**Partial Budgeting: A Tool for Evaluating the Profitability of Changes in Farm Businesses**

**Background:** Change is the norm farmer's face in managing farm businesses. They range from considering changes in cultural practices, renting services vs. doing in the farm business, changing the farm enterprise mix or scale to major changes in the farm business.  The scope of the prospective change impacts the analysis tool used and specialized educator / specialist skills required.

The focus of this Fact Sheet is on a tool that is widely used by educators and specialists on smaller changes in farm business. The partial budgeting skills discussed in this Fact Sheet are expected of all AABI educators. Many of you are already proficient in the use of these tools and can be a mentor to less experienced educators.

The concept of the partial budget is simple. It is a profitability concept. What is the proposed change? Typically the farmer is considering making a change that adds to gross revenue and eliminates an existing cost but also eliminate the gross revenue associated with current practice and adds the cost associated with the new practice. The "partial" in partial budget means we are only interested in the changes is gross revenues and allocated costs.

Many of the educators with plot data with several treatments will show the gross revenue less the allocated costs associated with the practice. Mike Staton's research on soybean planting rates is a representative example. He looks at the combined results from trials across years and locations and reports the net revenue above seed costs for each rate of planting. The seeding rate is the only thing that changes so all other costs associated with corn production are irrelevant.

The underlying theme of researchers and educators working with soybeans has been most farmers were planting at higher seeding rates than the most profitable rate. Thus, they might give up some yield by reducing the seeding rate but the decrease in the cost of seed would more than compensate for the vlue of the decrease in yield.

**Worksheet and an example:** The worksheet associated with this discussion is not the only worksheet that can be used for partial budget the most common one. In our example, a vegetable grower is consider the purchase of a lettuce thinner which will replace hand labor.



**Row Crop Thinner**

The Agmechtronix Row Crop Thinner (RCT) is capable of thinning row crops such as lettuce using computer machine vision to identify plant locations and a herbicidal spray to eliminate the unwanted plants, replacing the traditional thinning method of hand labor.

The economic information the farmer provided was:

- Annual labor cost saving: $28,000
- Thinner purchase price: $100,000
- Economic life of thinner: 10 years
- Salvage value of thinner: 20% of purchase price
- Thinner  annualoperating cost $2,000
- Target rate of return on investments: 6%

Since the proposed change in practice requires an investment, we must translate the purchase price into an annual cost so the lettuce thinner

costs and returns are all on the same time frame. The D+I approach is commonly used to estimate the annual cost; D denotes annual depreciation and I denotes the cost of using money whether equity, borrowed, or a combination. We go to our "Calculating the Annual Cost of Using Depreciable Assets" worksheet. The calculator is also in the Excel "Partial Budgeting" worksheet developed by Roger Betz of the Farm Business Management Work Team.

Annual depreciation is typically calculated as straight line depreciation. That is

$$Annual\ depreciation = \frac{Purchase\ price - salvage\ (terminal) value}{Years\ asset\ is\ kept}$$

For example, the thinner's  purchase price is $100,000, it's expected economic  life in the farm business is 10 years, and it is expected to have 20% of its purchase price remaining (in current dollars) in 10 years.

$$Annual\ depreciation = \frac{(\$100,000 - \$20,000)}{10} = \$8,000\ per\ year.$$

If there has been a trade-in, the purchase price would be the "boot" plus amount paid.


The annual cost of capita l(interest) on average investment is

$$Interest\ on\ avg\ investment = Interest\ rate\ x\ \frac{Beginning\ asset\ value + Ending\ asset\ value}{2}$$

To continue with our example, if we assume a potential rate of return in other investments (or, cost of funds) of 6% per year, the annual interest on investment would be

$$Interest\ on\ average\ investment = 0.06\ x\ \frac{\$100,000 + \$20,000}{2} = \$3,600\ /\ year\ .$$

The annual depreciation plus interest for this case would be $11,600 / year, or 11.6% of purchase price.

This approximation is consistent with how we calculate return on investment using coordinated financial statements such as those developed with MSUE Telfarm cooperators in our benchmarking project. It is a good approximation to the true cost when the interest rate is modest and years held is not more than 15 - 20 years.

We now have enough information to complete the template. In practice, the details of the framing of the information would be more complete and, if possible, draw upon experiences of peers in other regions.

Management Practice

| Characteristic | Current / Defender "Thin with hand labor" | Alternative / New / Challenger "Thin with Agmechtroncis row crop thinner" |
|---|---|---|
| Strengths | | Performance appears to be |
| Weaknesses | | |
| Risk assessment | Acquiring labor force required in a timely manner. What would they be doing if not completing this task. | If thinner breaks down, can supplemental labor be acquired in a timely manner. |
| Non-cash opportunity costs that should be considered | Some unpriced supervisory labor may need to be priced (e.g. family labor that does not receive a wage) | |
| Future impacts of continuing the practice | | |
| Other factors to consider | | Additional skilled labor may be required for operations and maintenance. |

| Economic Impact of Change: Partial Budget | | | |
|---|---|---|---|
| Positive Effects of Adopting Alternative / New / Challenger Practice | Value | Negative Effects of Adopting Alternative / New / Challenger Practice | Value |
| A. Increased Revenues (Annualized) | | C. Decreased Revenues (Annualized) | |
| 1 No increase in performance | $ | 1 No loss of performance | $ |
| 2 | $ | 2 | $ |
| Total | $ | Total | $ |
| | | | |
| B. Decreased cost (annualized) | D. Increased cost (annualized) | | |
| 1 Labor saved | $ 28,000 | 1 Annual cost of thinner | $ 11,600 |
| 2 | $ | 2 Thinner annual operating cost | $ 2,000 |
| 3 | $ | 3 | $ |
| | | | |
| Total positive effects (A+B) | $ 28,000 | Total negative effects (C+D) | $ 13,600 |
| | | | |
| Net effect (A+B) - (C+D) | $ 14,400 | | |

**Concluding comments:** This has been a simple example but it capture the principle features of partial budgets. This template of situation framing and calculating the expected impact on profitability is very helpful in documenting potential impacts of changes in profitability. In the example, the farm went beyond the presentation above and ran scenarios on the impact of thinning performance on the change in profitability.

Most, if not all, changes in cultural practice fit this framework. For some changes, future impacts and potential risks require additional tools but the core concept remains unchanged. For example, if one of the choices for disease management of a perennial crop is pulling a diseased block and replacing it with a resistant variety, then getting all profitability metrics on an annual basis is significantly more difficult. But, we have tools for annualizing costs and returns in that case to.

So, one of our tasks is assessing classes of cases where a relatively simple partial budget will get the evaluation done vs. cases of changes that are beyond the scope of examples like the one above.