Unit: FNCE5008 Financial Principles and Analysis

Assessment: Individual Assignment 2

Assessment Value: 25%

Due Date: To be submitted by **11:59pm, Sunday, 9 May 2021**

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IMPORTANT INSTRUCTIONS:

• This individual assignment is due by above date and time.

• **Show all working** to demonstrate you have understood how to solve each problem.

• Length of your report: **no more than 1,500 words**.

• Please present your answers in **at least 4 decimal places.**

• The assignment must be typed (Word or PDF). Please submit your report onto Blackboard by above due date via the Turnitin submission point on your Blackboard site. Please also submit your working in Excel via the Blackboard submission point.

• **Answer must be legible.** If the marker cannot follow or read your answers, marks cannot be rewarded.

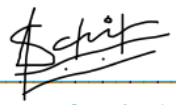
• **Answer all sections.**

Your assignment should meet the following requirements

- A copy of the assignment has been retained by me
- Declaration below is complete

Declaration

Except where I have indicated, the work I am submitting in this assignment is my own work and has not been submitted for assessment in another unit or course. I warrant that any diskettes and/or computer files submitted as part of this assignment have been checked for viruses and reported clean.



(Signature of student)

CAPITAL BUDGETING

This report explores and analyzes the financial aspects of MyUrbanFarm's brand new project: My Fish Poo Salad. The analysis consists of Capital Budgetting, with the inclusion of calculations such as Free cash Flow, Net Present Value (NPV), Internal Return Rate (IRR), Payback Period, and Profitability Index.

The following data was observed from the case study of MyUrbanFarm's project:

MyFishPooSalad Project Information	
Project period	4 years
R&D cost	($100,000)
Marketting	($50,000)
production of equipment	($200,000)
Cost to sell equipment at year 4 (Market Salvage Value)	$25,000
Sales price per unit	$9,500
Variable cost per unit	$6,000
Lease sale price per year	$4,000
Upfront revenue	$1,000
Remaining revenue	$3,000
Lease period	3 years
Fixed cost per year	$50,000
General admin cost	$50,000
General admin cost after year 4	$10,000
Tax	30%
Total sales	320
Outright sales	80
Lease sales	240
Initial working capital	$75,000
Net working capital requirements from year 1 - 4	25% of sales
Depreciation	($50,000)
Discount Rate	14%
Inflation	2%

Table A: My Fish Poo Salad Information

1. **Using the financial and qualitative information provided in the case, estimate the incremental free cash flow of this project each period.**

   First, the yearly sales price of the equipment, both outright ($9,500 per unit) and through leasing ($1,000 per quarter per unit) is laid out into the table, with cost of inflation (2%) taken into account, and the total income is calculated. The lifespan of the project is for 4 years; however, the equipment bought on the fourth year would last for 3 years. Hence, the table has 2 more columns for the 5^{th} and the 6^{th} years.

The total revenue collected from leased sales from different years was calculated collectively. It was noted that, despite the inflation, the equipment bought on year 1 would have the same payment rice on year 2 and 3 as well. After computing the income/revenue from each individual year, the total variable costs (total units * variable cost per unit) and the fixed cost with account of inflation were entered. The fixed cost was $50,000 for the first year as mentioned and would increase gradually with inflation rate 2%. It is also worth noting that the fixed cost would be $10,000 after year 4.

The Gross Profit was calculated thereafter by the elimination of fixed costs and total variable costs from the total revenue. Further, the depreciation cost is allocated over the 4 years. Since the production equipment is depreciated using the straight-line depreciation method over 4 years to a zero balance afterwards, the depreciation cost per year would be $50,000 as the total initial production cost was $200,000. The Earnings before Income Tax (EBIT) was obtained by eliminating the depreciation value from the gross profit. As EBIT is an element that gives a value before taxation, tax deductions should be applied to obtain the Incremental Earnings per year. As mentioned in the case study, the corporate for MyUrbanFarm is 30%. Therefore, the EBIT gets reduced by 30% as part of corporate tax, which then generates the yearly Incremental Earning of the project.

Now, the depreciated value is added back as depreciation is a non-cash investment and it was only reduced in order to calculate and generate proper after tax revenues. After addition of depreciation, the net working capital is allotted. The initial capital was mentioned to be $75,000 in year 0 and then 25% of the quarter sales thereafter. With this, the change in net working capital was also calculated to obtain the free cash flow of the project.

Before jumping into FCF, there are some crucial elements needed to be addressed. The after tax capital gain should be added to the free cash flow on the last year of the project. The calculation of after tax capital gain is shown below:

After tax capital gain	Equipment Price
Market Salvage Value	$25,000
Book Value	$0
Capital Gain	$25,000
Reduction of Tax (30%)	$7,500
After tax capital gain	$17,500

Table B: After tax capital gain

The market value of the equipment at the end of the fourth year was mentioned to be $25,000 and eliminating the tax amount (30%) from the market value, the capital gain after tax is generated.

Finally, the Free Cash Flow is calculated by adding the depreciation cost to the Incremental Earning, eliminating the change in net working capital, and adding the after tax capital gain. It is worth noting that the cost invested initially on research and development and product marketing were avoided, as those costs are basically non-essential.
The detailed amounts are displayed in the tabular form below:

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
4								
5	Outright Price per unit		$9,500.0000	$9,690.0000	$9,883.8000	$10,081.4760		
6	Leased Price per unit		$4,000.0000	$4,080.0000	$4,161.6000	$4,244.8320	$4,244.8320	$4,244.8320
7	Variable Cost per unit		$6,000.0000	$6,120.0000	$6,242.4000	$6,367.2480		
8								
9	Units sold outright		80	80	80	80		
10	Units leased		240	480	720	720	480	240
11	Total		320	560	800	800	480	240
12								
13	Total outright revenue		$760,000.0000	$775,200.0000	$790,704.0000	$806,518.0800		
14	Total revenue from lease		$960,000.0000	$1,939,200.0000	$2,937,984.0000	$2,996,743.6800	$3,036,303.3600	$1,018,759.6800
15	Total revenue		$1,720,000.0000	$2,714,400.0000	$3,728,688.0000	$3,803,261.7600	$3,036,303.3600	$1,018,759.6800
16								
17	(Eliminate) Total Variable Cost		$1,920,000.0000	$1,958,400.0000	$1,997,568.0000	$2,037,519.36		
18	(Eliminate) Fixed Cost		$50,000	$51,000	$52,020	$53,060	$10,000	$10,000
19								
20	Gross Profit		($250,000.0000)	$705,000.0000	$1,679,100.0000	$1,712,682.0000	$3,026,303.3600	$1,008,759.6800
21	(Eliminate) Depreciation		$50,000	$50,000	$50,000	$50,000		
22								
23	Earnings Before Income Tax		($300,000.0000)	$655,000.0000	$1,629,100.0000	$1,662,682.0000	$3,026,303.3600	$1,008,759.6800
24								
25	(Eliminate) Tax (30%)		($90,000.0000)	$196,500.0000	$488,730.0000	$498,804.6000	$907,891.0080	$302,627.9040
26								
27	Incremental Earning		($210,000.0000)	$458,500.0000	$1,140,370.0000	$1,163,877.4000	$2,118,412.3520	$706,131.7760
28								
29	(Add) Depreciation		$50,000	$50,000	$50,000	$50,000		
30								
31	Net Working Capital	$75,000	$430,000.0000	$678,600.0000	$932,172.0000	$950,815.4400		
32								
33	(Eliminate) Change in Net Working Capital	$75,000	$355,000.0000	$248,600.0000	$253,572.0000	$18,643.4400		
34								
35	After tax capital gain					$17,500		
36	Equipment production cost	$200,000						
37	Research and Development cost	$100,000						
38								
39	Free Cash Flow (FCF)	($275,000)	($515,000.0000)	$259,900.0000	$936,798.0000	$1,212,733.9600	$2,118,412.3520	$706,131.7760

Table C: Free Cash Flow Calculation

Please refer to the provided excel document for details on calculations and analysis.

2. The depreciation is a non-cash charge. Do you need to consider the depreciation in the capital budgeting process?

Depreciation is a non-cash charge. It requires no payment. Depreciation is basically the return you get on your capital (Irons 2019). In this case, the initial investment cost is $200,000 and that amount is depreciated over the course of 4 years with straight-line depreciation method, which would be $50,000 per year. This amount is not an actual cash charge but it is crucial to get the taxable amount from the gross profit. After depreciation is eliminated from the gross profit, the taxable income is calculated and the depreciation is added back to get the net cash flows. If depreciation was

deducted from the cash flow as part of an investment, then there would be misleading imbalances on the balance sheet.

The production equipment would be depreciated using the straight line depreciation method over 4 years to a 0 balance					
	Year 0	Year 1	Year 2	Year 3	Year 4
Equipment		$50,000	$50,000	$50,000	$50,000

Table D: Production Equipment Depreciation

3. **Should My Urban Farm use a different discount rate to other agriculture companies? If so, why, and what discount rate should they use?**

   Discount rate is a rate of return used by investors in corporate finance to discount the future cash flows to their present values (Corporate Finance Institute 2021). As per the information provided in the case study, MyUrbanFarm has a normal discount rate of 12% for agriculture. If 12% discount rate is applied, the NPV increases to $2,369,670.3221

4. **Ms Daisey had been told that there are various techniques for valuation such as the NPV, payback period, and discount payback period, IRR, and PI which all could be used for this project. She wants you to use all of these techniques and help make this investment decision. My Urban Farm requires the payback period is less than 3 years and discounted payback period is less than 4 years. What can you conclude from the information these techniques provided? Based on your analysis, should they accept this project? Show all your workings.**

   All the calculations of NPV, Payback period, discounted payback period, IRR, and PI can be found in the excel sheet provided. The table below is the snippet of the above mentioned calculations.

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Free Cash Flow(FCF)		($375,000.0000)	($515,000.0000)	$259,900.0000	$936,798.0000	$1,212,733.9600	$2,118,412.3520	$706,131.7760
Present Value at Discount rate 14%		($375,000.0000)	-$451,754.3860	$199,984.6106	$632,311.9664	$718,035.8594	$1,100,236.9938	$321,704.1380
Net Present Value (NPV)	$2,145,519.1824							
	$2,145,519.1824							
Internal Return Rate (IRR)	64.1781%							
Profitability Index	5.7214							
Cumulative Cash Flow		($375,000.0000)	($890,000.0000)	($630,100.0000)	$306,698.0000	$1,519,431.9600	$3,637,844.3120	$4,343,976.0880
Payback period				2.6726				
Cumulative Present Value		($375,000.0000)	-$826,754.3860	-$626,769.7753	$5,542.1911	$723,578.0505	$1,823,815.0444	$2,145,519.1824
Discounted Payback Period				2.9912				

Table E: NPV, IRR, PI, PP, and DPP

NPV:

Net Present Value or NPV is the present value of all expected positive and negative future cash flows (Peterson Drake and Fabozzi 2012). The NPV is calculated by the following formula:

$$NPV = \sum_{t=1}^{n} \frac{CF_t}{(1+r)^t} - CF_0$$

Where,

t represents the particular time period

n represents number of time periods or the life of the investment or project

CF_t represents cash flow on that particular time period and

r represents the expected rate of return or the cost of capital

A positive NPV means that the investment or the project brings positive income and adds value to the company, whereas negative NPV means that the investment takes the company to a loss.

In this case, the NPV can be calculated by first calculating the present values each year discounted with the rate of 14%. So at year 1, the value $515,000 is converted to $451,754.39 by dividing the discount rate and raised to the power of that time period, i.e. 1. After calculating it for each year, the values are added and the NPV is obtained as $2,145,519.1824.

The NPV is positive (NPV > 0), which means that the project adds value to the company.

IRR:

Internal Return Rate or IRR makes the present value of all the expected future cash flows equal to zero (Peterson Drake and Fabozzi 2012). It is calculated by the following formula:

$$\sum_{t=0}^{n} \frac{CF_t}{(1+IRR)^t} = 0$$

The IRR is used for decision making in which it is compared with the expected rate of return. If the IRR is greater than the expected rate of return, then the company should go along with the investment or project. And if the IRR is less than the expected rate of return, then the company probably shouldn't invest in the project.
In our case, the IRR is computed by the IRR function in excel and was found to be 64.1781%, which is 50% or so more than the cost of capital. So it would be safe to say that this project is a good investment.

PI:
Profitability Index or PI is an index that measures the whether the investment to the project returns a positive value or destroys value to the company. If the PI is greater than 0 then, the project will add value to the company, whereas, if the PI is less than 0 then, the project is expected to decrease the company wealth. It is measured by:

$$PI = \frac{NPV}{initial\ investment}$$

In our case, the NPV is $2,145,519.1824 and the initial investment is $375,000. Hence, by dividing the NPV with the initial investment, we get 5.7214, which is a positive number.

Payback Period:
In simple terms, payback period answers the question of how long it would take to get the initial investment back (Peterson Drake and Fabozzi 2012). To calculate payback period, the accumulated cash flows each year needs to be entered first. With the accumulated cash flows, the point where a negative number turns to a positive number then, that is the year the investment is fully recovered.

$$Payback\ Period = t + \frac{ACF_t}{CF_{t+1}}$$

From Table E, we can see that the accumulated cash flow started to give a positive number from year 3. Therefore, the investment was recovered somewhere during year 2. Calculating when specifically the investment was recovered, we add 2 to the fraction of the ACF at year 2 ($630,100) to the CF of next year ($936,798), which results to 2.6726 years.

Discounted Payback Period:
The discounted payback period is the time of recovery of the original investment in terms of discounted future cash flows (Peterson Drake and Fabozzi 2012).

$$DPP = t + \frac{Discounted\ ACF_t}{Discounted\ CF_{t+1}}$$

From Table E, it is clear that the cumulative discounted present values are entered and reaches to a positive number on year 3. This means that the investment is recovered somewhere during year 2 taking the discount rate into account. The Discounted Payback Period is then calculated similar to how payback period was calculated and obtained to be 2.9912 years.

From the above analysis,
NPV = $2145519.1824 > 0
IRR = 64% > 14%
PI = 5.7214 > 1

MyUrbanFarm requirement for payback period = 3 years
Payback Period = 2.6726 years

MyUrbanFarm requirement for discounted payback period = 4 years
Discounted Payback Period = 2.9912 years

Hence, it would be a wise and profitable decision to go ahead and invest on My Fish Poo Salad.

5. **Recently, Ms Daisey received another project proposal, 'My Solarponics' which has the similar overall risk as My Fish Poo Salad. This project is expected to generate NPV of $2 million in total and will operate for 3 years. If My Fish Poo Salad and My Solarponics are mutually exclusive projects, which project should My Urban Farm choose?**

My Solarponics has the expected NPV of $2,000,000 with a discount rate of 14% and will operate for 3 years. My Fish Poo Salad has and NPV of $2,145,519.1824 with similar discount rate and has a lifespan of 4 years. Since the two projects have different lifespans, the NPV's of the projects cannot be compared. Since the two projects are mutually exclusive and only one project should be chosen, the Equivalent Annual Annuity (EAA) method can be used to calculate the constant annual cash flow generated by the two projects over their lifespan and we can compare the benefits from each project (Kagan 2021). The Equivalent Annual Annuity Cash Flow is calculated by the following formula:

$$C = \frac{r * NPV}{(1 - (1 + r)^{-n})}$$

Where,
C = Equivalent Annual Annuity Cash Flow
NPV = Net Present Value
r = discount rate
n = number of periods

		My Fish Poo Salad		My Solarponics
NPV		$2,145,519.1824		$2,000,000.0000
Discount rate		14%		14%
Number of periods		4		3
Equivalent Annual Annuity Cash Flow		$736,352		$861,463

Table F: EAA Cash Flow comparison

From table F, it is clear that 'My Solarponics' generates a higher EAA of $861,463 as opposed to that from 'My Fish Poo Salad' of $736,352. Hence, the higher EAA cash flow would be a better decision to choose as it returns a higher value overall to the company.

References:

Corporate Finance Institute. 2021. "Discount Rate - Definition, Types And Examples, Issues". Corporate Finance Institute. https://corporatefinanceinstitute.com/resources/knowledge/finance/discount-rate/.

Irons, Robert. 2019. The Fundamental Principles Of Finance. 1st ed.

Kagan, Julia. 2021. "Equivalent Annual Annuity Approach (EAA)". Investopedia. https://www.investopedia.com/terms/e/equivalent-annual-annuity-approach.asp#:~:text=The%20equivalent%20annual%20annuity%20approach%20is%20one%20of%20two%20methods,if%20it%20was%20an%20annuity.

Peterson Drake, Pamela, and CFA Fabozzi. 2012. The Basics Of Finance. Hoboken: Wiley [Imprint].