THE ECONOMICS OF CAPITAL DECISIONS

I was reading my crumpled purple copy of Rich Dad, Poor Dad by Robert Kiyosaki while eating my soggy Special K with Red Berries (I'm not making this up, that's what they call it) this morning, learning how to become independently wealthy and not have to do this stuff anymore. I could be a philanthropist and save the world from a white-sand beach in the tropics. Wow! I can't wait to get to page 3 to see what happens next.

Anyway, Robert makes a point to throw the American public education system under the bus because they don't ever teach people even the basics of finance or money management. What's an asset, a liability, which should you own more of, that sort of thing. I had to agree with him on that, I didn't learn much about money in engineering school, and when I graduated with the rote knowledge of theorems and differential equations that I was never to use again, it took me a few years in the work world to understand a few things, starting with gross $\neq$ net and there exists an dastardly player in the universe called the IRS. As somebody with a technical background, I have been confronted time and again with one universal truth:

BUSINESS DECISIONS ARE MADE ABOUT MONEY!

Oh that sounds so simple and condescending, doesn't it? The problem is that I have seen many of my colleagues, prospects and customers forget this cosmic axiom. Stated aloud, it's obvious, but there are a boatload of 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, or they are embarrassed to admit that this information is not second nature to them. I guess companies assume this knowledge is universal and will be absorbed via osmosis 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 from Karl's The Capital Projects Bible (Random House, 2010). Accountants, CFOs, and Finance folks, please curb the unquenchable desire to send me corrective or hate-filled emails on the chance that I offend your mental dictionaries with the following:

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.

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 an act of Congress if your project looks like it will exceed the budget. Most companies have allowable overages, say 10%, which are permitted before calling your representative. 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 ringing the dinner bell for vendor budgetary quotations.

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 the inquisition comes.

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 your butt off, and now you're afraid that your name and Peter Principle might be included in the same sentence in a meeting of the top brass. Here is a process to know what to ask for, what the company can tolerate, and increase your chances of making something meaningful.

1. ***Know Your Stagnation Cost.*** What additional operational expenses are draining your company by sitting on its hands? 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 the fiddler 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 suffocate in the tar pits of *Projects-Not-Approved* land.
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 and dot all the I's, 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:

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

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

There is a better way grasshopper. Given what I've been talking about…

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 check this out:

$C = P + AE - OG$ 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 you'd better be at to really benefit your company, you're real adjusted Budget…

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

I told you this material wasn't complicated. If you as 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 thing, 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 thing off successfully, on budget and on time. If you're that person, feel the relief wash over you.

I know this has been more fun than a tree full of one-armed monkeys, but we're both busy trying to make these decisions. Any recovering buy-on-price-alone addicts who need more information can contact me directly.

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