**Details About the Project -  
Agenda - Valuation of a Proposed New Product Venture**

This is self-project on which I completed in a coursera course a new product venture project which will last for 8 years.   
This is divided in three phases. The initial is the startup phase which will be year 1 and year 2 in which our focus will be investing in the Property Plant and Equipment (PPE) of amount 70,000 dollars and We will be investing in the Research and Development over the two years of about 20,000 dollars. We will also be investing in Marketing and Administrative Costs over two years of about 25,000 dollars each year.

The next phase will be the operating phase in which will last from Year 3 to Year 7. In this phase we will focus on Production and Sales of the product we will be calculating how working capital change. We will be continued S,G & A Activities (that ramp up relative to the startup phase) like Variable Cost Per Unit (not subject to inflation) Starts in Year 3 because there are no sales until then - $ 15.00, allow for sales growth, and inflation rates of Sales and COGS but initially assumptions are that they both are zero.  
For working Capital Timing Issues , we will be collecting 90% in the year of sales and 10% following the next year, Desired Units of Inventory as a Percent of that year's sales - 10.00%, Payments on Purchases Made This year - Percent Paid this year - 95.00% and Percent Paid next year - 5.00%, Payments to Employees for Compensation and Benefits Earned this year - Percent Paid this year - 70.00% and Percent Paid Next year - 30.00%.

Third Phase will be the termination/Disposal/Shut Down phase which will be Year 8. In this phase we will liquidate the remaining Inventory at lower price, Collect Remaining Receivable, Pay Remaining Payable, Sell the remaining long-term assets and other disposal cost will be recorded like Proceeds from Disposal of PPE - $5,000.00 and Other Disposal or Cleanup Costs - $2,000.00.

Some Assumption we will follow are -

Our Focus is on the Cash Inflows and Outflows of the New Venture

• We will be not looking at how the New Venture is Financed

• The discount rate (6%) represents the opportunity cost of the capital we’re employing in the project (regardless of the source)

Next, we will focus on Forecasting Financial Statementsbut to do that we might have to have to start from forecasting sales and sales growth (initially 0%). We will use the projected sales figures to estimate the remaining income statement lines (which are often at least partially a function of sales volume). Then we will use the forecasted Sales numbers to construct a schedule for producing the product or service (production volume, inventory levels), Use the forecasted sales and production schedules to estimate the resources needed to accomplish the plans (assets) and the timing of resource acquisition and use. We will use the indirect method to generate the cash flow statement i.e., by using the income statement and balance sheets to construct the statement of cash flows.

Assumption - We’ll focus on the cash flows from project itself and not worry about the specifics as to how it is financed.

**Forecasting Revenues**

For forecasting the sales, we need to Try to Assess Consumer Demand, Forecast Industry Sales and Firm Market Share like Management Estimates and Analysts Forecasts. We will have to focus on Production/ Technology Constraints and Demand will also depend on the Sales Price. For a Newer Ventures we need to investigate question like

– How long until we can get to market?

– How long will the “high growth” phase last?

– What will steady state and “phase out/decline” phases look like?

For forecasting The Other Income Statement Lines, we will need to look into following points -

For Cost of Goods (or Services) Sold we need to investigate the following questions -

– What combination of material, labor and overhead is required?

– What Profit Margin is expected?

– How much of the Costs are Fixed vs Variable?

For Selling General and Administrative we need to investigate the following questions -

– What are the marketing and advertising plans?

– How do they Vary Over Time?

– How much do these costs go up when sales go up?

For getting more idea about income statement Prior (or Competitor) Income Statements can be helpful.

For Depreciation Expense in the income statement, we will need to investigate acquisitions of property, plant, and equipment up through that year and Estimates of Useful Lives and Salvage Value.

For Income Tax Expense in the income statement we will need to look into where will the income be (what tax jurisdiction?), What are our tax rates?.

We need to focus on that Income for tax purposes is generally different than financial statement income. We use Accelerated depreciation for tax purposes vs straight line depreciation for book purposes. So we’ll assume that this venture is part of a bigger company that has plenty of taxable income So if this venture incurs losses early on, we’re able to utilize those losses to reduce our taxes and If that’s not the case, you have to worry about more complicated features of the tax law involving Loss Carry forwards and Carry backs.

For the Income Statement in the Disposal Year There is a Gain on Sale of the PPE (its book value is $0 at the time of sale, but we sold it for $5000) and There are Other Disposal costs of $2000.

Next step is to forecast Balance Sheet in which we will need to investigate Working Capital. For working capital we will need to look in into Account receivables but to that we will need details such as -

– What will be our credit policy?

– How much of sales will be cash vs credit?

– How quickly will we get paid?

We will need to look in into Inventory but to that we will need details such as -

– What are production plans?

– Strategy: Make to Order / Make to Stock ?

– How long does production take?

– How much inventory do we want to hold?

We will need to look in into Accounts Payables but to that we will need details such as -

– when do we pay for

– Inventory

– Wages and Benefits

• Others

The other part of forecasting the Balance Sheet is its Long Term Assets, for which we will need answer this question first -

• What are our Production / Capital Expenditure Plans?

• Will we need to add capacity later?

And we need to look for Disposal Cost or Resale Value, Tangible vs Intangible Assets – Intangible Assets Like R&D aren’t Capitalized and Depreciation and Amortization Policies – Book vs Tax in the assumption we made earlier.

For Forecasting the Cash Flow Statement, we will use the forecasted Balance Sheets and Income Statements to forecast the Cash Flow Statements. Cash flow statement has three parts -

• Operating Cash Flow = Net Income + Depreciation – Change in Working Capital

• Investing Cash Flows which will be Purchase of PPE (During the Startup Period) and Sale of PPE(During the Disposal Period)

• Cash Flow Financed which will nothing here because of the assumption we made earlier.

Result of the Forecasted Statement -

In the Forecasted Income Statements we see that there No Growth In Sales Volume During Operating Phase (by assumption), there is Big Drop in Sales (and Sale Price) During the Termination Phase and there is Decline in Income During Operating Phase is because of the tax expense (and the declining tax shield provided by depreciation).

In the Forecasted balance sheet we see a Jump in Working Capital in Period 3, Released in Period 8.

In the Forecasted Cash Flow Statements we see that there is Negative Cash Flows during the start-up period and Positive Cash Flows during Operating Period. Thus, Cash Lags Income because of the investment in working capital and the Termination phase has a positive cash flow in this case (collection of receivables).

After forecasting the cash flow statement of the we will need to calculate Net Present Value (NPV) and IRR,Using the after-tax Cost of Capital (6%) to calculate NPV and to Recall that this represents the opportunity cost of our capital – The rate we could earn on our next best use (of equivalent risk) of capital

Remember that the NPV function in Excel assumes the first cash flow is one period away so Initial Cash Flow = -$70,000 and Present Value of Future Cash Flows = +$96,624. So Total Present Value of Cash Flows = $26,624 and Internal Rate of Return = 11.5%.

Interpretation of Net Present Value (NPV) = $26,624 is that This is the economic value that the New Product Venture will add to the firm. This considers both the timing and magnitude of the inflows and outflows of cash .It should also reflect the riskiness associated with the cash flows. (The discount rate is supposed to reflect this)

Interpretation of Internal Rate of Return (IRR) = 11.5% is that This means that the money we invest in the New Product Venture earns a rate of return of 11.5%. Again, this takes the timing as well as the magnitudes of the inflows and outflows of cash into consideration. Since 11.5% is considerably above the cost of capital (6%), this is additional evidence that this is a profitable product venture. If the cost of capital was 11.5%, this venture would have an NPV of zero and If the cost of capital was above 11.5%, this venture would have a negative NPV. It would be destroying value; not creating it.

Now when we look at the results such asthe NPV and IRR numbers look “precise” but How believable are those numbers?

This are the results are only as credible as the quality of the inputs that went into our spreadsheet which will be the parameters we put into the Assumptions Section of the Spreadsheet But these are all judgments or estimates (or guesses) about the future and how our business strategy will play out over time so We know that this can’t possibly be 100% accurate and let’s think about alternative scenarios for how things might turn out.

WE’RE NOT FINISHED yet, In fact, we’re just starting. Now we want to ask some hard questions like

– What can go wrong?

– How wrong can it go?

And to try to think “outside the box”

– Re-think all our assumptions

– How can we do this better?

Since we’ve set up the spreadsheet in a way that allows the series of future financial statements and the Net Present Value to be easily re-calculated under alternative scenarios.

We know that this Iterative Process. So we need to Translate your project idea into the future economic actions, transactions, events needed to carry out the project and your best estimate of the outcomes and Map those predictions into forecasted financial statements. Then Calculate the NPV of the forecasted cash flows. Then again Rethink your strategy like Consider Alternative Courses of Action and Alternative Scenarios.

For doing so we need to ask ourselves the following Reality Checks question such as -

• Do the statements make sense?

• Is our forecasted sales price realistic?

• Can we reasonably expect to sell that many?

• Do we have the capability of producing that many?

• Are the balances of receivables, inventory, and liabilities reasonable?

In the rethinking new strategy Let’s Start with Sales because this is the source of all our inflows and we assumed the sales to be 2000 in the start. Our calculations assumed that Volume will be 2,000 units per year “What if Sales Volume is different?”. How big are profits (in present value terms) at different sales levels?

We can check that by changing the “INITIAL SALES VOLUME” cell and All the calculations will automatically update.

So when we Re-calculation of NPV if Sales Volume is 20% Higher or 20% Lower than our Base-Line Forecasted Case –

|  |  |  |
| --- | --- | --- |
| Sales Volume in Units Per Year | NPV | IRR |
| 2,400 (20% higher) | $61,961 | 17.7% |
| 2,000 (original forecast) | $26,624 | 11.5% |
| 1,600 (20% lower) | -$8,712 | 4.0% |

We see that if Sales Falls Short of our Forecast by 20%, we’ll lose money!

So we need to ask ourselves that What Sales Volume Does our New Venture “Break Even?”. Breakeven means earns a Net Present Value of Zero or Equivalently, it means that the Venture Earns an IRR of 6%. We could try to figure this out by trial and error by putting in different volume levels as we know from the prior table above that the Breakeven Volume will be slightly above 1,600 units a year Or we can use a built in function in Excel called GOALSEEK to do this for us.

GOALSEEK Calculation of Break-Even Volume –

|  |  |  |
| --- | --- | --- |
| Sales Volume in Units Per Year | NPV | IRR |
| 2,000 (original forecast) | $26,624 | 11.5% |
| 1,698 (Breakeven Volume) | $0 | 6.0% |

In our case, we have a “margin of safety” of approximately 300 units of sales per year (relative to our forecast) before we start to lose money.

In many proposed new ventures, the breakeven point will turn out to be well ABOVE your forecasted sales volume. THIS MEANS YOU NEED TO RETHINK YOUR PLANS AND SEE IF THERE IS A WAY TO MODIFY YOUR STRATEGY OR PLANS FOR EXECUTING IT.

Another Concern is that Costs of Providing the Product or Service. In Our calculations assume we have a product gross margin of 55%. This means that if our sales price is $100, it will cost $45 to make each unit, leaving a margin of $55 to cover the rest of our costs. But how much margin of safety do we have there?

Another Scenarios can be How does NPV change with Profit Margin (As a Percent of Sales Price); Sales Volume = 2,000 units per year

|  |  |  |
| --- | --- | --- |
| Profit Margin Percentage | NPV | IRR |
| 65% | $71,820 | 19.5% |
| 55% (original forecast) | $26,624 | 11.5% |
| 45% | -$18,571 | 1.7% |

We see that If the Margin is only 45%, we lose money! We can use Goal Seek to fine tune this. And we need to think that Are there other ways to produce and deliver the product or provide the service that will cost less?

Next Scenario will be How Much will Sales Grow? This is one of the most important considerations in new ventures. Sales often grow during initial part of the Operating Phase. We’ve assumed NO GROWTH in the initial assumption so let’s change that! Assume (for simplicity) that sales grows at a constant rate during the operating phase.

So let’s start with What if Sales Volume Starts at 2,000 but Grows by 25% Year?

If look in the income statement we see the Increase in Sales. Sales Goes up Faster than Total Costs because some of the costs are fixed. Unlike the Constant Sales Case, Note that there is continued additional investment in Working Capital, with it all released in the last period.

Net Present Value as a Function of Sales Growth –

|  |  |  |
| --- | --- | --- |
| Growth In Sales Volume | NPV | IRR |
| 0% (original forecast) | $26,624 | 11.5% |
| 25% Per Year | $132,624 | 25.1% |

We see that Growth Makes a HUGE difference in Profitability. Note that Sales Volume goes from 2,000 units to 4,883 units per year. So we need to think about Do we have the PRODUCTIVE CAPACITY to handle this much volume? If not, we’ll need to add more productive capacity. When? How much? How much will it cost? Will it be worth it?

Another thing we need to think about is the inflation rate. A common mistake in doing these calculations is using the same initial period prices will persist for all future periods. But prices often change over time, especially in periods of inflation. We can incorporate this by building anticipated inflation into the future prices but we have to be careful because not all prices go up at the same rate. For Example - The tax shield from depreciation is usually set based on the original purchase price of the assets. In some sectors of the economy, prices go DOWN over time, not up.

Next is the Exploration of Scenarios with Inflation Rate –

Suppose the Inflation Rate in our New Product Venture applies Only to Sales and Cost of Goods.

|  |  |  |
| --- | --- | --- |
| Inflation Rate Per Year | NPV | IRR |
| 0% (original forecast) | $26,624 | 11.5% |
| 10% | $77,298 | 19.2% |
| 50% | $398,227 | 42.5% |

We need to think that if the Inflation Rate is that high, shouldn’t the discount rate be higher than 6%?

We also need to focus on whether Sales Revenue is increasing because of Higher Sales Prices or Higher Sales Volume (if this is the reason, this might require more capacity).

Other Scenarios To Explore is the Discount Rate. Higher expectations about inflation should imply higher discount rates and Higher risk should imply higher discount rates. But Higher discount rates will result in lower present values.

Other Scenarios To Explore can be Time Related Factors such as –

Credit Policy – Suppose we allow people to pay later. We know Collecting later is bad But will it Allow us to Sell to more customers. We need to think about do we think Sales will increase enough to offset the cost of later collections. Or Will we run into customer defaults?

There can be Different Patterns of Growth and Decline for Sales or the length of Time the Operating Phase lasts. How quickly will competitors come in and take away sales?  
If the Time to Market (sales start in year 3) – Faster time to market will result in higher present values.

We can also think about Interactions with Our Other Products and Activities like –

• Do the revenues from this new product cannibalize the revenues from our other products?

– Or will they make our other products more attractive to customers?

• Does this product venture cannibalize scarce resources that our other products use?

• Will we learn things in doing this product venture that we can apply to other products?

**Tentative Summary**

• Our baseline case (no growth) has a positive NPV

• But it doesn’t take much to go wrong to change that

• If Sales are expected to grow, things look much better

• There are many things that are difficult to quantify – this is where the ART mixes with the SCIENCE in business strategy discussions

Next is that we have one more thing we want to take another look at and that’s what happens at the end of the project.

We see in our example, we assume we Terminated the New Product Venture in Period 8. This resulted in a set of one-time cash flows from Sale of PPE, Sale of Remaining Inventory at a reduced price, Collection of Remaining Receivables, Payment of Remaining Payables, and Other Disposal Costs.

This is an easy one to overlook or underestimate as these are all ONE-TIME costs that occur 8 periods out, it’s easy to calculate their impact on the overall NPV of the project.

But What if We Continue Beyond the Forecast Horizon? By Continuing the Project Itself Or by Rolling it over into a New Project. This is especially relevant if we’re trying to value the FIRM as a whole (which has an indefinite life).

For Valuing a Firm we can think of a firm as a set of projects of which Some are operating simultaneously But new ones arise to take the place of old ones that get phased out. A Firm has an Indefinite life but we can’t keep forecasting all the way out to infinity.

Two Part Approach to Forecasting and Valuation –

Individual yearly forecasts are usually made for a finite horizon (typically 3 to 7 years) and Then a more ad hoc (simplified) assumption is made regarding what will happen beyond that time (often called the Terminal Value).

What Happens Beyond the Forecast Horizon?

Usually we assume that the firm goes into “steady state” beyond the forecast horizon. The Common Assumptions about Steady State is that Cash Flows are Constant beyond the Forecast Horizon let’s say, equal to the Cash Flow from Period 7. This is called a perpetuity the Cash Flows grow at a constant rate beyond the forecast Horizon. This is called a constant growth perpetuity. While often a good “approximation,” the main virtue of these assumptions is that the math is easy.

Valuation of a Constant Growth Perpetuity –

Suppose the discount rate is r and If the cash flows start at C and grow at g percent per year, the present value is PV of growing perpetuity = C /(r – g). The growth rate g has to be less than the discount rate r because You can’t grow at too a high a rate forever!

No growth is just a special case of this. In our case, this constant growth perpetuity doesn’t start until year 8, so we have to further discount the above formula.

The Terminal Value Assumption Has a Big Impact on Valuation!

Suppose the Discount Rate = 6% then –

|  |  |  |  |
| --- | --- | --- | --- |
| What Happens Beyond Year 7? | Present Value of Cash Flows Beyond Year 7 | Present Value of Cash Flows During Years 0-7 | Total Present Value of Cash Flows |
| Terminate – One Cash Flow of $9,800 in Period 8 | $6,148 | $20,476 | $26,624 |
| Perpetuity – 0% Growth Over Period 7 Cash Flow | $381,299 | $20,476 | $401,775 |
| Perpetuity – 2% Growth Over Period 7 Cash Flow | $583,388 | $20,476 | $603,864 |

Most of the Value of the Firm is from Cash Flows Beyond Year 7, even with no growth.