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AGRIBUSINESS MANAGEMENT

EVALUATING CAPITAL INVESTMENTS IN AGRIBUSINESS

Technological advancements impact the agribusiness industry in a very irregular fashion. Given the difficulties associated with predicting the arrival and/or adoption of technological advances it is equally difficult for an agribusiness firm to incorporate such adjustments in their long-range plans. Nevertheless, when a major technological improvement becomes known to the industry, each and every firm is confronted with a similar problem, i.e., what means should be employed in evaluating the desirability, accessibility and affordability of the new technology.

Quite obviously, the dependability and suitability of the improvement must be judged. Yet this is most often an assessment based on engineered needs and specifications. For agribusiness managers, the more difficult decisions relate to questions of economic efficiency and the impact which the new technology might have on the firm's level of profit.

By most any modem day standards, new technological improvements are expensive -- involving or requiring large expenditures of funds by the adopting firms. Given the magnitude of the expenditures involved and the length of expected service associated with such adoptions, the process of evaluating the capital investment cannot be taken lightly.

Few managers can afford to rely fully on engineering reports and manufacturer specifications alone. Most are forced into an evaluative procedure which at least acknowledges such items as the effective cost of debt, the opportunity cost of capital, and alternative rates of return on investments. Within this assemblage of confusing terms lie the real answers regarding the adoption of new technology and the acceptance of the concomitant capital expenditure. The objective of this discussion is to review with agribusiness managers the alternative methodologies employed in the process of evaluating capital investments. The three methods discussed are: (1) internal rate of return, (2) net present value, and (3) payback (payout) period.

Net Cash Flow

Since all three alternative methodologies noted relate either directly or indirectly to the concept of "net cash flow," it would seem advisable to review this concept first. Most simply stated, net cash flow constitutes the algebraic sum of money flowing into and out of a business over a specified period of time (usually a year). In concert with usual convention, cash inflows are considered in the positive, while outflows are negative.

Cash flows into or out of a business evolve from a multiple of sources, functions, or activities. Hence when evaluating a single capital investment, the agribusiness manager must direct his attention towards only those

cash flows associated with the single source, function, or activity comprising the investment being evaluated. In this sense, net cash flow is the incremental (or marginal) net cash flow expected to result from the purchase and adoption of the investment (new technology) being evaluated. As such, the simplest procedure is to document and review those cash inflows and outflows emanating from each year's use of the investment throughout that investment's useful life. We normally assume (again for simplicity) that these annual cash flows occur as discrete sums received or expended at the end of their respective years.

Another simplifying assumption commonly incorporated into the evaluation procedure is that all investments being evaluated are to be financed by internally existing or generated funds. Such concerns as financial liquidity, debt service costs, and the availability of debt capital are thereby separated from those procedures associated with the evaluation of the economic desirability of the investment. No doubt in many agribusiness situations such concerns cannot be separated from the evaluation process because internal funds are simply not sufficient or available. We shall address this interdependency at a later date. However, for purposes of describing the basis of alternative investment analysis, we shall accept such an assumption of separation.

Our Agribusiness Example

To aid in our review of methodology we shall consider the following example:

Our illustrative agribusiness firm is considering the construction of an entirely new processing facility which incorporates the very latest in technological equipment. It is estimated that the land upon which this new facility could be constructed costs $2,000,000. The building itself could be constructed in the first year following the purchase of the land. It would cost an estimated $1,000,000 and have a salvage value of only $100,000 at the end of its 30-year useful life. Processing equipment installed in the plant during the first year will cost about $2,000,000, having a $200,000 salvage value at the end of its 20 years of useful life. Further equipment complements would be added to the facility during the second and third years, valued at $1,000,000 and $500,000 respectively. Each of these latter additions is expected to have a useful life of 20 years, after which no salvage value will remain. Data in Table 1 is indicative of this capital investment.

TABLE 1
Capital Investment Data – Agribusiness Example

End of Year	(K) Capital Investment	Item	Useful Life	(L) Salvage Value
0	200,000	Land	--	--
1	1,000,000	Building	30	100,000
1	2,000,000	Equipment	20	200,000
2	1,000,000	Equipment	20	0
3	500,000	Equipment	20	0

In the process of installing and calibrating the equipment, operating costs totaling $80,000 and $100,000 would be incurred during the first and second years. By the third year the facility would reach full operation, generating operating (total) costs of $500,000 per year thereafter. Beginning with the first year of operation (year 3), the new facility is expected to generate a first-year gross income of $400,000, and $2,000,000 per year thereafter. These data are shown in Table 2.

Assuming a straight-line depreciation allowance for all nonland assets employed in this new facility, the depreciation schedule shown in Table 3 results.

TABLE 2
Illustrative Gross Income and Cost Data ($)

End of Year	(G) Gross Income	(C) Total Costs
0	--	--
1	--	80,000
2	--	100,000
3	400,000	500,000
4	2,000,000	500,000
* * * * * * * * * * * *		
25	2,000,000	500,000

TABLE 3
Illustrative Depreciation Schedule ($)

End of Year	Item: / Cost: / Useful Life: / Salvage Value:	Building 1,000,000 30 100,000	Equipment 2,000,000 20 0	Equipment 1,000,000 20 0	Equipment 500,000 20 0	(D) Tax Depreciation Allowance Total
0		--	--	--	--	--
1		--	--	--	--	--
2		30,000	90,000	--	--	120,000
3		30,000	90,000	50,000	--	170,000
4		30,000	90,000	50,000	25,000	195,000
* * * * * * * * * * * *						
21		30,000	90,000	50,000	25,000	195,000
22		30,000	--	50,000	25,000	105,000
23		30,000	--	--	25,000	55,000
24		30,000	--	--	--	30,000
* * * * * * * * * * * *						
31		30,000	--	--	--	30,000

Net cash flow, as earlier defined and as prescribed with this illustrative new processing facility must now be calculated in accordance with the following formula:

$$X_n = (G - C) - (G - C - D)T - K + L$$

where:

X_n = net cash flow in year n

G = gross income (revenue or savings) in year n estimated to result from the investment being evaluated

C = total annual operating costs in year n associated with the gross income in the same year. (These costs are out-of-pocket and represent money flowing out of the company for both direct and indirect labor and materials costs.)

D = tax depreciation allowance in year n

T = composite state and federal marginal tax rate

K = capital investment in year n

L = salvage value in year n

Now assuming a marginal tax rate of .52 and calculating X_n by the above formula for the years 1-31, the net cash flows shown in Table 4 can be ascertained.

Other Tax Considerations

As Table 4 illustrates, the marginal tax rate of .52 is incorporated into our considerations in a simple manner. Consideration of investment tax credit is not, however, included. If it were included, and if we assume that the investment tax is realized in the year following the capital expenditure, and if we assume that taxable income from other company functions is large enough to qualify for the full deduction of investment tax credit, then our net cash flow for years 2, 3, and 4 would have to be adjusted as follows:

$$X_2 = -100,000 - (-100,000 - 120,000)(.52) - 1,000,000 + (.10)(2,000,000) = \$785,600$$

$$X_3 = (400,000 - 500,000) - (400,000 - 500,000 - 170,000)(.52) - 500,000 + (.10)(1,000,000) = \$359,600$$

$$X_4 = (2,000,000 - 500,000) - (2,000,000 - 500,000 - 195,000)(.52) + (.10)(500,000) = \$871,400$$

We should also note that salvage values used to determine tax depreciation schedules are based not only on estimated future value of the asset, but also on the basis of tax regulations. Hence, should there be a difference between expected and actual salvage value realized, the cash flows for the year the asset is salvaged should be adjusted. For example, if actual salvage value for the equipment salvaged in year 25 is half that estimated, net cash flow for that year should be modified to:

$$X_{25} = (2,000,000 - 500,000) - (2,000,000 - 500,000 - 30,000)(.52) + 100,000 + (200,000 - 100,000)(.52) = \$883,600$$

One final tax complication arises if all assets were disposed of in year 25 with the termination of production. As a first step, we must calculate the book value for each class of assets at the time of disposition. At year 25, all assets except the building are fully depreciated and have a book value equal to their salvage value. The building has $180,000 remaining in undepreciated value in addition to its $100,000 salvage value. The price of each asset disposed of in year 25 must now also be estimated to determine if there is to be a loss or gain (see Table 5).

TABLE 4
Net Cash Flow Computations ($)

End of Year	Computation	Net Cash Flow
0	$-200,000$	- 200,000
1	$-80,000-(-80,000)(.52)-3,000,000$	- 3,038,400
2	$-100,000-(-100,000-120,000)(.52)-1,000,000$	- 985,600
3	$(400,000-500,000)-(400,000-500,000-170,000)(.52)-500,000$	- 459,600
4	$(2,000,000-500,000)-(2,000,000-500,000-195,000)(.52)$	821,400
	* * * * * * * * * * *	*
21		821,400
22	$(2,000,000-500,000)-(2,000,000-500,000-105,000)(.52)$	774,600
23	$(2,000,000-500,000)-(2,000,000-500,000-55,000)(.52)$	748,600
24	$(2,000,000-500,000)-(2,000,000-500,000-30,000)(.52)$	735,600
25	$(2,000,000-500,000)-(2,000,000-500,000-30,000)(.52)+200,000$**	935,600
26***	$-(-30,000)(.52)$	15,600
	* * * * * * * * * * *	*
30		15,600
31		315,600

* Although land is not depreciable as a capital asset, it is assumed to be sold in year 31.

** It could be argued that this should have been added in year 21 since this is when the asset is fully depreciated. However, since the operation remains in operation until year 25, it's assumed here that the asset is retained an additional 4 years before it is salvaged.

*** It might be argued that since production ceases in year 25, *all* cash flows should terminate at this point. This argument can be accepted if all the assets are actually disposed of at that time.

TABLE 5
Tax Treatments of Gains and Losses ($)

Item	Asset	Book Value	Selling Price	Loss	Gain	Tax Treatment (Section)
(1)	Equipment -1,000,000	0	30,000	--	30,000	Ordinary Income (1,245)
(2)	Equipment -2,000,000	200,000	100,000	100,000	--	Loss (1,245)
(3)	Equipment -500,000	0	20,000	--	20,000	Ordinary Income (1,245)
(4)	Building	280,000	150,000	130,000	--	Loss (1,250)
(5)	Land	200,000	350,000	--	150,000	Capital Gain (1,231)

As Section 1245 items, equipment (1) and (3) are designated as ordinary income and the cash flows for the sale of these would be shown as follows:

(1) $30,000-(30,000-0)(.52)=\$14,400$

(3) $20,000-(20,000-0)(.52)=\$9,600$

As shown in Table 5, the only capital gain is that realized from the sale of land. It would be accounted for through the netting of capital gains and losses as follows:

$$150,000-(100,000+130,000)=\$80,000$$

This net loss can be taken as a reduction in ordinary income and shown to impact cash flow as follows for items (2), (4), and (5):

$$100,000+150,000+350,000+(80,000)(.52)=\$641,000$$

Using all the above considerations, cash flow for year 25 and the sale of all assets would be:

$$X_{25}=(2,000,000-500,000)-(2,000,000-500,000-30,000)(.52)+14,400+9,600+641,600=\$1,401,200$$

Working Capital Considerations

Agribusiness managers are generally aware of the distinction between capital investment and working capital. Not all, however, are fully aware of the potential relationship between the two. In fact, many capital investment projects impact and/or cause changes in a firm's working capital requirement. Most commonly, one would expect that the construction of a new processing facility (our example) would result in an increased working capital requirement as funds are required to meet an expanded payroll and purchase more raw products. Working capital increases, of course, have the effect of increasing the cash outflows experienced by the firm, particularly in the earlier years of the capital investment project. Such working capital increases are usually assumed to be fully recovered during the latter years of the investment period. Nevertheless, the omission of working capital considerations in an evaluation of alternative capital investments

could lead to incorrect conclusions and/or improper project selection.

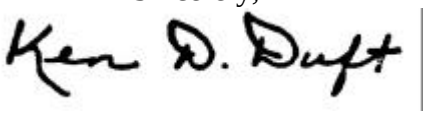
As an example, let's assume that in our project working capital increases of $200,000 and $100,000 in years 3 and 4 are anticipated. Our modified cash flows for these two years and for the year when working capital recovery is reflected would appear as follows:

$$X_3 = -459,600 - 200,000 = \$659,600$$
$$X_4 = 821,400 - 100,000 = \$721,400$$
$$X_{25} = 935,600 + 300,000 = \$1,235,600$$

Finally, The Comparative Analysis

The process by which our illustrative capital investment project was assessed was long and complex. Considering the incorporation of working capital, investment credit, salvage value, and other tax items in our cash flows computation, the process can be most demanding. As an end product of the effort, we have created an estimated annual net cash flow for our illustrative project for the expected life of the investment. Were the agribusiness manager confronted with more than a single capital investment project, the selection of the most attractive alternative investment would require that this complex procedure be followed for each option. Given that investment, alternatives would commonly be characterized by different expected investment lives, a year-by-year comparison of alternative annual cash flows is not a viable suggestion. Moreover, since an option always available to management is to reject all projects, some criteria must exist by which such investments are accepted or rejected by management. Comparing alternative projects with differing annual cash flows and different investment lines, or judging a single project in accordance with a specific investment criteria are two management actions not afforded by the procedures described so far. We shall deal exclusively with these two important management decision areas in the next issue of this publication.

Sincerely,



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