate of Return (IRR) - A Guide for Financial Analysts. [online] Available at: <https://corporatefinanceinstitute.com/resources/knowledge/finance/internal-rate-return-irr/> [Accessed 17 June 2021].

Corporate Finance Institute. 2021. Net Present Value (NPV) - Definition, Examples, How to Do NPV Analysis. [online] Available at: <https://corporatefinanceinstitute.com/resources/knowledge/valuation/net-present-value-npv/> [Accessed 18 June 2021].

IG. 2021. Investment appraisal definition. [online] Available at: <https://www.ig.com/uk/glossary-trading-terms/investment-appraisal-definition#:~:text=Investment%20appraisal%20is%20important%20for,its%20future%20projects%20and%20endeavours.> [Accessed 16 June 2021].

Invest19 Financial Blog – Guide to Financial Investment & Wealth Management. 2020. Factors to be considered before making an Investment Decision - Invest19 Financial Blog – Guide to Financial Investment & Wealth Management. [online] Available at: <https://www.invest19.com/blog/factors-to-be-considered-before-making-an-investment-decision/> [Accessed 19 June 2021].

Marsh, P. (1982). 'The Choice Between Equity and Debt: An Empirical Study'. The Journal of Finance, 37 (1), pp. 121-144.

Pike, R. and Neale, B. (2009). Corporate Finance and Investment: Decisions and Strategies, 6th Edition. Harlow: Pearson Education Limited.

Ross, S.A., Westerfield, R.W. and Jordan B.D. 2017. Essentials of Corporate Finance, 9th Edition. New York: McGraw-Hill Education.

Ss.kln.ac.lk. 2021. [online] Available at: <https://ss.kln.ac.lk/depts/econ/media/attachments/2019/08/19/econ-53065-lecture-2.pdf> [Accessed 17 June 2021].

Thakur, M., 2021. Advantages and Disadvantages of NPV. [online] WallStreetMojo. Available at: <https://www.wallstreetmojo.com/advantages-and-disadvantages-of-npv/> [Accessed 18 June 2021].

WallStreetMojo. 2021. Payback Period Advantages and Disadvantages. [online] Available at: <https://www.wallstreetmojo.com/payback-period-advantages-and-disadvantages/> [Accessed 17 June 2021].

7.0 Appendix

7.1 Calculations

i) **Cash Inflow**

Cash Inflow (CI) increases at a rate of 7.5% per annum (UNICAF/USW Assessment 2 Brief, 2019)

CI for Year 1 = **650,000** (UNICAF/USW Assessment 2 Brief, 2019)

CI for Year 2 = 650,000 + (7.5% × 650,000)
= 650,000 + 48,750 = **698,750**

CI for Year 3 = 698, 750 + (7.5% × 698,750)
= 698,750 + 52,406.25 = **751,156**

CI for Year 4 = 751,156 + (7.5% × 751,156)
= 751,156 + 56,336.70 = **807,493**

CI for Year 5 = 807,493 + (7.5% × 807,493)
= 807,493 + 60,561.98 = **868,055**

ii) **Variable Costs**

Variable Costs (VC) increase at a rate of 6.75% per annum (UNICAF/USW Assessment 2 Brief, 2019)

VC for Year 1 = **27,000** (UNICAF/USW Assessment 2 Brief, 2019)

VC for Year 2 = 27,000 + (6.75% × 27,000)
= 27,000 + 1,822.50 = **28,822.50**

VC for Year 3 = 28,822.50 + (6.75% × 28,822.50)
= 28,822.50 + 1,945.52 = **30,768.02**

VC for Year 4 = 30,768.02 + (6.75% × 30,768.02)
= 30,768.02 + 2,076.84 = **32,844.86**

VC for Year 5 = 32,844.86 + (6.75% × 32,844.86)
= 32,844.86 + 2,217.03 = **35,061.89**

iii) Future Value of Working Capital

Future Value (FV) = Present Value (PV) × $(1 + r)^n$

Where r = required return; and n = no. of periods (years in this case) of investment

In this case, r = WACC = 10% = 0.10; n = 5 years

PV for working capital = 140,000 (UNICAF/USW Assessment 2 Brief, 2019)

$FV = 140{,}000 \times (1 + 0.10)^5$
$= 140{,}000 \times 1.10^5$
$= 140{,}000 \times 1.61051 =$ **225,471.40**

iv) Net Operating Cash Flow

Net Operating Cash Flow = Cash Inflow + Scrap Value – Variable Costs – Future Value of Working Capital

Scrap value of equipment = 375,000 (UNICAF/USW Assessment 2 Brief, 2019)

Using results from i, ii, and iii,

NOCF for Year 1 = 650,000 - 27,000 = **623,000**

NOCF for Year 2 = 698,750 - 28,822.50 = **669,928**

NOCF for Year 3 = 751,156 - 30,768.02 = **720,388**

NOCF for Year 4 = 807,493 – 32,844.86 = **774,648**

NOCF for Year 5 = 868,055 + 375,000 – 35,061.89 – 225,471.40 = **982,522**

v) Taxable Cash Flow

Taxable Cash Flow (TCF) = Net Operating Cash Flow – Capital Allowance

TCF for Year 1 = 623,000 - 600,000 = **23,000**

TCF for Year 2 = 669,928 - 390,000 = **279,928**

TCF for Year 3 = 720,388 – 345,000 = **375,388**

TCF for Year 4 = 774,648 – 300,000 = **474,648**

TCF for Year 5 = 982,522 – 240,000 = **742,522**

vi) Tax

In this case, tax is pegged at 20% of taxable cash flow, payable 1 year in arrears.

Tax for Year 1 = 0.00 (To be paid the following year in arrears)

Tax for Year 2 = 20% × 23,000 = **4,600**

Tax for Year 3 = 20% × 279,928 = **55,985.60**

Tax for Year 4 = 20% × 375,388 = **75,077.60**

Tax for Year 5 = 20% × 474,648 = **94,929.60**

Tax for Year 6 = 20% × 742,522 = **148,504.40**

vii) Net Cash Flow

Net Cash Flow (NCF) = Net Operating Cash Flow – Tax

From iv and vi,

NCF for Year 1 = 623,000 – 0.00 = **623,000**

NCF for Year 2 = 669,928 – 4,600 = **665,328**

NCF for Year 3 = 720,388 – 55,985.60 = **664,402**

NCF for Year 4 = 774,648 – 75,077.60 = **699,570**

NCF for Year 5 = 982,522 – 94,929.60 = **887,592**

NCF for Year 6 = 0.00 – 148,504.40 = **-148,504**

viii) Discount Factor

$$\text{Discount Factor (DF)} = \frac{1}{(1+r)^n}$$

Where r = discount rate; and n = no. of periods (years in this case) of investment

r = WACC = 10% = 0.1

$$\text{DF for Year 1} = \frac{1}{(1+0.1)^1} = \frac{1}{(1.1)^1} = \frac{1}{1.1} = \mathbf{0.90909}$$

$$\text{DF for Year 2} = \frac{1}{(1+0.1)^2} = \frac{1}{(1.1)^2} = \frac{1}{1.21} = \mathbf{0.82645}$$

$$\text{DF for Year 3} = \frac{1}{(1+0.1)^3} = \frac{1}{(1.1)^3} = \frac{1}{1.331} = \mathbf{0.75131}$$

$$\text{DF for Year 4} = \frac{1}{(1+0.1)^4} = \frac{1}{(1.1)^4} = \frac{1}{1.4641} = \mathbf{0.68301}$$

$$\text{DF for Year 5} = \frac{1}{(1+0.1)^5} = \frac{1}{(1.1)^5} = \frac{1}{1.61051} = \mathbf{0.62092}$$

$$\text{DF for Year 6} = \frac{1}{(1+0.1)^6} = \frac{1}{(1.1)^6} = \frac{1}{1.771561} = \mathbf{0.56447}$$

ix) Present Value

Present Value (PV) = Net Cash Flow × Discount Factor

From vii and viii,

PV for Year 1 = 623,000 × 0.90909 = **566,363**

PV for Year 2 = 665,328 × 0.82645 = **549,860**

PV for Year 3 = 664,402 × 0.75131 = **499,172**

PV for Year 4 = 699,570 × 0.68301 = **477,813**

PV for Year 5 = 887,592 × 0.62092 = **551,124**

PV for Year 6 = -148,504 × 0.56447 = **- 83,826**

x) Net Present Value

Net Present Value (NPV) = Sum of Present Values – Sum of Relevant Start-Up Costs

$$\sum \text{Present Values} = 566{,}363 + 549{,}860 + 499{,}172 + 477{,}813 + 551{,}124 - 83{,}826 = 2{,}560{,}506$$

$$\sum \text{Relevant Start-Up Costs} = \text{Cost of Plants and Machinery} + \text{Working Capital} = 2{,}250{,}000 + 140{,}000 = 2{,}390{,}000$$

NPV = 2,560,506 – 2,390,000 = **170,506**

xi) Internal Rate of Return

$$\text{Internal Rate of Return (IRR)} = \left(L + \left[\left\{\frac{NPV_L}{NPV_L - NPV_H}\right\}(H - L)\right]\right) \times 100$$

(UNSCAF/UNW, 2019)

Where L = Lower Discount Rate = r = WACC = 10% = 0.10

H = Higher Discount Rate that still results in a positive NPV, e.g. 12% = 0.12

NPV_L = Net Present Value using lower discount rate

NPV_H = Net Present Value using higher discount rate

For H= 0.12, using the formulae in viii, ix, and x,

$$\text{DF for Year 1} = \frac{1}{(1+0.12)^1} = \frac{1}{(1.12)^1} = \frac{1}{1.12} = 0.89286$$

$$\text{DF for Year 2} = \frac{1}{(1+0.12)^2} = \frac{1}{(1.12)^2} = \frac{1}{1.2544} = 0.79719$$

$$\text{DF for Year 3} = \frac{1}{(1+0.12)^3} = \frac{1}{(1.12)^3} = \frac{1}{1.404928} = 0.71178$$

$$\text{DF for Year 4} = \frac{1}{(1+0.12)^4} = \frac{1}{(1.12)^4} = \frac{1}{1.573519} = 0.63552$$

$$\text{DF for Year 5} = \frac{1}{(1+0.12)^5} = \frac{1}{(1.12)^5} = \frac{1}{1.76234} = 0.56743$$

$$\text{DF for Year 6} = \frac{1}{(1+0.12)^6} = \frac{1}{(1.12)^6} = \frac{1}{1.97382} = 0.50663$$

PV for Year 1 = 623,000 × 0.89286 = 556,252

PV for Year 2 = 665,328 × 0.79719 = 530,393

PV for Year 3 = 664,402 × 0.71178 = 472,908

PV for Year 4 = 699,570 × 0.63552 = 444,591

PV for Year 5 = 887,592 × 0.56743 = 503,646

PV for Year 6 = -148,504 × 0.50663 = - 75,237

NPV_H = (556,252 + 530,393 + 472,908 + 444,591 + 503,646 - 75237) – 2,390,000
= 42,553

From x, NPV_L = 170,506

$$IRR = \left(0.10 + \left[\left\{\frac{170{,}506}{170{,}506 - 42{,}553}\right\}(0.12 - 0.10)\right]\right) \times 100$$

IRR = (0.10 + [{1.33257}(0.02)]) × 100
= (0.10 + 0.02665) × 100
= **12.67 %**

Confirmation of IRR using NPV Profile

At r = 0,

DF for Year 1 = $\frac{1}{(1+0)^1} = \frac{1}{(1)^1} = \frac{1}{1} = 1$

The DF will be 1 for all years since the denominators in the equations will always be 1 because every number raised to the power 0 = 1

PV for Year 1 = 623,000 × 1 = 623,000

PV for Year 2 = 665,328 × 1 = 665,328

PV for Year 3 = 664,402 × 1 = 664,402

PV for Year 4 = 699,570 × 1 = 669,570

PV for Year 5 = 887,592 × 1 = 887,592

PV for Year 6 = -148,504 × 1 = - 148,504

$\mathbf{NPV_{r=0}}$ = (623,000 + 556,328 + 664,402 + 669,570 + 887,592 – 148,504) – 2,390,000 = **1,001,388**

At r = 5% = 0.05,

DF for Year 1 = $\frac{1}{(1+0.05)^1} = \frac{1}{(1.05)^1} = \frac{1}{1.05} = 0.95238$

DF for Year 2 = $\frac{1}{(1+0.05)^2} = \frac{1}{(1.05)^2} = \frac{1}{1.1025} = 0.90703$

DF for Year 3 = $\frac{1}{(1+0.05)^3} = \frac{1}{(1.05)^3} = \frac{1}{1.157625} = 0.863838$

PV for Year 3 = 664,402 × 0.657516 = 436,855

PV for Year 4 = 699,570 × 0.571753 = 399,981

PV for Year 5 = 887,592 × 0.49718 = 441,293

PV for Year 6 = -148,504 × 0.43233 = - 64,203

$NPV_{r=0.15}$ = (541,742 + 503,081 + 436,855 + 399,981 + 441,293 – 64,203) – 2,390,000 = **- 131,251**

At r = 20% = 0.20

DF for Year 1 = $\frac{1}{(1+0.20)^1} = \frac{1}{(1.20)^1} = \frac{1}{1.20} = 0.83333$

DF for Year 2 = $\frac{1}{(1+0.20)^2} = \frac{1}{(1.20)^2} = \frac{1}{1.44} = 0.69444$

DF for Year 3 = $\frac{1}{(1+0.20)^3} = \frac{1}{(1.20)^3} = \frac{1}{1.728} = 0.578703$

DF for Year 4 = $\frac{1}{(1+0.20)^4} = \frac{1}{(1.20)^4} = \frac{1}{2.0736} = 0.482253$

DF for Year 5 = $\frac{1}{(1+0.20)^5} = \frac{1}{(1.20)^5} = \frac{1}{2.48832} = 0.401878$

DF for Year 6 = $\frac{1}{(1+0.20)^6} = \frac{1}{(1.20)^6} = \frac{1}{2.985984} = 0.334898$

PV for Year 1 = 623,000 × 0.83333 = 519,165

PV for Year 2 = 665,328 × 0.69444 = 462,030

PV for Year 3 = 664,402 × 0.578703 = 384,491

PV for Year 4 = 699,570 × 0.482253 = 337,370

PV for Year 5 = 887,592 × 0.401878 = 356,704

PV for Year 6 = -148,504 × 0.334898 = - 49,734

$NPV_{r=0.20}$ = (519,165 + 462,030 + 384,491 + 337,370 + 356,704 – 49,734) – 2,390,000 = **- 379,974**

The values of discount rates were plotted against the corresponding values of NPV in figure 2.3 to determine the IRR which is the discount rate when NPV = 0

xii) Payback Period

Payback Period = 3 years + $\frac{437,270}{699,570}$ = 3yrs + 0.63 years = **3.63 years**

7.2 CALCULATIONS FOR PROJECT WOLF

i) Material Costs

Material Costs (MC) increase at a rate of 7.5% per annum (UNICAF/USW Assessment 2 Brief, 2019)

MC for Year 1 = **14,400** (UNICAF/USW Assessment 2 Brief, 2019)

MC for Year 2 = 14,400 + (7.5% × 14,400)
= 14,400 + 1,080 = **15,480**

MC for Year 3 = 15,480 + (7.5% × 15,480)
= 15,480 + 1,161 = **16,641**

MC for Year 4 = 16,641 + (7.5% × 16,641)
= 16,641 + 1,248.08 = **17,889.08**

MC for Year 5 = 17,889.08 + (7.5% × 17,889.08)
= 17,889.08 + 1,341.68 = **19,230.76**

ii) Other Expenses

Other Expenses (OE) decrease at a rate of 7.5% per annum (UNICAF/USW Assessment 2 Brief, 2019)

OE for Year 1 = **18,000** (UNICAF/USW Assessment 2 Brief, 2019)

OE for Year 2 = 18,000 - (7.5% × 18,000)
= 18,000 - 1,350 = **16,650**

OE for Year 3 = 16,650 - (7.5% × 16,650)
= 16,650 - 1,248.75 = **15,401.25**

OE for Year 4 = 15,401.25 - (7.5% × 15,401.25)
= 15,401.25 - 1,155.09 = **14,246.16**

OE for Year 5 = 14,246.16 - (7.5% × 14,246.16)
= 14,246.16 - 1,068.46 = **13,177.70**

iii) Rental Income

The Present Value (PV) of the Rental Income (RI) is 75,000 per annum. The future value (FV) of this RI is as follows: (UNICAF/USW Assessment 2 Brief, 2019)

FV = PV of RI × $(1+r)^n$ (UNICAF/USW Assessment 2 Brief, 2019)

r = discount rate = WACC = 10% = 0.10 ; n = no. of periods (years in this case)

FV of RI for Year 1 = $75,000 \times (1 + 0.10)^1$
= $75,000 \times 1.10^1$
= 75,000 × 1.10 = **82,500**

FV of RI for Year 2 = $75,000 \times (1 + 0.10)^2$
= $75,000 \times 1.10^2$
= 75,000 × 1.21 = **90,750**

FV of RI for Year 3 = $75,000 \times (1 + 0.10)^3$
= $75,000 \times 1.10^3$
= 75,000 × 1.331 = **99,825**

FV of RI for Year 4 = $75,000 \times (1 + 0.10)^4$
= $75,000 \times 1.10^4$
= 75,000 × 1.4641 = **109,807.50**

FV of RI for Year 5 = $75,000 \times (1 + 0.10)^5$
= $75,000 \times 1.10^5$
= 75,000 × 1.61051 = **120,788.25**

iv) Net Operating Cash Flow

Net Operating Cash Inflow (NOCF) = Cash Inflow – Material Costs - Other Expenses - FV of Rental Income (UNICAF/USW, 2019)

Cash Inflow = 955,000 for all years (UNICAF/USW Assessment 2 Brief, 2019)

NOCF for Year 1 = 955,000 – 14,400 - 18,000 - 82,500 = **840,100**

NOCF for Year 2 = 955,000 - 15,480 – 16,650 – 90,750 = **832,120**

NOCF for Year 3 = 955,000 – 16,641 – 15,401.25 – 99,825 = **823,133**

NOCF for Year 4 = 955,000 – 17,889.08 – 14,246.16 – 109,807.50 = **813,057**

NOCF for Year 5 = 955,000 – 19,230.76 – 13,177.70 - 120,788.25 = **801,803**

v) Tax

There is no capital allowance so all the net operating cash flow, tax is pegged at 20% of net operating cash flow, payable 1 year in arrears.

Tax for Year 1 = 0.00 (To be paid the following year in arrears)

Tax for Year 2 = 20% × 840,100 = **168,020**

Tax for Year 3 = 20% × 832,120 = **166,424**

Tax for Year 4 = 20% × 823,133 = **164,626.60**

Tax for Year 5 = 20% × 813,057 = **162,611.40**

Tax for Year 6 = 20% × 801,803 = **160,360.60**

vi) Net Cash Flow

Net Cash Flow (NCF) = Net Operating Cash Flow – Tax

From iv and v,

NCF for Year 1 = 840,100 – 0.00 = **840,100**

NCF for Year 2 = 832,120 – 168,020 = **664,100**

NCF for Year 3 = 823,133 – 166,424 = **656,709**

NCF for Year 4 = 813,057 – 164,626.60 = **648,430**

NCF for Year 5 = 801,803 – 162,611.40 = **639,192**

NCF for Year 6 = 0.00 – 160,360.60 = **-160,361**

vii) Discount Factor

Discount Factor (DF) = $\frac{1}{(1+r)^n}$

Where r = discount rate, and n = no. of periods (years in this case) of investment

r = WACC = 10% = 0.1

DF for Year 1 = $\frac{1}{(1+0.1)^1} = \frac{1}{(1.1)^1} = \frac{1}{1.1} =$ **0.90909**

DF for Year 2 = $\frac{1}{(1+0.1)^2} = \frac{1}{(1.1)^2} = \frac{1}{1.21} =$ **0.82645**

DF for Year 3 = $\frac{1}{(1+0.1)^3} = \frac{1}{(1.1)^3} = \frac{1}{1.331} =$ **0.75131**

DF for Year 4 = $\frac{1}{(1+0.1)^4} = \frac{1}{(1.1)^4} = \frac{1}{1.4641} =$ **0.68301**

DF for Year 5 = $\frac{1}{(1+0.1)^5} = \frac{1}{(1.1)^5} = \frac{1}{1.61051} =$ **0.62092**

DF for Year 6 = $\frac{1}{(1+0.1)^6} = \frac{1}{(1.1)^6} = \frac{1}{1.771561} =$ **0.56447**

viii) Present Value

Present Value (PV) = Net Cash Flow × Discount Factor

From vii and viii,

PV for Year 1 = 840,100 × 0.90909 = **763,727**

PV for Year 2 = 664,100 × 0.82645 = **548,845**

PV for Year 3 = 656,709 × 0.75131 = **493,392**

PV for Year 4 = 648,430 × 0.68301 = **442,884**

PV for Year 5 = 639,192 × 0.62092 = **396,887**

PV for Year 6 = -160,361 × 0.56447 = **- 90,519**

ix) Net Present Value

Net Present Value (NPV) = Sum of Present Values – Sum of Relevant Start-Up Costs

∑ Present Values = 763,727 + 548,845 + 493,392 + 442,884 + 396,887 – 90,519
= 2,555,216

∑ Relevant Start-Up Costs = 2,250,000

NPV = 2,555,216 – 2,250,000 = **305,216**

x) Internal Rate of Return

Internal Rate of Return (IRR) = $\left(L + \left[\left\{\frac{NPV_L}{NPV_L - NPV_H}\right\}(H-L)\right]\right) \times 100$

(UNICAF/USW, 2019)

Where L = Lower Discount Rate = r = WACC = 10% = 0.10

H = Higher Discount Rate that still results in a positive NPV, e.g. 15% = 0.15

NPV_L = Net Present Value using lower discount rate

NPV_H = Net Present Value using higher discount rate

For H= 0.15, using the formulae in viii, ix, and x,

DF for Year 1 = $\frac{1}{(1+0.15)^1} = \frac{1}{(1.15)^1} = \frac{1}{1.15} = 0.86957$

DF for Year 2 = $\frac{1}{(1+0.15)^2} = \frac{1}{(1.15)^2} = \frac{1}{1.3225} = 0.75614$

DF for Year 3 = $\frac{1}{(1+0.15)^3} = \frac{1}{(1.15)^3} = \frac{1}{1.520875} = 0.657516$

DF for Year 4 = $\frac{1}{(1+0.15)^4} = \frac{1}{(1.15)^4} = \frac{1}{1.749006} = 0.571753$

DF for Year 5 = $\frac{1}{(1+0.15)^5} = \frac{1}{(1.15)^5} = \frac{1}{2.011357} = 0.49718$

DF for Year 6 = $\frac{1}{(1+0.15)^6} = \frac{1}{(1.15)^6} = \frac{1}{2.313061} = 0.43233$

PV for Year 1 = 840,100 × 0.86957 = 730,526

PV for Year 2 = 664,100 × 0.75614 = 502,153

PV for Year 3 = 656,709 × 0.657516 = 431,797

PV for Year 4 = 648,430 × 0.571753 = 370,742

PV for Year 5 = 639,192 × 0.49718 = 317,793

PV for Year 6 = -160,361 × 0.43233 = - 69,329

NPV_H = (730,526 + 502,153 + 431,797 + 370,742 + 317,793 − 69,329) − 2,250,000
= 33,682

From ix, NPV_L = 305,216

$$IRR = \left(0.10 + \left[\left\{\frac{305,216}{305,216-33,682}\right\}(0.15-0.10)\right]\right) \times 100$$

IRR = (0.10 + [{1.12404}(0.05)]) × 100
= (0.10 + 0.056202) × 100
= **15.62 %**

Confirmation of IRR using NPV Profile

At r = 0,

DF for Year 1 = $\frac{1}{(1+0)^1} = \frac{1}{(1)^1} = \frac{1}{1} = 1$

The DF will be 1 for all years since the denominators in the equations will always be 1 because every number raised to the power 0 = 1

PV for Year 1 = 840,100 × 1 = 840,100

PV for Year 2 = 664,100 × 1 = 664,100

PV for Year 3 = 656,709 × 1 = 656,709

PV for Year 4 = 648,430 × 1 = 648,430

PV for Year 5 = 639,192 × 1 = 639,192

PV for Year 6 = -160,361 × 1 = - 160,361

$NPV_{r=0}$ = (840,100 + 664,100 + 656,709 + 648,430 + 639,192 − 160,361) − 2,250,000 = **1,038,170**

At r = 5% = 0.05,

DF for Year 1 = $\frac{1}{(1+0.05)^1} = \frac{1}{(1.05)^1} = \frac{1}{1.05} = 0.95238$

DF for Year 2 = $\frac{1}{(1+0.05)^2} = \frac{1}{(1.05)^2} = \frac{1}{1.1025} = 0.90703$

DF for Year 3 = $\frac{1}{(1+0.05)^3} = \frac{1}{(1.05)^3} = \frac{1}{1.157625} = 0.863838$

DF for Year 4 = $\frac{1}{(1+0.05)^4} = \frac{1}{(1.05)^4} = \frac{1}{1.215506} = 0.822703$

DF for Year 5 = $\frac{1}{(1+0.05)^5} = \frac{1}{(1.05)^5} = \frac{1}{1.276282} = 0.783526$

DF for Year 6 = $\frac{1}{(1+0.05)^6} = \frac{1}{(1.05)^6} = \frac{1}{1.340096} = 0.746215$

PV for Year 1 = 840,100 × 0.95238 = 800,094

PV for Year 2 = 664,100 × 0.90703 = 602,359

PV for Year 3 = 656,709 × 0.863838 = 567,290

PV for Year 4 = 648,430 × 0.822703 = 533,465

PV for Year 5 = 639,192 × 0.783526 = 500,824

PV for Year 6 = -160,361 × 0.746215 = - 119,664

$NPV_{r=0.05}$ = (800,094 + 602,359 + 567,290 + 533,465 + 500,824 – 119,664) – 2,250,000 = **634,368**

At r = 15% = 0.15,

DF for Year 1 = $\frac{1}{(1+0.15)^1} = \frac{1}{(1.15)^1} = \frac{1}{1.15} = 0.86957$

DF for Year 2 = $\frac{1}{(1+0.15)^2} = \frac{1}{(1.15)^2} = \frac{1}{1.3225} = 0.75614$

DF for Year 3 = $\frac{1}{(1+0.15)^3} = \frac{1}{(1.15)^3} = \frac{1}{1.520875} = 0.657516$

DF for Year 4 = $\frac{1}{(1+0.15)^4} = \frac{1}{(1.15)^4} = \frac{1}{1.749006} = 0.571753$

DF for Year 5 = $\frac{1}{(1+0.15)^5} = \frac{1}{(1.15)^5} = \frac{1}{2.011357} = 0.49718$

DF for Year 6 = $\frac{1}{(1+0.15)^6} = \frac{1}{(1.15)^6} = \frac{1}{2.313061} = 0.43233$

PV for Year 1 = 840,100 × 0.86957 = 730,526

PV for Year 2 = 664,100 × 0.75614 = 502,153

PV for Year 3 = 656,709 × 0.657516 = 431,797

PV for Year 4 = 648,430 × 0.571753 = 370,742

PV for Year 5 = 639,192 × 0.49718 = 317,793

PV for Year 6 = -160,361 × 0.43233 = - 69,329

$NPV_{r=0.15}$ = (730,526 + 502,153 + 431,797 + 370,742 + 317,793 – 69,329) – 2,250,000 = **33,682**

At r = 20% = 0.20,

DF for Year 1 = $\frac{1}{(1+0.20)^1} = \frac{1}{(1.20)^1} = \frac{1}{1.20} = 0.83333$

DF for Year 2 = $\frac{1}{(1+0.20)^2} = \frac{1}{(1.20)^2} = \frac{1}{1.44} = 0.69444$

DF for Year 3 = $\frac{1}{(1+0.20)^3} = \frac{1}{(1.20)^3} = \frac{1}{1.728} = 0.578703$

DF for Year 4 = $\frac{1}{(1+0.20)^4} = \frac{1}{(1.20)^4} = \frac{1}{2.07736} = 0.482253$

DF for Year 5 = $\frac{1}{(1+0.20)^5} = \frac{1}{(1.20)^5} = \frac{1}{2.48832} = 0.401878$

DF for Year 6 = $\frac{1}{(1+0.20)^6} = \frac{1}{(1.20)^6} = \frac{1}{2.985984} = 0.334898$

PV for Year 1 = 840,100 × 0.83333 = 700,081

PV for Year 2 = 664,100 × 0.69444 = 461,178

PV for Year 3 = 656,709 × 0.578703 = 380,039

PV for Year 4 = 648,430 × 0.482253 = 312,707

PV for Year 5 = 639,192 × 0.401878 = 256,877

PV for Year 6 = -160,361 × 0.334898 = - 53,705

$NPV_{r=0.20}$ = (700,081 + 461,178 + 380,039 + 312,707 + 256,877 – 53,705) – 2,250,000 = - **192,823**

The values of discount rates were plotted against the corresponding values of NPV in figure 2.4 to determine the IRR which is the discount rate when NPV = 0

xi) **Payback Period**

Payback Period = 3 years + $\frac{89,091}{648,430}$ = 3yrs + 0.14 years = **3.14 years**

7.3 CALCULATIONS TO SHOW EFFECT OF SOURCE OF FINANCE ON CURRENT AND POTENTIAL SHAREHOLDERS AND LENDERS

i) If the source of finance is equity financing,

D = 18,000,000; E = 20,000,000 + 2,250,000 = 22,250,000

Taxable Income = EBIT = Net Operating Cash Flow = 840,100

Tax = 20% × 840,100 = 168,020

Profit After Tax = Taxable Income – Tax = 678,080

$$ROE = \frac{\text{Profit After Tax}}{\text{Equity}} = \frac{678,080}{22,250,000} = 0.0302 = \mathbf{3.02\ \%}$$

ii) If the source of finance is debt financing,

D = 20,250,000; E = 20,000,000

EBIT = Net Operating Cash Flow = 840,100

At 8% Interest Rate,

Interest = 8% × 840,100 = 67,208

Taxable Income = EBIT – Interest = 840,100 – 67,208 = 772,892

Tax = 20% × Taxable Income = 20% × 772,892 = 154,578.40

Profit After Tax = Taxable Income – Tax = 772,892 – 154,578.40 = 618,313.60

$$ROE = \frac{\text{Profit After Tax}}{\text{Equity}} = \frac{618,313.60}{20,000,000} = 0.0309 = \mathbf{3.09\ \%}$$

At 9% Interest Rate,

Interest = 9% × 840,100 = 75,609

Taxable Income = EBIT – Interest = 840,100 – 75,609 = 764,491

Tax = 20% × Taxable Income = 20% × 764,491 = 152,898.20

Profit After Tax = Taxable Income – Tax = 764,491 – 152,898.20 = 611,592.80

$$ROE = \frac{\text{Profit After Tax}}{\text{Equity}} = \frac{611,592.80}{20,000,000} = 0.0306 = \mathbf{3.06\ \%}$$

At 10% Interest Rate,

Interest = 10% × 840,100 = 84,010

Taxable Income = EBIT – Interest = 840,100 – 84,010 = 756,090

Tax = 20% × Taxable Income = 20% × 756,090 = 151,218.00

Profit After Tax = Taxable Income – Tax = 756,090 – 151,218.00 = 604,872.00

$$ROE = \frac{\text{Profit After Tax}}{\text{Equity}} = \frac{604,872.00}{20,000,000} = 0.0302 = \mathbf{3.02\ \%}$$

At 11% Interest Rate,

Interest = 11% × 840,100 = 92,411

Taxable Income = EBIT – Interest = 840,100 – 92,411 = 747,689

Tax = 20% × Taxable Income 20% × 747,689 = 149,537.80

Profit After Tax = Taxable Income – Tax = 747,689 – 149,537.80 = 598,151.20

$$ROE = \frac{\text{Profit After Tax}}{\text{Equity}} = \frac{598,151.20}{20,000,000} = 0.0299 = \mathbf{2.99\ \%}$$

7.4 CALCULATIONS TO SHOW EFFECT OF SOURCE OF FINANCE ON WACC

i) $R_E = R_A + [(R_A - R_D) \times (D/E)]$
(Ross, S.A., Westerfield, R.W. and Jordan B.D. 2017)

D = 18,000,000; E = 20,000,000
(UNICAF/USW Assessment 2 Brief, 2021)

$D/E = \frac{18,000,000}{20,000,000} = \mathbf{0.9}$

$R_D = 8\% = 0.08$
(Assumption)

$R_A = WACC = 10\% = 0.1$
(UNICAF/USW Assessment 2 Brief, 2021)

$$R_E = 0.1 + [(0.1 - 0.08) \times 0.9]$$
$$= 0.1 + [0.02 \times 0.9]$$
$$= 0.1 + 0.018 = 0.118$$

If the chosen source of finance is equity,

$$D = 18,000,000 \; ; \; E = 20,000,000 + 2,250,000 = 22,250,000$$
$$D/E = \frac{18,000,000}{22,250,000} = \mathbf{0.81}$$

If the chosen source of finance is debt,

$$D = 18,000,000 + 2,250,000 = 20,250,000 \; ; \; E = 20,000,000$$
$$D/E = \frac{20,250,000}{20,000,000} = \mathbf{1.01}$$

At D/E = 0.81,

$$R_E = 0.1 + [(0.1 - 0.08) \times 0.81]$$
$$= 0.1 + [0.02 \times 0.81]$$
$$= 0.1 + 0.0162 = 0.1162$$

At D/E = 1.01,

$$R_E = 0.1 + [(0.1 - 0.08) \times 1.01]$$
$$= 0.1 + [0.02 \times 1.01]$$
$$= 0.1 + 0.0202 = 0.1202$$

Recalculating WACC using the calculated values of RE and D/E,
WACC = [(E/V) × RE] + [(D/V) × RD × (1-TC)]
(Ross, S.A., Westerfield, R.W. and Jordan B.D. 2017)

TC = 20% = 0.2 (UNICAF/USW Assessment 2 Brief, 2021)

At D/E = 0.9, $R_E = 0.118$

$$V = D + E = 18,000,000 + 20,000,000 = 38,000,000$$

$$E/V = \frac{20,000,000}{38,000,000} = 0.53$$

$$D/V = \frac{18,000,000}{38,000,000} = 0.47$$

$$WACC = [0.5263 \times 0.118] + [0.47 \times 0.08 \times (1 - 0.2)]$$
$$= [0.063] + [0.47 \times 0.08 \times (1 - 0.2)]$$
$$= [0.063] + [0.47 \times 0.08 \times 0.8]$$
$$= 0.063 + 0.0301 = 0.0931 = \mathbf{9.31\ \%}$$

At D/E = 0.81, $R_E = 0.1162$

$$V = D + E = 18,000,000 + 22,250,000 = 40,250,000$$

$$E/V = \frac{22,2500,000}{40,250,000} = 0.55$$

$$D/V = \frac{18,000,000}{40,250,000} = 0.45$$

$$WACC = [0.55 \times 0.1162] + [0.45 \times 0.08 \times (1 - 0.2)]$$
$$= [0.063] + [0.45 \times 0.08 \times (1 - 0.2)]$$
$$= [0.063] + [0.45 \times 0.08 \times 0.8]$$
$$= 0.063 + 0.03 = 0.093 = \mathbf{9.3\ \%}$$

At D/E = 1.01, $R_E = 0.1202$

$$V = D + E = 20,250,000 + 20,000,000 = 40,250,000$$

$$E/V = \frac{20,000,000}{40,250,000} = 0.50$$

$$D/V = \frac{20,250,000}{40,250,000} = 0.503$$

$$WACC = [0.50 \times 0.1202] + [0.503 \times 0.08 \times (1 - 0.2)]$$
$$= [0.0601] + [0.50 \times 0.08 \times (1 - 0.2)]$$
$$= [0.0601] + [0.50 \times 0.08 \times 0.8]$$
$$= 0.0601 + 0.0322 = 0.0923 = \mathbf{9.23\ \%}$$

8.0 TABLES

Table 1: Payback Period Schedule For Project Wolf

S/N	DESCRIPTION	YEAR	DEBIT	CREDIT	BALANCE
1	Start-Up Cost	0	($2,250,000)		-$2,250,000
2	Net Cash Flow	1		$840,100	-$1,409,900
3	Net Cash Flow	2		$664,100	-$745,800
4	Net Cash Flow	3		$656,709	-$89,091
5	Net Cash Flow	4		$648,430	$559,339
6	Net Cash Flow	5		$639,192	$1,198,531
7	Net Cash Flow	6		($160,361)	$1,038,170

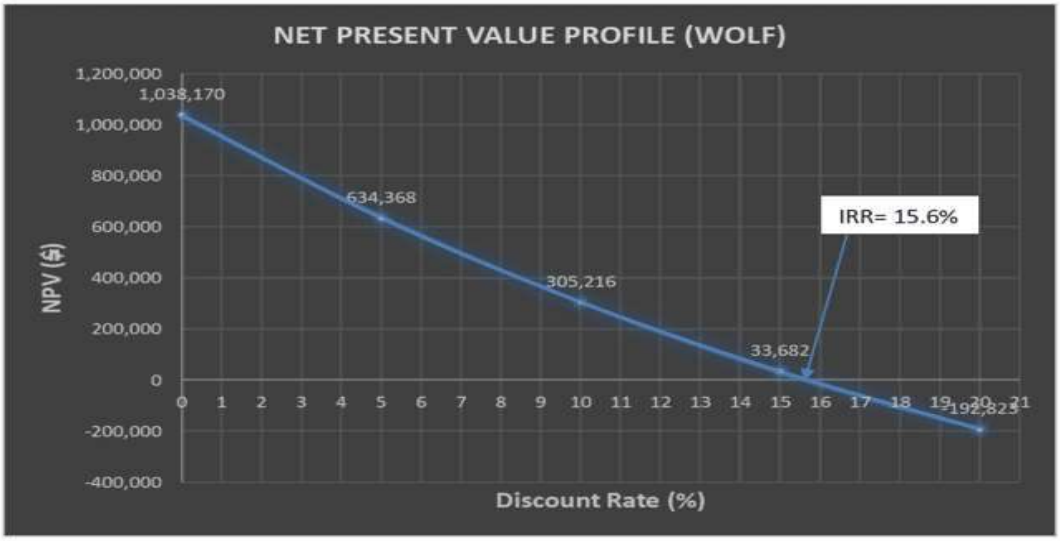
Project Wolf's payback period stretches beyond the five years shown, exceeding the initial investment of -$2,250,000 at some point after year 5 due to the negative net cash flow in year 6.

Table 2: Payback Period Schedule for Project Aspire

S/N	DESCRIPTION	YEAR	DEBIT	CREDIT	BALANCE
1	Start-Up Cost	0	($2,390,000)		-$2,390,000
2	Net Cash Flow	1		$623,000	-$1,767,000
3	Net Cash Flow	2		$665,328	-$1,101,672
4	Net Cash Flow	3		$664,402	-$437,270
5	Net Cash Flow	4		$699,570	$262,300
6	Net Cash Flow	5		$887,592	$1,149,892
7	Net Cash Flow	6		($148,504)	$1,001,388

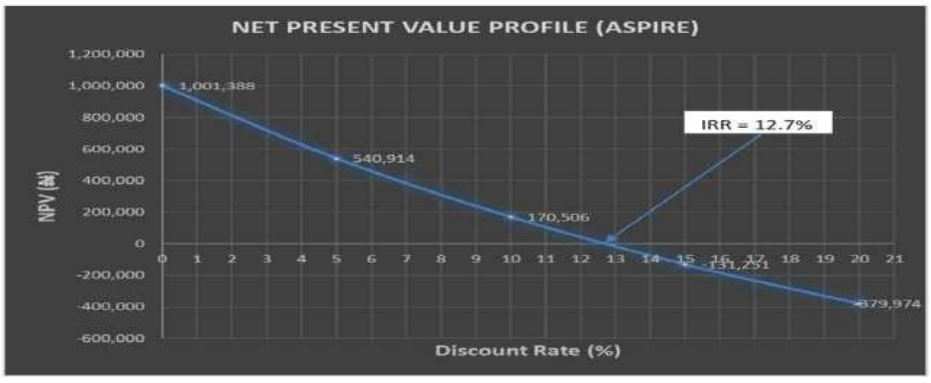
Project Aspire's payback period is projected to be within the first year, as the cumulative net cash flow surpasses the initial investment of -$2,390,000 by the end of year 1.

Table 3: Profile Net Present Value for Project Wolf



From the graph, Project Wolf is expected to be worth 156% more than its initial cost, making it a very profitable investment.

Table 4: Profile Net Present Value for Project Aspire



The graph displays Project Aspire's Net Present Value (NPV) profile, with an initial NPV above 1 million but steadily declining as the discount rate increases, eventually turning negative at around a 17% discount rate.

Table 5: Project Wolf Projected Cash Flow Statement

Project Wolf's projected cash flow statement shows initial positive inflows followed by declining net cash flows due to rising material costs and operating expenses, ultimately turning negative in year 6.

DESCRIPTION	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Initi DESCRIPTION	YEAR 0	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Cash Plant and Machinery	(2,250,000)						
Working Capital	(140,000)						
Mat Cash Inflow		650,000	698,750	751,156	807,493	868,055	
Othe Scrap Value						375,000	
Rent Variable Costs		(27,000)	(28,822.50)	(30,768.02)	(32,844.86)	(35,061.86)	
Repayment of Working Capital (Future Value)						(225,471.40)	
Net Net Operating Cash Flow		623,000	669,928	720,388	774,648	982,522	
Tax Capital Allowance		(600,000)	(390,000)	(345,000)	(300,000)	(240,000)	
Net Tax (20%)		(0.00)	(4,600)	(55,985.60)	(75,077.60)	(94,929.60)	(148,504.40)
Net Cash Flow		623,000	665,328	664,402	699,570	887,592	(148,504)
Disc Discount Rate (10%)		0.10	0.10	0.10	0.10	0.10	0.10
Disc Discount Factor		0.90909	0.82645	0.75131	0.68301	0.62092	0.56447
Present Value	(2,390,000)	566,363	549,860	499,172	477,813	551,124	(83,826)
Pres Net Present Value (NPV)	170,506						
Net Present Value (NPV)	305,216						

Table 6:Project Aspire Projected Cash Flow Statement

Project Aspire's projected cash flow statement shows a positive net operating cash

flow in all years, driven by increasing revenue and decreasing working capital requirements, but its future value is negative due to the discounting effect.

Table 7: Investment Appraisal Techniques Calculation Summary

S/N	APPRAISAL TECHNIQUE	PROJECT ASPIRE	PROJECT WOLF
1	NPV (Before Risk Assessment)	$170,506	$305,216
2	NPV (After Risk Assessment)	$170,506	$169,449
3	IRR	12.7%	15.6%
4	Payback Period	3.63 Years	3.14 Years

The table compares the Net Present Value (NPV) and Internal Rate of Return (IRR) of two projects before and after risk assessment, indicating Project Aspire as the more favorable option despite having a lower IRR compared to Project Wolf.

Table 8: Equity vs Debt Financial Differences

Equity financing gives investors ownership in the company, while debt financing gives them a fixed claim on the company's profits but no ownership stake.

DESCRIPTION	EQUITY	DEBT
Ownership	The equity investor receives a portion of the proceeds.	The entirety of ownership is retained by business owner.
Risk	The stock investor shares the risk.	The single bearer of risk is the business owner.
Profitability	Profits can be re-invested in the company's future growth.	Loan repayments are taken from profits, lowering profitability and limiting future reinvestment.
Decision Making	Investors will have a significant say in management choices and day-to-day operations.	The firm owner has complete control over decision-making (s).
Tax	Dividends are not deductible for tax purposes.	Interest paid on a loan is tax deductible.
Interest Rates	In most cases, the return on equity is larger than the interest rate on a loan.	Loan interest rates are often lower than returns on equity.
Predictability	When it comes to the prospective exit of equity partners and investors, there is generally some scepticism.	Because loan instalments are predictable, budgeting is simpler and more reliable.
Examples and Sources	Family and friends, as well as venture capital firms.	Term loans, invoice finance, credit cards, lines of credit, and merchant cash advances are some of the options available.

Table 9: The Effect of Financing Source on WACC, as Shown in the Results (Appendix shows the detailed computations)

Scenario	Finance Source	Debt, D ($)	Equity, E ($)	D/E	WACC
Scenario 1	Before Project	18,000,000	20,000,000	0.9	9.31 %
Scenario 2	Debt	20,250,000	20,000,000	1.01	9.23 %
Scenario 3	Equity	18,000,000	22,250,000	0.81	9.30 %

The company's WACC would decrease if it financed the project with more debt (Scenario 2) instead of issuing equity (Scenario 3). This is because the cost of debt (5.32%) is lower than the cost of equity (9.90%) in this scenario. As a result, the overall average cost of the company's capital (WACC) would be lower if it used more debt financing.

Table 10: Variable Interest Rate Return on Equity (Appendix shows the detailed)

DESCRIPTION	AMOUNT($)	AMOUNT($)	AMOUNT($)	AMOUNT($)	AMOUNT($)
Finance Source	Equity	Debt	Debt	Debt	Debt
EBIT for Year 1	840,100.00	840,100.00	840,100.00	840,100.00	840,100.00
Interest Rate	-	8 %	9 %	10 %	11 %
Interest	-	(67,208.00)	(75,609.00)	(84,010.00)	(92,411.00)
Taxable Income	840,100.00	772,892.00	764,491.00	756,090.00	747,689.00
Tax (20%)	(168,020.00)	(154,578.40)	(152,898.20)	(151,218.00)	(149,537.80)
Profit After Tax	672,080.00	618,313.60	611,592.80	604,872.00	598,151.20
Equity	22,250,000	20,000,000	20,000,000	20,000,000	20,000,000
Return on Equity	3.02 %	3.09 %	3.06 %	3.02 %	2.99 %

The return on equity (ROE) for the company in the image would decrease as the interest rate on its debt increases, because the company would have to pay more in interest expense, which would reduce its net income. For example, if the interest rate on the company's debt increased from 8% to 11%, its ROE would decrease from 3.09% to 2.99%.

Table 11: Interest Rates vs. Equity Returns

The rising interest rates make bonds more attractive compared to stocks, leading to ***potentially lower equity returns****, while falling rates do the opposite.*

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