

Evaluating Capital Investments: Buying the Big Ticket Items



Rodney Jones

Rodney.jones@okstate.edu

405 744 6173



Welcome to this video where we will focus on a few things to consider when acquiring “big ticket” items, or capital investments. Farms and ranches are capital intensive businesses, and require a lot of things that cost a lot of money such as land, buildings, equipment, and even breeding livestock to function. The question for individual managers is how to we obtain the use of such capital assets in the most economically rational manner.

Capital Investment Decisions

- What are they
- Feasibility considerations
- Time value of money
- Profitability considerations



Today we are going to talk about what is meant by the term “capital investment”, and then introduce you to three very important economic concepts or considerations that should enter into the evaluation of each major purchase decision. Specifically we will introduced the concept of “feasibility” and why it is important, then the concept of “time value of money” will be discussed, which will lead to a discussion regarding how we evaluate the “profitability” of major purchase decisions.

What is a Capital Investment?

- Capital assets that are not “used up” in one production cycle
- And that have some “economic” implications for the business (generates cash, saves expenses, etc.)
 - Land, Buildings, Equipment, Breeding Livestock, Perennial Crops



Two “characteristics” make something a capital investment. First, it is something that is not “used up” in just one production cycle, but rather can be utilized for a period of time. So inputs like fertilizer or feed would not be considered a capital investment, because we use them up as we buy them. Basically, we think of items that last more than one year, and again, most of the time we are talking about things that cost a significant amount of money. The second characteristic that must be present in order for something to be considered a “capital investment” is that it does (or would if we are considering buying something) have some economic implication for the business. It would help with production for example, which would in turn generate income, or it is something that will save the business money relative to what the business is currently doing.

Examples includes such things as land (which would be used to produce something for the business) or buildings, which would house something on the farm, either reducing the weathering impacts or allowing us to store something that otherwise we would have to pay someone to store for us. Another good example is breeding livestock, such as a young beef cow that we intend to keep for several years and raise calves from.

There are, of course, things that we all spend significant amounts of money on that we intend to keep and use for several years that do not have anything to do with our business. Items such as a family car, or even a nice television set for the house are big ticket items that we purchase, but they would not be considered capital investments, but

rather just personal living expenditures. So, capital investments are big ticket long lasting items that we intend to use for our business.

Categories of Capital Investments

- Replacement (replace existing machine)
- Cost reducing (gets job done cheaper)
- Revenue increasing (more capacity)
- Outside of current business (value added)
- Combination (fits more than one of the above)



There are some specific categories that we use to categorize capital investments. The first is simply replacing an existing machine or other long lasting asset with a newer version (or less worn out) version of the same asset. Replacing a 60 horse utility tractor that is worn out with a lower houred tractor of the same capacity and with the same capabilities would be an example. The second category is “cost reducing” capital investments, or replacing an existing capital asset with something that will do the same job, but do it at a lower cost. A good example of this is a friend of mine who runs a trucking company. He discovered long ago that certain truck models that he could purchase for his business got the job done with significantly less fuel than some of the trucks he had at the time. At that time his fuel bill was running about \$30,000.00 per month, so following a plan to replace existing high operation cost trucks with ones that operated on much less fuel really helped out his bottom line. We can all think of examples in agriculture where certain technologies allow us to get the job done at a lower cost, and we all have to weigh the benefits of that cost reduction with the annualized cost of obtaining the newer technology. Individual row shutoff (triggered by GPS) on a planter is a good example. The technology (for a similar sized planter) costs about the same regardless of how much you use the planter, the shape of your fields, or the type of seed you typically plant. Obviously, that technology has more value to someone planting a lot of high priced seed (corn, for example relative to grain sorghum, etc.), on a lot of acres involving irregularly shaped fields.

The third category, or general type of capital investment is what we call revenue increasing, or capacity increasing investments. Simply put, buying bigger equipment or

additional equipment to replace or enhance smaller equipment. These types of capital investments are considered all the time as the farm or business is expanding and outgrowing the capacity of the existing equipment line. It's the old question "should we hire more help and run the existing equipment more hours, or should we obtain bigger equipment"?

Other potential category of capital investment is to invest in something that is unrelated to the current enterprise mix or scope of the business. This could be anything, for example a farm family deciding to purchase and operate a restaurant in the local community, or even a farming operation that is currently involved only in crops deciding to diversify and invest in a cow herd.

Finally, we can think of capital investments that fall into more than one of the preceding categories. For example, a farmer may decide to replace his or her current combine with a much larger one, with the intent of starting a custom harvesting business as well. So the new purchase would be a replacement, a revenue increasing (possibly) an outside the current business, and maybe even a cost reducing investment consideration if it harvests more efficiently than the old machine.

Evaluating Capital Investments (Capital Budgeting)

■ Steps

- Identify alternatives
- Estimate streams of receipts and costs over time
- Evaluate feasibility and profitability
 - Conduct sensitivity analysis (change your assumptions)
- Select the most appropriate investment alternative (decide)



The term we use for the process of evaluating capital investments is “capital budgeting”. The steps to evaluating capital investments (from an economic perspective) include 1. Identifying the alternatives to consider, 2. Estimate streams of cash receipts and cash costs over the expected life of the asset for each alternative, 3. Evaluate feasibility and profitability of each alternative, and 4. select the “best” investment alternative.

The first step may actually be the most difficult because we all know there are an unlimited number of things one can spend money on. However, we can narrow down the list of possibilities by referring back to our business vision, objectives, and goals, and considering only those things that move us in the direction we want to go in the long run. Sometimes it is straightforward, we added some land to our operation, and we need a larger piece of equipment, for example. Even then, there are probably multiple choices with regard to brand and features, and do we buy new, or find a good used item to get the job done.

Step two involves obtaining information regarding original cost, expected life, and salvage value for the various alternatives we are considering. In addition, we need to estimate how much money the investment will generate (either produce or save) for us in each year of it’s expected life. For example, purchasing a combine to harvest ourselves rather than hiring the job done obviously saves us the custom harvest bill every year, but we do have to provide labor, fuel, repairs, etc. to own and operate the combine. So we include the “operating” cash revenues or savings net of “operating” costs. However, we in capital budgeting analysis we don’t consider interest or principle

payments in the annual cash operating projections, as those items are taken into consideration in the various evaluation tools we will use. The next few slides provide information regarding how to appropriately evaluate capital investment opportunities.

Evaluating Feasibility

- An investment can appear profitable in the long run, but may not be feasible (may not be able to pay for it based on your circumstances)
- Compare net cash flows (especially during early years) (after accounting for tax implications, etc.) to the scheduled loan payments
- Might need to supplement payments with other income, re-negotiate loan terms, etc. The ability to do so will depend on your individual circumstances



The first point to be sure we understand is that “feasibility” and “profitability” are two very different (but equally important) economic considerations. In order for a proposed capital investment to be a wise decision to move forward with, it needs to satisfy both criteria. Feasibility simply answers the question, “can we pay for it”? Many investments can be profitable in the long-run, but are simply not feasible in the mean time for our individual situation. Historically, land has been a common example of this. It may be profitable in the long run largely because of increasing in value, but it’s darn tough to pay for in the meantime. For things like machinery, buildings, breeding livestock, or even land, the key is to compare those net operating cash flows (net of tax’s etc.) with the scheduled principle and interest payment. In many cases the investment will not generate enough cash to make the payments. That doesn’t necessarily mean it is a bad idea, it just means that we need to recognize that cash may need to come from somewhere else (besides the income generated by that particular investment) to help make the payments. Whether that is possible, and to what extent, depends of course on individual circumstances.

Common “Feasibility” Capital Budgeting Tool

- Payback Period (PP)
 - Number of years of after-tax net cash flow needed to pay back the initial investment
 - Ex. \$10,000 investment generating \$2,000 net cash flow per year would require 5 years to “pay back” (don’t forget to do sensitivity)
 - If looking at only one alternative, if the calculated PP is less than your required target, you should buy the item
 - If comparing two or more alternative, shorter PP is better



Arguably the most common “feasibility” related capital budgeting tool is the payback period calculation. The calculation reveals the number of years of after-tax net cash flow needed to pay for the initial investment, and is calculated as the initial investment divided by the average net operating cash flow. For example, a piece of equipment that costs \$10,000 and is projected to generate an additional \$2,000 per year (net after paying operating expenses) would have a calculated PP of 5 years. Since these are projections, one should always do the calculation not only based on average expectations, but also based on alternative projected scenarios such as best case – worst case. In other words, how certain are we that the projected \$2,000 net will actually materialize.

You compare the calculated PP with some target required level that you have in mind. Perhaps that required PP is related to how long of a loan you can obtain to purchase that type of asset. If the calculated PP is less than your required target, then it is much more likely that the net earnings will come close to making the payments, for example, which make the project more attractive from a “feasibility” standpoint. Finally, if comparing two alternatives that will both get the job done, we usually consider a shorter calculated PP to be preferred.

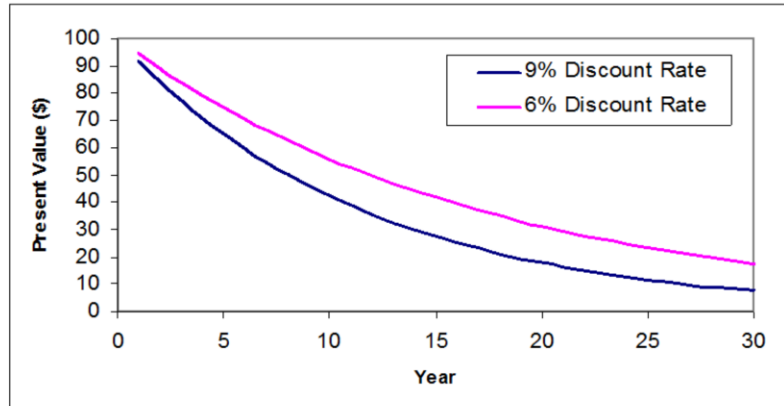
Time Value of Money (TVM)

- An important consideration when evaluating the “profitability” potential of a capital investment
- A dollar today is worth more than a dollar at any time in the future
 - The time value of money is expressed as an interest rate – or discount rate



Before we can talk about tools to evaluate the “profitability” potential of capital investment alternatives, we need to be reminded of the economic fact that money loses value over time. In other words, we can't spend a dollar today to get back a dollar at some time in the future. We will lose every time on that proposition, because that dollar in the future has less value to us (purchasing power, etc.) than a dollar today. This “time value of money” concept is reflected in interest (or discount) rates that we observe.

Present Value Of \$100.00 Received at Various Times In The Future



The higher the interest rate, the faster money loses value over time. This simple illustration shows that, At a 6 percent interest rate, \$100 received about 15 years from now would be worth nearly 50 dollars today, while at a 9 percent interest rate, that same \$100 received about 15 years from now would be worth only about 30 dollars today. At either interest rate, \$100 received a long time in the future (say 30 years or more) is not worth very much today.

Common Applications TVM

- Compounding

- If I put money in a retirement account, how fast will it grow, how much will I have when I retire

- Discounting

- If I think I will receive a payment (a net income from some capital investment for example) at some point in the future, what is that worth to me today



We use this time value of money concept all the time. For example, we rely on TVM in a positive way (compounding) when we are saving for retirement or investing. The longer we have until retirement, or the higher the returns we can consistently earn on our retirement portfolio, the larger the nest egg we will have when we get to that point in life. We use TVM in the opposite direction (discounting) when we are evaluating the merits of purchasing something that will generate operating cash flows well out into the future. The whole idea is to figure out what those future cash flows are worth to us in today's dollars, which tells us whether it is profitable to purchase a capital investment for the price that is being asked. (is it worth it?)

Compounding

- We know Present value, but not Future value
- \$1 received today can earn interest
 - $FV_n = PV_0 * (1 + r)^n$
 - Example, 8% interest (r) for 3 years
 - $\$1 * 1.08 * 1.08 * 1.08 = \1.26
- There is an “opportunity” cost associated with using capital to make investments in machinery, etc.



Not to make this too complex, but when compounding, we multiply dollars today time 1 plus the interest rate to the nth power. For example, 1 dollar invested for 3 years at 8% annually compounding interest would be worth 1.26 in three years.

What's the point, if we are using money that we have on hand to buy things there is an opportunity cost, because that money could be earning us money if we used it for something else.

Discounting

- We know Future value, but not Present value
- Opposite of compounding
- \$1 received 3 years in the future is worth less today
 - $PV_0 = FV_n / (1+i)^n$
 - $\$1 / [1.08 * 1.08 * 1.08] = \0.79
- Income generated in the future by a capital asset (rents, etc.) may not be worth as much as you think



When discounting we do the opposite. We divide that cash flow that we will receive at some time in the future by 1 plus the interest (or discount) rate to the nth power. In this case 1 dollar received 3 years from now is only really worth about 79 cents in today's dollars assuming an 8 percent discount rate.

Whats the point? Future incomes may not be worth as much as they initially appear to be.

Measuring Profitability

■ Net Present Value (NPV)

- The sum of the present values of future net cash flows minus the initial investment
- $PV_0 = \sum (CF_n)/(1+i)^n$
- Ex. Net after tax cash flows of \$20 yr 0, \$30 yr1, and \$40 yr 2 8% interest rate
- $PV_0 = 20 + 27.78 + 34.29 = \82.07
- If the investment cost \$85.00, $NPV = \$82.07 - \$85.00 = -\$2.93$
- Negative NPV means not profitable



The way we calculate today's value (present value) of some net income or net cash flow that we expect to receive at some point in the future is to divide that net cash flow by $(1+i)$ to the n th power, with i being the relevant interest rate in decimal form, and n be the number of time periods in to the future we are looking (in capital budgeting we are usually thinking in terms of years). So for example, \$20 received today is worth \$20 today (no discounting necessary), but \$30 expected to be received 1 year from now is only worth \$27.78 today based on an 8% discount rate $(30 / (1.08)^1)$. By the same token, \$4 expected to be received 2 years from now is only worth \$34.29 today $(40 / (1.08)^2)$. So if that were the net cash flow stream that a particular investment alternative we were considering purchasing was expected to generate, the value of that cash flow stream in today's dollars is simply the sum of the discounted cash flows, or $20 + 27.78 + 34.29 = \$82.07$. To get to the commonly used capital budgeting profitability measure known as "net present value" we take that discounted value of all the future cash flows and we subtract off what the investment would cost us if we were to purchase it today (the initial purchase price) and see if it is negative or positive. In this case it is negative, which indicates that this capital investment alternative would not pass the "profitability" test.

NPV Choice Criteria

- If looking at only one investment alternative a positive NPV means the investment is “profitable”
 - But don’t forget to do some sensitivity analysis
- If comparing two or more investment choices, the largest positive NPV is the best choice (usually)



When using the net present value evaluation tool (NPV as it is commonly known), if we are only considering one investment idea (we are either going to do this, or nothing at this time) we simply look for a positive NPV, which indicates the idea is profitable if all of our underlying assumptions turn out to be true. That is of course why it is critical to do some sensitivity analysis. As before, that involves plugging some alternative numbers into the calculation to see if the investment still looks profitable if some of the future cash flows don’t turn out quite as well as projected.

If you are comparing more than one alternative, we usually say that the one with the highest positive calculated NPV is the better choice (most profitable). Caveats to that statement include when we are trying to compare NPVs across alternatives that have significantly different lives, or different degrees of perceived risk. Methods are available to compensate for those issues, but that gets a little beyond the scope of this video. Oh, just in case your thinking, wow, this looks like a lot of complication and a lot of calculations, who’s going to go to the trouble. Rest a little bit at ease, there are plenty of calculators and tools available to do the number crunching for you. What is important here is that you understand the concept.

Measuring Profitability

■ Internal Rate of Return (IRR)

- IRR is the discount rate (interest rate) that sets the net present value of an investment to 0.
- Higher discount rate makes NPV lower (think about the math)
- Calculated IRR values greater than the interest rate paid to obtain capital (usually the loan interest rate) are considered “good” or profitable investments (the NPV will be positive when calculated using the loan interest rate as the discount rate)



Another profitability evaluation tool that is closely related to NPV, is Internal rate of return or IRR. Without getting too bogged down in details, when doing the NPV calculation on any set of facts (net cash flows), the higher the discount rate used, the lower the calculated NPV will be. In other words a higher discount rate makes it harder for any proposed capital investment to pass the “profitability test, or have a positive NPV. For any set of facts (any proposed investment), the discount rate that causes that NPV calculation to switch from positive to negative (in other words be right at 0) is called the Internal rate of return (IRR). A higher IRR in general means the proposed capital investment is projected to be more profitable. Think of it as a projected return on investment in percentage terms. So, if the projected return on investment (IRR) is higher than the cost of the capital used to buy the investment (the interest rate on borrowed funds is a good place to start) then the project would be considered a profitable investment.

IRR Choice Criteria

- If looking at only one investment alternative as long as the calculated IRR is an acceptably high rate of return for you, the investment is considered “profitable”
 - But don’t forget to do some sensitivity analysis

- If comparing two or more investment choices, the largest positive IRR is the best choice (usually)



So if you are only considering one alternative capital investment and the calculated IRR is higher than your cost of funds, the investment would be considered profitable for you. Of course as with the other capital budgeting tools, the result depends on the accuracy of the facts you put into the analysis, or more specifically the accuracy of your net cash flow projections in future years, so again it is important to at least consider scenarios where the cash flows are not as “rosy” as the average projections you use in your initial evaluation.

When looking at more than one potential alternative capital investment alternative using the IRR method, the largest IRR is the best choice in most instances (meaning choose the one that is projected to generate the highest percentage returns). Most of the tools that are available to do NPV analysis will also do IRR analysis, so once you have thought about the cash flow streams, the evaluation can be done for you.

Summary (Key Points From This Section)

- Feasibility and Profitability are two different, but equally important considerations when considering capital investments
- Feasibility is evaluated using
 - After tax cash flows
 - Payback Period
- Profitability of an investment decision is evaluated using
 - Net Present Value
 - Internal Rate of Return



To wrap up this video segment, always keep in mind that Feasibility and Profitability are two very different but equally important considerations when looking at purchasing big ticket long lasting assets for you farm or ranch business. You need to know if you will be able to pay for it, and you need to be assured that it is a wise decision with respect to the potential to make your operation more profitable. We often use the capital budgeting tool called Payback period as one tool to evaluate the feasibility of investment decisions, and by the same token NPV and IRR are the most commonly used capital budgeting tools for evaluating the profitability of major purchases

In the next video we evaluate the wisdom of a significant proposed capital purchase based on our case farm example.