

Case 49

The Arbitrator

AccuSpeaker manufactures stand-alone speakers including the enclosure, which are then sold under the labels of AccuSpeaker at major retailers. The speakers are also sold without enclosures to other manufacturers. Your new job is as staff assistant to Henry Higgins, the CEO. One of your first tasks is to evaluate the proposed capital budgets of the manufacturing and marketing department heads. These proposals represent the second step in the annual budgeting exercise, which begins with the CEO and the department heads identifying the projects that might be undertaken. After each of the four department heads ranks the alternatives, the CEO evaluates each proposed budget. He then prepares a budget that is the basis for further discussion, modification, and finally adoption.

Henry Higgins is a firm believer in training and testing. Evaluating all four proposals would probably be overwhelming, so he only gave you the memos from two departments. He has also decided *not* to guide your thinking by letting you examine last year's proposals and summation. By forcing you to compare two budgets, the CEO can observe your skill at ferreting out the truth from alternative perspectives. By examining your methodology, he can check for other theoretical approaches that may differ from the firm's historical techniques.

Henry has identified \$1.5 million as next year's capital budget, although transfers between the capital and operating budgets gives some flexibility. He has indicated that the firm is borrowing money with long-term loans at 9%, that last year's returns on sales was 6%, and that contribution to profit and overhead is about 65% for most products.

To: Executive Committee
From: Henry, CEO
Date: October 17
About: Minutes of Meeting on Potential Capital Projects

We discussed numerous projects at our recent meeting, but I believe that we reached a consensus that the following three (with some mutually exclusive alternatives) were the ones worth further consideration. We also agreed to follow the same process as last year. The next step is to prioritize the projects with their preferred alternatives. Please have your memos on your proposed capital budget to me by October 22, so that we can refine these before the Board of Directors' meeting in early November.

Project I: Installation of CAD/CAM System

The engineering department has been using computers for analysis of proposed designs for years, but we have not yet attempted to integrate this with the drafting or manufacturing processes. They have suggested that we purchase an integrated system from the ADAM Corp. (Aiding Design And Manufacturing). The proposal can be undertaken immediately, or we can do a part of it now and decide later on the rest. We believe that ADAM will cut the price for each module by 10% for each one we buy at the same time. Thus if we buy alternative 3 immediately, then the prices for the analytic, the drafting, and the control modules will all be cut by 20% (both hardware and software). If we wait to purchase the more advanced modules, some decline in hardware costs is likely. They charge a 15% annual fee for maintenance and updates.

Alternative 1: Replace our current computer system with ADAM's analytic module. This would provide the foundation for purchase of other modules later, and it would allow us to better judge ADAM before we commit substantial sums. This provides little in new capabilities, but would require about 6 man-months in training for users (engineers) at \$5000 per month including benefits. The cost for hardware is \$50,000 with a 10-year physical life, while the software will cost another \$50,000.

Alternative 2: Add the drafting module. This would cost \$75,000 for software and \$15,000 for hardware (life about 5 years). This would allow us to eliminate two drafting positions, although about 3 man-months of extra time will be required from one of the engineers.

Because the computer cannot be as flexible as a person, we will have to standardize some elements of our design.

Alternative 3: Can be done with or without 2. Add computerized control of some of the machining and cutting operations. While the additional cost for computer hardware is inconsequential, this would require about \$350,000 in new factory equipment and process control hardware. This new equipment should last 10 years. About three-quarters of this investment is likely to be required within the next 5 years anyway, when our current equipment will have to be replaced. The other quarter is the cost of controlling hardware. This is a standard application, so the software would only cost \$50,000, and we believe we could reduce the number of machinists from 4 to 2.

Alternative 4: Add computerized assembly operations. After our meeting I decided to remove this alternative from current consideration. I cannot yet accept the large cost and uncertainty in moving to the use of robots. I am sure the Board would seriously consider such a proposal, but only after we have implemented at least the drafting or machining modules.

Projects II & III: Adding Cabinetry Facilities

Currently we subcontract for both our wood and our plastic speaker enclosures. By purchasing appropriate equipment we could move one or both types of enclosures in house. Either one would be sufficient to allow greater flexibility in our production process. To have more flexible responses to machinery and supply problems is worth about \$80,000 a year to us.

Alternative 5: Add woodworking facilities. We currently purchase 55,500 wood enclosures each year at an average cost of \$8.57 each. Manufacturing's estimate is that these could be produced for \$5.00, including costs of material, the operating costs of the machinery, and the labor and benefits of the new employees. The new machinery would cost about \$200,000 and would last 15 years. The storage of incoming materials would save a small amount of space, because we would have a smaller inventory of completed enclosures, and the machinery for "finishing" would fit in an unused portion of the plant (1500 square feet). However, the cutting, sanding, etc. equipment would require a new 2500-square-foot addition, which would cost \$175,000 and last at least 40 years.

Alternative 6: Add a small injection molding facility. We now purchase 45,000 plastic enclosures each year at \$3.58 each. This has essentially the same space requirements as the woodworking option, but the capital cost is double that of the woodworking alternative for any volume between 30,000 and 100,000 per year. The first shift can run at 30,000 to 50,000 units, while the second shift can be part-time. A major refurbishing would be required about every half a million units for \$250,000. Because of the automation built into this continuous process, the combined cost for material, for energy, and for operator labor is only \$0.35 each (0.38 on the night shift).

Alternative 7: Add a larger injection molding facility for plastic enclosures. The space requirements would increase by 25%, the capital costs by 50%, and the capacity by 100%. The unit costs would remain about the same, but the refurbishing interval would double with the capacity.

Project IV: Revamp Electronics Assembly Line

This is the only portion of our operation where we suffer from significant worker dissatisfaction. We have reorganized our other assembly lines with two main operational criteria—increasing the number of tasks performed by each employee and physically placing them so that they can converse while they work. The results over the six lines have increased our productivity by 15%, 24%, 31%, 10%, 18%, and 5% in order of introduction. While this line will be more expensive to change than our last one, there is far more potential for improvement. However, I suspect that some workers prefer the older linear assembly line, and that they are shifting positions with other employees who prefer the newer, more team-like organization.

Alternative 8: Modernize the equipment without restructuring the line. This would keep one line in the traditional mode. Since we have modernized our other lines, this is currently our "oldest" line. It has the largest incidence of equipment problems. At an installed cost of \$250,000 for new equipment, we can reduce our annual maintenance costs by \$35,000. More importantly, productivity should increase by 5% without any increase in operating costs. The line produces nearly 800,000 units per year with a direct manufacturing cost of \$5.40 (excluding materials). Although this revamping will extend the life of the line for only ten years, it is unlikely that we can put it off for more than 2 years.

Alternative 9: Rebuild and restructure this line. This would increase the capital cost by 50% over the modernization alternative. It will improve productivity by the same 5% as modernizing the line by eliminating the reliability problems. It may produce large productivity gains due to the reorganization. We have experienced large productivity gains on all of the other lines.

To: Henry, CEO
From: Myron, Head Marketing
Date: October 17

I recommend that we accept alternatives 3 and 7. While I have calculated the present worth indexes,¹ I find that I place more importance on two other reasons. I support alternative 3 (and 4 likewise) because I believe it will allow us to respond more quickly to customers who want to include our speakers in their systems. I cannot quantify the value of this, but I believe that it is essential for our competitiveness. Secondly, I support alternative 7, because I believe that we can substantially increase the sale of our speakers in plastic enclosures. If one examines the national market shares of wood and plastic enclosures, there is a steady trend of 2% annual shift to plastic.

¹ These have been omitted to provide a student option. The present worth indexes should be calculated as the PW of the annual net receipts (including costs) at 6% (our rate of return on sales) divided by the PW of capital expenditures. Use the time period of each alternative and do not analyze the increments between the alternatives within a project. Include direct labor and benefits only.

To: Henry, CEO
From: Margaret, Head of Manufacturing
Date: October 21
About: Next Year's Capital Budget

I recommend that we accept alternatives 2 and 9, which would allow the purchase of ADAM's computer aided design and drafting modules and reorganize our production line. I analyzed the alternatives within each project to decide which one was best, although the enclosure project would allow alternative 5 along with one of 6 or 7. Even though both projects 5 and 6 appear to be good choices, and even though both can be done within the capital constraint, I would prefer to reserve that capital for the implementation of alternative 4—which is likely to be quite expensive.

Thus my recommendations depend more on the urgency of certain improvement than on the payback periods that I calculated.² We know we are going to redo that assembly line—let's get it done. Then it won't be hanging over our heads.

Also I believe we must implement a CAD/CAM system, but I've heard too many horror stories when the process is rushed. While alternative 3 is attractive, I believe that we would get more benefit out of computerizing our assembly operations than adding new numerically controlled machines. Because you feel the Board won't accept alternative 4 yet, I think we have to build a base for selling it. Alternative 1 will have great difficulty in implementation, because it is all cost and no benefit—thus only alternative 2 is left.

I realize there is some conflict between my desires to begin computerizing assembly operations in the near future and to immediately restructure the electronics line. However, I believe that we cannot maintain a line on straight hourly wages with a production bonus unless the line functions reliably. This is particularly true since everyone in the plant knows how well some of the small production teams are doing in incentive bonuses, not to mention the posters for team of the week (which in four years has never featured a team from our older lines—every winner has been a team from a reorganized line!!!)

² Calculations of payback period should include a burden rate of 120% for indirect expenses and overhead, which should be calculated on direct labor hours and benefits. The base wage is \$9.87/hour.