THE ECONOMICS OF CAPITAL DECISIONS

Business decisions are made about money -

Stated aloud, it's obvious, but there are numerous engineers, GMs, plant managers, and operations people from good, profitable companies who are tasked with evaluating the next big expansion or improvement project and are sketchy at best at the basic principles of making sound, economically viable capital decisions. These good people are operating under the belief that the bean counters will take care of that. I guess companies assume this knowledge is universal and will be absorbed by the folks who have been placed in leadership roles. Sort of like public speaking—no CEO likes to admit to anyone he is weak at it, after all, he's the CEO!

Terminology

First, let's start with some basic definitions:

> ***Ancillary Expense*** – A cost currently not incurred that becomes reality in order to engage in a capital project. If you are expanding to 2 additional manufacturing lines, over and above the equipment and engineering of the process you might incur costs for building infrastructure, utilities and another operator. These often are operational expenses such as labor, maintenance and power consumption to run the new toys.
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> ***Budget*** – The maximum amount your company is willing to pay to solve this particular dilemma, usually inclusive of all ancillary expenses although sometimes these are forgotten because they come from a different bucket of corporate funds. This number can be inviolate and require going through multiple levels of Executives if the project looks like it will exceed the budget. Most companies have allowable overages; say 10%, which are permitted before requesting further review. Budgets are generally formed with some basic knowledge of revenue potential and ROI (see below) requirements and a working expectation of capital outlay for plant and equipment, often derived from requesting vendor budgetary quotations.
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> ***Cost*** – The expense of implementing a capital project over time, including all ancillary expenses. Cost is a word sometimes carelessly confused with Price.

Operational Gain – This is the sum of all the reasons you are doing the project <u>besides</u> straight capacity increase (thought of as financial improvement), converted into dollars and easy to justify when justification questions start to arise.

Opportunity Cost – This is the cost of tying up company capital with your project that could be doing something else, like funding another project or earning interest in a bank.

Overage – The percentage or dollar amount of leeway beyond a budget you have before this project is either rejected, you need to reduce its scope, or re-justify to the corporation so the budget can be expanded.

Price – The one time, fixed expense of engaging in a capital project, usually the sum of all partner/vendor quotations for their piece of the overall picture. The rule is, the get into the game, you deal with price, to stay in the game, you worry about cost.

Return on Investment (ROI) – For purposes of capital projects, this is usually thought of in units of time, the time to payback the overall capital price (often costs as defined here are not included in this calculation) with the additional revenue or decreased expenses resulting from the change you make. A decent ROI for capital projects had been 5 years not long ago. This is shrinking to 2 or less in many industries, particularly with regard to new products, as the market viability of those products may not be certain beyond just a few years.

Stagnation Cost – This is the reverse of the opportunity cost, meaning it is the cost of your current problem, the continued lost revenue not earned or higher operational expense you'll continue to pay if you do nothing. Don't increase capacity to meet demand, forfeit those sales to a competitor.

If you're a decision-maker or the person tasked with putting together a capital project, you likely either know these terms or derivatives of them or know what they mean to your submittal. If you don't, for instance if you're an engineer who doesn't know the budget limitations of his own project, your company has decided to spend a lot of time, money and energy in do-overs. You can't hit a target that doesn't exist and chances are slim if it's there and you cannot see it.

How to Make the Case

You'd think that the MBAs in your company, if you have them, would be all over this process, and you would likely be wrong. What if you don't have MBAs? You're a plant manager with the factory for 20 years who rose through the ranks because you worked hard. Here is a process to know what to ask for, what the company can tolerate, and to increase your chances of making the proposal meaningful.

1. ***Know Your Stagnation Cost.*** What additional operational expenses are draining your company by not doing this project? This can take the form of a high ratio of maintenance fees to output on old, outdated equipment. Using more human resources than necessary for manual processes and capturing the fully loaded expenses is generally used to justify automation upgrades. This is also key in evaluating options on major capital projects. It can be the risk factor of an OSHA or EPA fine for knowingly avoiding a safety or environmental issue. These get management's attention really fast after they happen, but many companies are not pre-emptive and have to pay fines at least once. Sum these and put them in terms of dollars, percent of throughput, per unit time—whatever has the impact necessary to get attention. The CFO will always have the numbers on increasing capacity and what it means to output, that's easy, but she may not be familiar enough with manufacturing to understand the smaller detriments associated with current state. This information helps you later if you need to go for an overage against the current budget.
2. ***Know Your Pre-Approved Budget.*** If accounting gives you a number without your input on stagnation cost and knowledge of available solutions, you're already in trouble. You may be tasked with arriving at the budget and justifying it. Re-read number 1, and combine it with…
3. ***Know the Company's ROI Requirement.*** As a rule, those with a financial interest in the company make the decisions on what can be lived with on time to payback, ROI. This may be inflexible, but even if there is wiggle room, you're not going fly your solution with a 10 year ROI past the Board of Directors when they're anticipating 3. You'd better be within 20-30% of expectation, or prepare to see *Project-Not-Approved* on the Proposal.
4. ***Know the Competition.*** By this I mean, know the opportunity cost your company gives up to fund your improvements. It may look really good to demonstrate a nice 4 year ROI, but if sinking the investment in another project or an investment portfolio blows it away, you may lose the battle. I say may lose because there are non-financial mitigating circumstances that influence choices here, such as keeping within the core of the business, positioning for future demand (capacity increases come to mind), and the legacy of the ownership.

5. ***Think Cost, Not Price.*** This is the hardest pill to swallow, because in most cases, the company CFO and CEO are thinking one-time price to meet the ROI desired. By getting that dictated to you, it makes your life simple but not easy. You don't have to think about all the costs that they should have thought about but didn't. You're focused and don't need the headache. The problem is, the most obvious decision of price versus capacity payback alone may only capture 70% of the picture, and the darned 30% is the part that could have gotten the project approved and producing benefits. Those with direct operational authority are in the best position to quantify operational gains and stagnation costs into an annual figure to bump into the ROI formula.

The Formula

If you get familiar with and buy into the above, the rest is pretty simple. Here is a back-of-the-envelope formula used to make economic decisions on capital improvements:

$$\frac{\text{Budget or Price (P)}}{\text{Financial Improvement (FI)}} = ROI \quad \text{or} \quad P = ROI * FI$$

The ROI is known, somebody took a pass at annualized Financial Improvement through margin on increased sales or reduced scrap or something similar, and you're left with your Budget or allowable Price.

There is a better way.

Financial Improvement must consider a Price (P) in terms of Cost (C) and Ancillary Expenses (AE) and Operational Gain (OG). All these can be thought about as annual figures. So take a look at this:

$C = P + AE - OG$ and, in most cases,
$C \leq$ *Opportunity Cost* and $C \leq$ *Stagnation Cost*

The ROI equation should be adjusted relative to Cost over the long haul instead of Price and include these things.

$$\frac{Cost\ (C)}{FI} = ROI \text{ ; combining above, } \frac{(P + AE - OG)}{FI} = ROI$$

That results in the P (Budget or Price) that needs to really benefit your company, you're real adjusted Budget…

$$P = (ROI * FI) + OG - AE$$

If you're the person who is trying to drive the capital decision, know and can quantify with some degree of comfort the Operational Gain and Ancillary Expenses of implementing this project, you can afford more or less Price depending on which is higher. Many times the additional gains far outweigh the expenses, meaning you can hit your ROI with a higher priced solution, one that may mean less sacrifices and headaches, less internal resource draw, and fewer sleepless nights for the person responsible to pull this project off successfully, on budget and on time.

I know this has been not a lot of fun, but now you have some hard facts to help you and your Management Team make these decisions. .

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