DECISION MAKING AND SCENARIOS
MODULE 4.4 – New Product Venture

Formulation and Evaluation of Alternative Scenarios

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Agenda – Valuation of a Proposed New Product Venture and Evaluation of Alternative Scenarios

- Introduction and Spreadsheet Set up
- Forecasting of Future Cash Flows
- Valuation (NPV and IRR)
- **Formulation and Evaluation of Alternative Scenarios**
- Expanding Beyond the Time Horizon

Iterative Process

- Translate your project idea into the future economic actions, transactions, events needed to carry out the project and your best estimate of the outcomes
- Map those predictions into forecasted financial statements.
- Calculate the NPV of the forecasted cash flows
- **Rethink your strategy**
  - **Consider Alternative Courses of Action**
  - **Alternative Scenarios**

Reality Checks

- 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?

Let's Start with Sales

- This is the source of all our inflows.
- Remember that we assumed the following in our spreadsheet

Operating Phase - Sales	
Iniitial Sales Volume (in units) - Starts in Year 3	2000
Sales Growth Rate per year	0.00%
Sales Price Per Unit	$100.00
Product Gross Margin Pct	55.00%
Inflation Rate for Sales and COGS	0.00%

- These assumptions (at this point) partly reflect
  - our best estimate of what we think will happen
  - Simplifications to make it easier to check if our spreadsheet was working

What If Analysis? – Sales Volume

- 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?
- Go back to the spreadsheet and change the "INITIAL SALES VOLUME" cell
  - All the calculations will automatically update

Operating Phase - Sales	
Iniitial Sales Volume (in units) - Starts in Year 3	**2000**
Sales Growth Rate per year	0.00%
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Product Gross Margin Pct	55.00%
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What If Analysis? – Sales Volume

- Our calculations assumed that Sale Volume is 2,000 units per year
  - What if they're not?
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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%

Note that if Sales Falls Short of our Forecast by 20%, we'll lose money!

At What Sales Volume Does our New Venture "Break Even?"

- Breakeven means earns a Net Present Value of Zero
- 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
  - we know from the prior slide 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 – an Excel Function to solve this

- We have set up the spreadsheet such that
  - There is a cell that contains the Sales Volume per year (We can put in an arbitrary number. Goalseek will change the number)
  - There is a cell that contains the results of the NPV calculation
- Under the Data Tab, choose “What If Analysis” and “Goalseek”.
- Choose to Set the Cell with the NPV formula in it Equal to 0.0 by changing the Cell with the Volume in it.
- This asks Excel to find the Sales Volume per year that results in the Overall NPV of the project (discounted at 6%) to equal 0.0
- Equivalently, this finds the Sales Volume such that the project earns a 6% rate of return (after tax)

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%

- This is an Important Calculation to make
- 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 – Costs of Providing the Product or Service

- 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?

Operating Phase - Sales	
Iniitial Sales Volume (in units) - Starts in Year 3	2000
Sales Growth Rate per year	0.00%
Sales Price Per Unit	$100.00
Product Gross Margin Pct	**55.00%**
Inflation Rate for Sales and COGS	0.00%

Scenarios – 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%

- If the Margin is only 45%, we lose money!
  - We can use GoalSeek to fine tune this
- **Are there other ways to produce and deliver the product or provide the service that will cost less?**

Scenario – 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 – let's change that!
- Assume (for simplicity) that sales grows at a constant rate during the operating phase

Operating Phase - Sales	
Iniitial Sales Volume (in units) - Starts in Year 3	2000
Sales Growth Rate per year	**0.00%**
Sales Price Per Unit	$100.00
Product Gross Margin Pct	55.00%
Inflation Rate for Sales and COGS	0.00%

Growth In Sales -- What if Sales Volume Starts at 2,000 but Grows by 25% Year?

INCOME STATEMENT	1	2	3	4	5	6	7	8
Sales Revenue	$0	$0	$200,000	$250,000	$312,500	$390,625	$488,281	$21,973
Cost of Goods Sold	$0	$0	$90,000	$112,500	$140,625	$175,781	$219,727	$21,973
Gross Margin	$0	$0	$110,000	$137,500	$171,875	$214,844	$268,555	$0
Depreciation Expense	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Research & Development	$20,000	$20,000	$0	$0	$0	$0	$0	$0
SG&A	$25,000	$25,000	$55,000	$62,500	$71,875	$83,594	$98,242	$0
Other Losses (Gains)	$0	$0	$0	$0	$0	$0	$0	($3,000)
Pre-tax Income (Loss(	($55,000)	($55,000)	$45,000	$65,000	$90,000	$121,250	$160,313	$3,000
Tax Expense (Benefit)	($26,120)	($23,600)	$17,800	$27,200	$37,760	$50,820	$66,725	$1,200
Net Income (Loss)	($28,880)	($31,400)	$27,200	$37,800	$52,240	$70,430	$93,588	$1,800

- Note the Increase in Sales!
- Sales Goes up Faster than Total Costs
  - Because some of the costs are fixed!

With 25% Growth in Sales – More Working Capital

CASH FLOW STATEMENT	0	1	2	3	4	5	6	7	8
Net Income		($28,880)	($31,400)	$27,200	$37,800	$52,240	$70,430	$93,588	$1,800
Add Depreciation		$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$0
Minus Change in Accts Rec		$0	$0	($20,000)	($5,000)	($6,250)	($7,813)	($9,766)	$48,828
Minus Change in Inventory		$0	$0	($9,000)	($2,250)	($2,813)	($3,516)	($4,395)	$21,973
Plus Change in Accts Payable		$0	$0	$4,950	$788	$1,434	$1,793	$2,241	($11,206)
Plus Change in Wages Payable		$7,500	$0	$9,000	$2,250	$2,813	$3,516	$4,395	($29,473)
Other		$0	$0	$0	$0	$0	$0	$0	($5,000)
Cash From Operations		($11,380)	($21,400)	$22,150	$43,588	$57,424	$74,410	$96,063	$26,922
Investment in PPE	($70,000)	$0	$0	$0	$0	$0	$0	$0	$0
Disposal of PPE	$0	$0	$0	$0	$0	$0	$0	$0	$5,000
Net Cash Inflow (Outflow)	**($70,000)**	**($11,380)**	**($21,400)**	**$22,150**	**$43,588**	**$57,424**	**$74,410**	**$96,063**	**$31,922**

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%

- Growth Makes a HUGE difference in Profitability!
- Note that Sales Volume goes from 2,000 units to 4,883 units per year
- 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?

Inflation

- 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
- Be careful – not all prices go up at the same rate
  - 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

Exploration of Scenarios – 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)	$26,624	11.5%
10%	$77,298	19.2%
50%	$398,227	42.5%

- But if the Inflation Rate is that high, shouldn't the discount rate be higher than 6%?
- Keep track of whether Sales Revenue is increasing because of
  - Higher Sales Prices
  - Higher Sales Volume (if this is the reason, this might require more capacity)

Other Scenarios To Explore – Discount Rate

- Discount Rate
  - Higher expectations about inflation should imply higher discount rates
  - Higher risk should imply higher discount rates
- Higher discount rates will result in lower present values

Other Scenarios To Explore - Time Related Factors

- Credit Policy – Suppose we allow people to pay later
  - Collecting later is bad
  - But will it Allow us to Sell to more customers?
  - Do we think Sales will increase enough to offset the cost of later collections?
  - Will we run into customer defaults?
- Different Patterns of Growth and Decline for Sales
- Length of Time the Operating Phase lasts
  - How quickly will competitors come in and take away sales?
- Time to Market (sales start in year 3)
  - Faster time to market will result in higher present values

Interactions with Our Other Products and Activities

- 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

- We have one more thing we want to take another look at – and that's what happens at the end of the project
- Or whether this is, in fact, the end.


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