



TEMPES CORPORATION (C)

Including Environmental Impacts in the Analysis

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Reviewing the long list of potential environmental impacts, Susan Barclay, the *Water Moccasin* business manager, has realized that she needs to rethink her initial approach to analyzing the new design decision.

Recent discussions with her staff have revealed that a number of factors could become important in the future. For instance, the plastics industry might suffer as a result of growing public criticism of the deep-well injection method of waste disposal. In such a case, the price of acrylic polymer, the key raw material for Design A, could rise as its manufacturers respond to increasing regulation, limitations on waste disposal, and potential law suits for cleaning up past spills. Yet, if the price of acrylic polymer rises, the price of the engineering thermoplastic may also climb, resulting in cost increases for Design B as well.

Discussing such issues with her staff, Barclay has found herself wondering whether they could quantify the factors that they have identified as potentially important. How can the traditional capital budgeting analysis be modified to incorporate impacts of changing European regulations, the risk of a groundwater spill, or shifts in consumer preferences for recycled materials? To address this question, a task force has been assembled. The group includes members of the Tempes legal staff, the engineering group (with representatives from the design team and plant operations), and the purchasing department, as well as the firm's environmental officer and its North American and international marketing managers.

This case was prepared by Lawrence Molinaro, Jr., William Lovejoy, and Christopher A. Cummings, as a basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation. It was subsequently revised by Anjali Sastry and Henry Jacoby, Sloan School of Management, Massachusetts Institute of Technology. This case was developed with support from the World Resources Institute. Copyright © 1995 by the World Resources Institute. All rights reserved.

The starting point for the task force is the list of issues that had emerged in earlier discussions. As the first working meeting begins, it becomes clear that the managers need to agree on an approach for their analysis.

The task force quickly agrees that the analysis would be easier if, as an initial step, they take one design as the "base case" and assess the effects of varying factors on the other. Using Design B as the base case allows the analysis to focus on Design A to address those factors that influence the two designs differentially. For example, if worldwide interest in extreme sports declines because of increasing pollution, both designs would probably be equally affected; thus Tempes' choice of Design A versus Design B would not be influenced. If, on the other hand, the cost of acrylic polymer increases while the cost of engineering thermoplastic remains relatively constant, Design A's costs would rise relative to the Design B base case cost.

The next step is to determine how these impacts would be assessed. An engineering manager proposes an "expected value" approach based on likely costs or revenue impacts and probabilities of occurrence for each important factor. He argues his case during the meeting: "Using data on costs and likelihood, we'd figure out the expected value for each event, such as the cadmium spill we discussed last week. We'd add this expected value to the spreadsheet to calculate the effects on NPV. While I know it's difficult to come up with good probability estimates, I think we've got to try, so that we're comparing everything on the same basis."

The environmental manager is quick to disagree with his colleague, calling instead for a scenario-based approach. "Otherwise," he argued, "you end up planning for some 'average' case that will never happen. We just don't have one one-hundred-thousandth of a spill. We either have a spill or we don't. So we should look at a best case (no spill), a bad case (small spill), and a worst case (big spill). Then we can compare scenarios."

The scenario idea also makes sense to the marketing managers. "Suppose that attitudes towards recycling shift," one notes. "That may, in turn, result in a set of related changes in the regulatory sphere as take-back laws are enacted, in our customers' willingness to pay price premiums for recyclable products, and in raw materials prices. So the impacts we've been talking about may not be independent. We can put together consistent scenarios to tell a number of stories about how our business environment may change in the next few years."

"Since there are several of these potential scenarios, you're still left with the problem of figuring out relative probability" the engineering manager pointed out. "But maybe we could get around that with a sensitivity analysis. In a sensitivity analysis, we ask how much each of these assumptions would have to change in order for our preferences to be reversed."

Your Task

At this point, the business manager has decided that you've all heard enough for one day. What is needed now is a second round of financial analysis. She closes the meeting by asking you and the other task force members to go back to the initial capital budgeting spreadsheet to test the impacts of the factors they had discussed. "If you'd like to construct scenarios, please put together three cases you think are likely. Or you may choose to conduct a sensitivity analysis. But in either case, I'd like you to document the new assumptions you've made and explain why you've chosen them."

Walking back to her office, the *Water Moccasin* business manager wonders whether the exercise she has just set for the task force would raise more issues than it settled. "At least we're dealing with the right issues," she thinks.