Sugar Cane Refining And Processing Company: A Comprehensive Case In Capital Budgeting

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ABSTRACT

The Sugar Cane Refining and Processing Company is a comprehensive case covering a firm's investment decision in fixed assets or capital budgeting. Most senior level undergraduate and graduate corporate financial management courses cover advanced topics in capital budgeting, including measuring complex cash flows, biasness in the capital budgeting process, agency issues, managerial options and risk adjusting techniques. To cover these relevant topics in a single case, the invented or "armchair" approach is used. This case is completely contrived but is very educationally effective.

Keywords: Capital budgeting; managerial options; biasness in capital budgeting

INTRODUCTION

Investment decisions involving fixed assets or capital budgeting are extremely important to the firm's success, cash flows, risk and, to a very large part, its market value (Bierman and Smidt 1988). Many financial economists consider capital budgeting to be the most important task facing the financial manager. Finance research has made major advances in theory that provide the tools to correctly evaluate capital investment decisions. These tools are taught in undergraduate and graduate finance classes (for an excellent reference book see Brigham and Capenski 2008). The estimate of true increment cash flows and discounting those projected to cash flows to present value at the appropriate required rate of return has proven to be the correct theoretical method to value a capital project (Woods and Randall 1989). In the last twenty years, possible bias in capital investment decisions' importance has been recognized and addressed in the literature (Pruitt and Gitman 1987). It has been found that many firms error when considering how to include opportunity costs and sunk costs in their cash flow estimates (Reinhardt 1973). Risk has been a very intriguing component in the analysis of cash flows in capital budgeting. Scenario analysis is a very powerful risk investigating technique that considers both the sensitivity of the net present value to changes in key variables and the range of likely variable values (Hiller 1963). The risk-adjusted discount rate approach (RADR), although having a slight theoretical flaw, is the most frequently used in practice (Robichek and Myers 1966). Managerial options in capital budgeting have been given much research attention and gaining interest by the business executives (Kulatilaka and Marcus 1992). How to adjust for inflation in capital budgeting is an interesting and well investigated topic (Horne 1971).

THE CASE

Patricia Hotard, the senior manager and top executive of Sugar Cane Refining and Processing Company (SCRPC), picked up the telephone to call Jimmy Cohan, the firm's marketing manager. Cohan had sent her a email earlier that morning suggesting that SCRPC might be able to increase its sales and profits substantially if the "old" or "new" manufacturing plants were allowed to increase the production capacity for making maple-flavored pancake syrup, a high-margin product that is sold primarily in bulk to large grocery chains and restaurants for bottling and sale under their own store and restaurant labels.

"Your suggestion interests me," said Patricia, "but I can't give you an answer until the "financials" have been worked up. Also, we are at or near full capacity at our both locations so we would have to expand one of our current facilities or look for another location. I am not sure we can expand enough at either site but talk to "production" and get their thoughts. Not to bias you or put any pressure but I really hope the increase in sales looks as good as you say. You know we will both probably get a "sweet" bonus and a nice increase in salary if we can markedly increase sales and profits. We must find out if profits from the increased sales you expect to get will give us a big enough return on our capital investment. As soon as you have firm estimates for sales, and how much money you will need for advertising and promotions, get with Stephanie Boudreaux (the company's controller). She can get the other data she needs to make the calculations from purchasing and production, and I will ask her to send me her capital budgeting analysis and recommendation by early next week. If it is as profitable as you think it will be, we will move on it immediately."

SCRPC's first plant ("old plant") which is the focus of this capital budget study is located on the outskirts of a mid size city in south Louisiana and had been in operation for over 50 years. It was the first sugar refinery to locate in the heart of what was a newly developing sugar cane growing area, and it remains by far the largest processor in the region. SCRPC leased the facility under a long-term contract for many years. In recent years, the property owner and SCRPC agreed to shorten the lease to eight years with provisions to break the lease. For the first twenty years, SCRPC would refine the sugar cane into sugar and package and sell the finished sugar under its own label. In the last twenty years, SCRPC added a processing plant to this refinery that converts the sugar into syrups and other sweetener products. Ten years ago, SCRPC added a second processing plant and built its corporate headquarters at this new site. The newer plant is located in another city that is 30 miles away.

Although a conglomerate acquired the company in the 1960s, it continues to operate autonomously. In addition to the title of senior manager, Patricia Hotard also serves as a vice-president of the parent conglomerate in charge of agricultural product operations. SCRPC plant now produces a range of products, from granulated sugar, maple flavored syrup, buttered syrup, fruit flavored syrups molasses to specialty sweeteners used by other food and beverage processors. The plant has a small section devoted to producing certain sugar based candies (candy cigarettes, love hearts and candy canes). Approximately 20 percent of the plant's current output are sold under the SCRPC label, with the remaining production sold under other firm's names/labels.

The product line (maple flavored syrup), which Jimmy Cohan wants to expand, was first introduced in 1944 under the SCRPC brand name, but its real sales growth came in the early 1980s. At that time, contracts were signed that provided for bulk delivery to several regional grocery chains and small restaurant chains for bottling and sale under their own labels. In the past few years, Cohan has had inquiries from several larger grocery chains and expanding restaurant chains (I-HOP, INT'L PANCAKES, etc) about similar arrangements, but the present production facility is already producing at its maximum design capacity. Additionally, these chains have hinted that they would consider purchasing other (buttered and fruit flavored syrups) existing SCRPC products if the bulk maple-flavored syrup arrangement "works out."

Jimmy Cohan's staff has just completed a marketing study, which indicates that several large grocery chains would like to purchase and sell under their own names, powdered sugar. Although SCRPC is **not** producing powdered sugar, this product could be manufactured using the same equipment and technology used to manufacture granulated sugar and syrup. The profit margin on this product, powdered sugar appears to be very high.

After talking to Patricia Hotard, Jimmy Cohan discussed the expansion idea with Jamie Fontenot, plant manager of the old facility and Justin Taylor, head of production at both plants. According to Fontenot, there is not enough room to significantly expand production capacity at the old facility. It is located what has turned into a heavy industrial zone with all types of manufacturing plants located very close to it. The old plant is also located over forty miles from the headquarters which houses marketing, accounting and senior management as well being collocated with the manufacturing facility for sweeteners. Justin Taylor reveals that the new facility is also land locked and expansion is not an option. Other tenants presently occupy all of the land and buildings adjacent to the new plant.

Justin Taylor tells Jimmy Cohan and Jamie Fontenot that he knows of a company that has recently been placed in receivership whose manufacturing facility is both very near the SCRPC new plant/headquarters and is available for lease. It has much more than enough floor space and utilities in place, and it can be leased for 5 years at $500,000 per year. "I've wanted to get rid of the old syrup facility for years," said Taylor. "It's a real inconvenience to have to go all the way over there whenever they have a problem - and they have quite a few since they operate at full capacity all the time. Besides being time consuming and inconvenient to visit and support this plant, it is difficult to get big trucks in and out of the plant. There have been several accidents and near accidents in the past three years and our insurance rates have skyrocketed. Moving to a location practically across the street from the new plant and expanding capacity would really make things better. Also, we should save a lot of money by reducing the cost of transferring of raw/processed sugar from the old plant to the new plant."

Jimmy learns that at the old site, the lease is for another five years but we can break if we pay them $1,000,000. Jamie Fontenot tells Jimmy and Justin Taylor, "There are some very big advantages and disadvantages of the move. As stated earlier, the old site has big logistic problems. If we do move, we could use state of the art equipment to manufacture our products and even have enough space for future expansion. With new equipment and economies of scale we could lower our per-unit cost. Also, we could finally offer our employees a decent break room and maybe even perks such as a recreation room and shower area. This is all very positive. However, there are some major negative points. We just spent over $600,000 on lease improvements that I had requested and had to beg the top brass. I have my name on that yellow slip and depreciation has not even started. We cannot transfer these improvements to the building so that would be lost. I can not just throw away $600,000 (you can expense this loss as well as the $1,000,000 to break the lease). The rent is going to increase by 500% and the new equipment and lease improvements will cost $2,200,000. That means more fixed cost to cover. If we have a major down turn in the economy like 6 years ago, we might be in trouble. Not only that but I don't know if all of the employees would drive an additional hour or so to work. It would be very costly to hire and train a large number of new employees and we may have some major down time because of this. My step-son works there and I know he won't drive an extra 2 hours round trip and I don't want him moving back in my house. I don't know if you can count on my help on convincing the boss to make the move. I must review the analysis when we finish the study"

Working with Taylor, Jamie and Cohan, Stephanie Boudreaux prepared the preliminary analysis shown in Exhibit 1.

EXHIBIT I
PRELIMINARY PROFITABILITY ESTIMATES
SYRUP CAPACITY EXPANSION & MOVE
5-YEAR PERIOD

Sales (42,000 barrels at $100)		$42,000,000
Cash Expenses		
Cost of goods sold		
Barrels at $50.00)	$21,720,000	
Building lease	2,500,000	
Marketing expenses	3,100,000	
Other expenses	1,500,000	
Total expenses		28,820,000
Contribution to profit		$13,180,000
Equipment Required/Expenses		
New equipment to be purchased and new lease improvements	$2,200,000	
Value of old equipment to be moved	15,000	
Cost of moving and installation Of kettles	25,000	
Loss on Abandonment of property improvements	600,000	
Total capital cost		$ 2,840,000

TOTAL PROFIT PROJECTION $ 10,340,000

AVERAGE YEARLY PROFIT
10,340,000 / 5 = $2,068,000

PAYBACK PERIOD
2,840,000/2,068,000 = 1.37 YEARS or 1.37/5 = 27.5% of LIFE

ROI = $10,340,000 = 362%
$2,840,000

NET PROFIT ON INVESTMENT = $10,340,000

As the four sat down to discuss their analysis, Boudreaux remarked 1.37 year payback and a net profit of over $10,000,000 was hard to beat. She said the payback is less than three years, which is our corporate benchmark, so it is definitely a "GO."

She also noted that Hotard wanted to move on the project quickly, so she hoped that no one would delay in passing the proposal on to Hotard with everyone's full support.

EXHIBIT II
ESTIMATED SALES AND MARKETING EXPENSES
(THESE PROJECTIONS ARE ACCURATE.)

	Annual Barrels	Annual Sales Revenues	Marketing Expenses	Increase in Working Capital
Status quo	50,000	$5,000,000	$87,500	
New Facility				
Year 1	60,000	6,000,000	400,000	_____
Year 2	70,000	8,000,000	500,000	_____
Year 3	80,000	8,000,000	600,000	_____
Year 4 and 5	100,000	10,000,000	800,000	

ESTIMATED PRODUCTION COST

	Variable Costs per Barrel	Annual Lease	Fixed Costs Depreciation*	Other
Status quo	$60.00	$100,000	$123,000	$50,000
New Facility				
Year 1	$58.00	$500,000	$443,000	$300,000
Year 2	$56.00	$500,000	$443,000	$300,000
Year 3	$54.00	$500,000	$443,000	$300,000
Year 4 and 5	$50.00	$500,000	$443,000	$300,000

*These amounts are for reporting purposes and are based on a 5-year life, straight-line rates, and zero salvage values. The current facility has a book value of depreciable assets of $615,000 ($600,000 of new lease improvements and kettle of $15,000).
The new facility would have a book value of depreciable assets of $2,215,000 ($2,200,000 of lease improvements and new equipment and kettle of $15,000).

After glancing at the figures shown in Exhibits 1 and 2, Hotard noticed major problems with the financial analysis. She had recently been to financial seminar sponsored by a local university One topic that was covered quite thoroughly was capital budgeting.

Although Hotard had no evidence, she was concerned that an increase in sales of maple-flavored syrup may take away sales from the company's other products, specifically buttered syrup (approximately $200,000 loss in cash flow to buttered syrup).

The figures for the first two years shown in Exhibit 2 represent an introduction period in which marketing efforts are to be directed at several potential customers. Faulkner also knew that sales increases of this order of magnitude would require substantial amounts of new working capital. Accounts receivable and inventory would have to increase and accounts payable would increase but not at the same level. From her recent training and talking to Boudreaux, she estimated that the current net working capital level of $420,000 would be sufficient if the move is not made to the new location and sales were not changed. However, if the move is made, a total of $725,000 invested in net working capital will be needed by the end of the first year (that is, an increase of $305,000 is required at t = 1). Net working capital would rise to a total of $1,300,000 at the end of year 2 (that is, an increase of $575,000 is required at t = 2). For year 3 a further increase to a total of net working capital is expected to be $1,800,000 (that is, an increase of $500,000 is required at t = 3) in Year 3.

A question about the equipment that is to be moved from the old to the new facility arose. That is, the cooking kettles and handling equipment. It is still on the books at a value of $15,000, and the depreciation is $3,000 per year for the next five years. It will cost us $25,000 to dismantle it, move it to the new building, and reinstall it. If we wanted to get rid of it and buy all new equipment, I could probably sell it for its book value, but the new equipment we would have to buy will cost over $500,000. Should the company replace the current equipment, after all there are no cost advantages with new kettles and the old ones are all in good shape?

Everyone agrees that the new facility should be able to operate profitably for many years. Senior management requires that a study life of five years, the standard used by the corporation, would be employed in the analysis. At the end of five years, the company's market value of the plant and equipment is assumed to be zero as it is part of the lease agreement that improvements will remain. The full value of the change in working capital can be recovered. When evaluating capital projects, the corporation uses a tax rate of 40 percent. SCRPC has a policy of using straight-line depreciation.

After contacting SCRPC concerning the firm's required return, a risk adjusted discount rate (RADR) schedule was communicated.

The Corporate Headquarters uses the following risk adjusted discount rate (RADR) schedule for its major capital budgeting projects:

Discount Rate	**Risk Level**	**Type of Project**
20 percent	HIGH RISK	NEW VENTURE
16 percent	AVERAGE RISK	CORE BUSINESS BUT EXPANSION WITH UNCERTAINTY
12 percent	LOW RISK	REPLACEMENT WITH GREAT CERTAINTY IN CASH FLOWS

REQUIREMENTS

1. Critique the Preliminary Profitability Estimates provided in Exhibit I. **Suggestion, go through the statement, item by item. Were all of the real costs for the move included? Look at their overall economic approach.**
2. Boudreaux used the payback period as an indicator of the merit of the move to the new facility. Is this the only decision criterion that should use? What problems are there with the payback approach?
3. Should the firm buy new kettles or move the old ones? You do not have to do the math. Is this a capital budgeting project?
4. Calculate the INITIAL INVESTMENT, OPERATING CASH FLOWS and TERMINAL CASH FLOW. Assume that the improvements at the old site, the kettle moving expense and the fee for breaking the lease can be written off or charged off immediately (EXPENSED) for tax purposes. Assume the depreciation provided is correct. Present in a table the firm's incremental cash flows for the initial investment, the operating life and the terminal flow.

5. Determine and report the "move's" NPV, IRR, Profitability Index, Payback Period and Modified IRR. Write the model or equation for each technique and list the advantages and disadvantages of each technique.
6. Are there additional benefits (managerial options) for the move other than that which is directly expressed and included in the cash flow estimates? If so list and discuss. Define managerial options.
7. Are there problems (called externalities) associated with the move that are not addressed and accounted for in your objective analysis (hint labor problems, sales, etc)? Define externalities.
8. Is there an agency issue? How should we include any conflicts in the analysis? Define agency issue.
9. If there was a probability of 25% that the increase in sales for the expansion could be lower by 50% each year which will be called the "worst case" scenario, a 25% probability that the increase in sales could be higher by 50% per year which will be called the "best case" and a probability of 50%, that the sales level estimated by the marketing department are correct, which will be named the "most likely" scenario, what is the expected NPV, the standard deviation and the coefficient of variation for the move? **Make sure you adjust the CGS with the lower sales level.** If the average CV for this firm is 1.88, what does this imply about the project's risk and return?

Event	**Probability**	**Sales Level**
Worst Case	25%	Increase is 50% less than forecasted
Most Likely	50%	Increase is correct as forecasted
Best Case	25%	Increase is 50% more than forecasted

10. If we are using debt to finance this project, should we use the interest expense as cash outflows in the analysis? Explain.
11. If we believe inflation will increase over the next several years at a higher rate than we are using to predict future sales, cost of goods, etc., should we use a dollar value that reflects the nominal dollar values/true sales figures for the analysis or should we use the "real" values (adjusted for inflation in today's dollars)? Why?
12. Are we abandoning a previous capital budgeting project by leaving the old facility and does that mean we made an error in the past? How can an abandonment option have value?
13. What discount rate or rate of return should SCRPC use for this project? Describe the differences between the Certainty Equivalent Approach and the Risk Adjusted Discount Rate Approach.

LEARNING BENEFITS

Students will have to use important critical thinking skills to complete the assignment. The measure of incremental cash flows for the project requires a good understanding of sunk costs as well as opportunity costs. Important finance theories are covered including agency issue, incremental analysis, risk, externalities, managerial options and inflation. After successfully completing this case, the student will have demonstrated a thorough knowledge of capital budgeting.

AUTHOR INFORMATION

Denis O. Boudreaux is an Associate Professor of finance at the University of Louisiana at Lafayette. He teaches the financial management case course and the MBA advanced finance course. Some of his research interests include capital market efficiency, capital budgeting, valuing and measuring the cost of capital for small privately held firms. He has published in many refereed journals including *Business and Economic Review*, *Journal of Business & Economics Research*, *Southwestern Economic Review*, and the *Journal of Economics and Finance*. Dr. Boudreaux is a practicing forensic economist and testifies in litigation concerning personal injury and commercial damages cases.

S.P. Rao is a full professor at the University of Louisiana at Lafayette. He teaches the investment graduate and undergraduate investment and portfolio management courses. His research interests lie in the field of Investments, especially asset pricing, portfolio theory, optimization, capital market efficiency and evaluation of Mutual funds performance. He has also has research interest in finance decision support systems, especially application of simulation, linear programming and other tools to financial modeling. Dr. Rao has published peered reviewed

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NOTES