UTILITY ANALYSIS: A NEW PERSPECTIVE ON HUMAN RESOURCE MANAGEMENT DECISION MAKING

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Introduction

What do Human Resource Management (HRM) decisions contribute to organizational objectives? Are the organizational investments in HRM programs (such as pay for knowledge, enhanced employee benefits, training, staffing, and employee involvement) justified by their returns? Since labor costs can exceed fifty percent of total operating expenses (Milkovich & Boudreau, 1988), are the human resources being managed with the same accountability, rationality and care as the plant, equipment and marketing resources? Is such management even possible with human resources, or are the "people issues" facing organizations simply too ill-defined and unpredictable to be managed systematically?

These important questions face any human resource manager, whether a line executive or a staff professional. Though most managers, and certainly most HR professionals, would readily agree that human resources are among the most important in terms of dollar expenditures and effects on organizational goals, the HRM function is often regarded as a "cost center" or as an "overhead budget item," with little systematic attention devoted to its contribution to organizational goals (especially its contribution to the financial performance of the organization). Indeed, the question of its contribution to corporate profit is still controversial enough to merit recent debate in a widely-read professional journal (Gow, 1985). It is difficult to imagine such a debate regarding the Finance, Marketing, Accounting, or Engineering departments.

With increased competition, and evidence from the U.S. and abroad that competitive companies manage their people differently, organizations are paying more attention to their HRM decisions. HR managers are finding it increasingly difficult to justify very large year-to-year human resource

programs solely because they are "good for human relations," "being done by everyone else in the industry," or "done that way in Japan and Korea." Instead, the HRM function is being required to justify its existence and account for its contributions. And appropriately so, because the HRM function is a steward for the single largest resource in most organizations. Yet, how can a Personnel manager respond to top management's order to justify a million-dollar training program? What can a Personnel manager say when top management proposes cutting 30% of the HRM programs in an effort to reduce "excess overhead?" How can an HR manager justify increasing budgets for training and outplacement when the organization is reducing staff levels to cut costs?

Human resource management programs produce potentially lucrative returns even when budgets are tight, but because the costs of such programs are often quite visible, while their benefits remain unmeasured, decision makers may be tempted to "cut the overhead" without considering lost program benefits. In contrast, decisions about programs in other management areas (e.g., marketing, finance, accounting, and plant operations) often consider not only costs, but dollar estimates of program benefits as well. It is difficult to imagine an engineer proposing to spend a million dollars to develop a new production process, without explaining its effects on product quality or cost. Yet, million-dollar HRM programs are routinely made with little explicit consideration of their effects on product quality or cost. For example, the decision to train 1,000 employees can easily incur costs of $1,000 per trainee (considering course development, instructor time, travel and lodging), but training results often go unmeasured. Lacking a systematic analysis of the training program's returns, a top manager might form the impression that such a million-dollar HRM program is more

expendable than programs in other management areas.

This Chapter explores cost-benefit (or utility) analysis, a decision-support framework that explicitly considers the costs and benefits of human resource decisions. Utility analysis provides formulas for computing the dollar value of human resource programs, but it is more than formulas. It is a way of thinking about HR decisions that makes facts, assumptions and beliefs behind decisions more explicit, systematic and rational. It supports human resource decisions even when information is unavailable or uncertain, translates statistics into useful decision information, and it helps determine when more information is or is not needed.

Though utility analysis models can be complex and detailed, this Chapter will emphasize their managerial implications. It presents several case studies, illustrating how utility analysis models have been developed to encompass progressively more realistic and complete HRM decisions. Though it will draw on sophisticated algebraic models (with citations to direct interested readers), algebraic formulas will be minimized to emphasize the findings and implications. The first section discusses the advantages of cost-benefit models compared to other decision systems. The second discusses general issues important to applying cost-benefit models to human resource decisions. The third section shows how utility analysis applies to programs affecting the existing stock of employees, using a training program as an example. The fourth section develops cost-benefit models for decisions affecting employee flows, using a case study to illustrate each model's contribution. The final section presents implications and conclusions.

Why Use Cost-Benefit Analysis for Human Resource Management Decisions?

Decision makers concerned with how to invest resources in HRM programs

have several types of information available to support those decisions. Let us examine where cost-benefit (utility) analysis fits in.

Alternative Decision Systems

Costs. Organizations could make their human resource management decisions based on costs, attempting to minimize them. Costs are incurred in every human resource management activity, so reducing costs often means reducing the number or scope of human resource activities. Other typical cost-reduction techniques involve reducing presumably costly employee behaviors such as turnover (Cascio, 1987, Flamholtz, 1985). Of course, this is only half the picture. Reducing HR activities or presumably costly employee behaviors may cut costs, but it may also reduce organizational effectiveness. Human resource activities or employee behaviors that at first appear costly may actually enhance effectiveness, as occurs for example when turnover creates opportunities to hire highly-qualified employees, but a cost-focused decision system may fail to detect this.

Informally-defined benefits. Organizations might informally consider human resource management benefits without an explicit framework or system, but the sheer complexity of these benefits can lead to unsystematic shortcuts. For example, a recruitment program might be assessed in terms of filling vacancies, while a selection test might be assessed in terms of whether competitors use such devices, or whether it will be vulnerable to scrutiny by the regional Equal Employment Opportunity office. Lacking a systematic approach, the analysis may be dominated by unsubstantiated beliefs, personal influence or political power, and the decisions may not achieve organizational goals.

Cost or Head Count Ratios. Decision makers might calculate any of a variety of ratios designed to analyze HR costs or staff levels. For

example, one might compute the ratio of total employees to HR staff employees, or the ratio of sales to HR costs, or the ratio of training costs to the number of trainees (Fitz-Enz, 1984). Such ratios are sometimes compared over time, or to other competing organizations. While they can be useful for directing attention to staff levels or costs, they provide no framework for interpretation or decision making. If your cost ratio is higher than last year (or higher than a competitor's), what decision does that suggest? Is it always bad to have high or rising HR staff-to-employee ratios or HR cost-to-sales ratios? Clearly, if the programs and activities provided in return for such cost or staff levels are producing high organizational returns, there is less cause for concern than if they are not. Thus, cost and head count ratios must be interpreted within a decision framework to be useful in guiding HR decisions.

Audits. The fourth approach involves auditing human resource activities (Mahler, 1979; Sheibar, 1974). Such audits can be quite systematic and detailed, and can demonstrate whether human resource programs are being implemented as planned. However, they provide only limited information because they may not address whether the plan was appropriate in the first place. It is little consolation to find that an ill-conceived program was implemented as planned and incurred costs at the budgeted level, or that it was applied to the projected number of employees. A decision system needs to address costs and benefits before the activities are implemented, as well as providing an evaluation framework after they have been implemented.

Formal studies. The fifth approach involves conducting formal statistical studies to determine the effects of human resource programs. Examples include validation studies reporting the statistical relationship

between test scores and performance ratings, and experiments comparing the statistical difference in output levels between groups receiving different training programs. However, statistics alone are often not very useful to human resource managers, who are less concerned with exploring theory than with determining how to invest their limited resources to achieve the greatest benefit. Rarely does a scientific study even mention dollar values, let alone report results in terms of investments and returns.

Fully-detailed cost-benefit analysis. The sixth approach involves a full-blown cost-benefit analysis. The organization would identify alternatives, draw up a list of all the factors to be considered for each alternative, measure the factors on a common scale (such as dollars), and then compute the benefits and subtract the costs to determine the overall net value of each alternative. The best alternatives, or those with net values (or returns on investment) exceeding a minimum standard, would be implemented. The problem here, of course, is that all of the decision factors cannot be evaluated precisely and with certainty. Moreover, measuring everything may be quite costly. Still, the cost-benefit approach has a good deal of merit, if only it could be efficiently applied.

Advantages of a Cost-Benefit System

A cost-benefit approach offers the following advantages compared to other approaches:

1. Explicitness. Identifying and evaluating costs and benefits makes the assumptions, beliefs and facts more visible to all. They can be discussed, questioned and corrected, thus reducing the chance that incorrect or counter-productive information will go undetected.
2. Consistency. Human resource decisions are complex. Without

a system, it is easy for HR managers and strategic planners to make some decisions based on one set of issues, and other decisions based on a different set. For example, recruitment programs may be chosen based on low cost and probability of filling vacancies (Rynes & Boudreau, 1986), while selection programs are chosen based on legal defensibility and tradition. Yet, these four factors are relevant to both decisions, and none of these factors reflects the productivity of those hired. A cost-benefit system encourages consistency by providing a list of factors to be explicitly considered before basing a decision on only a few of them.

3. Efficiency. A cost-benefit system promotes efficiency because it can be applied to many decisions. Once developed, the organization can spend less time re-inventing the wheel for each new decision. While each decision is unique and may require some unique analysis effort, organizing the most commonly-considered factors in a cost-benefit system frees resources to focus on the really unique factors. Moreover, a cost-benefit approach guides the use of information and information systems. By identifying the decision factors, a cost-benefit framework allows decision makers to set priorities in gathering and using information, as we shall see in the subsequent examples.

4. Communication. A cost-benefit system improves communication among decision makers because it offers a common "language" for decision making. The identified set of decision factors and the system for applying them allows HR managers and their staff to coordinate. It is not necessary to redefine the data gathering

task every time, so decision makers can devote more resources to making decisions rather than identifying and locating information. Moreover, because organizations are measured (at least in part) by how well they use dollar-valued resources to achieve goals, communication with other management functions is improved by cost-benefit information that is expressed in dollars. When HR decision makers express their contribution in the same bottom-line terms used by other management functions (such as Finance, Marketing, Accounting and Operations), cross-function communication (and perhaps credibility) may be improved.

Cost-Benefit Decision Systems in Human Resource Management

The principal drawback of a cost-benefit decision system is that all the costs and benefits cannot be measured precisely (indeed, some cannot be measured at all). It is impossible to quantify the variety of factors affecting decisions about human resource activities into a single dollar value that expresses their contribution to the organization. But, is this really what a decision system must do? It is certainly not the typical approach used in other management functions. Anyone who has tried to forecast the stock market or predict the sales of a new product realizes that Finance and Marketing are not exact sciences. Yet, these functions typically express their programs' effects in dollar terms. Their objective is to enhance decisions by focusing on the important factors, isolating the ambiguous or uncertain factors, and systematically and explicitly addressing potential risk and uncertainty.

Unfortunately, the simplifications typically adopted to address human resource decisions (such as focusing only on costs, adopting programs because of tradition, and ignoring human resource benefits because they

are uncertain) can have undesirable effects. A cost-benefit decision system offers a way out of this bind. It too simplifies the decision situation, proposing a set of variables to describe human resource program consequences, but it also efficiently summarizes a great deal of important information about human resource programs in an explicit, consistent and systematic way. It does not require measuring everything. To the contrary, cost-benefit techniques can help to pinpoint important information, and thus reduce the effort necessary to gather information.

Applying Utility Analysis to Human Resource Decisions

Utility analysis is the term for a set of cost-benefit models originally developed by industrial psychologists concerned with selection, and recently extended to other human resource programs and decisions. "Utility" simply means usefulness, and the aim of the models is to predict, explain and improve the usefulness of different human resource management decisions.

Requirements for Utility Analysis

Utility analysis, like other decision systems, requires: (1) A problem, or the gap between what is desired and what is currently achieved; (2) a set of alternatives to address the problem; (3) a set of attributes, or the variables that describe the important characteristics of the alternatives (such as effects on productivity, costs, employee attitudes, etc.); (4) a utility function, the system used to combine the attributes into an overall judgment of each alternative's usefulness. Utility analysis is generally employed when the first two requirements are met. Given a set of alternatives, utility models suggest a set of attributes and a utility function for combining attributes into an overall usefulness value, usually expressed in dollars.

The Unit of Analysis: Human Resource Programs

Utility analysis models focus on decisions about human resource programs. A human resource program (sometimes called an "intervention" by industrial psychologists, or an "activity" by HR professionals) is simply a set of activities or procedures that affect human resource value. Examples include selection tests, training courses, recruiting techniques, compensation plans, and job redesign. Decisions about such programs provide a vital link between broader human resource strategies and the day-to-day operational decisions made by human resource managers.

Human resource programs are more specific than human resource strategies. Strategies address broader issues such as staffing levels, functional areas to emphasize, and appropriate organizational structures. But, strategy implementation requires decisions about human resource programs. For example, a strategy intended to increase manufacturing employee flexibility requires choices among competing programs in selection, training and job design.

At the same time, decisions about human resource programs encompass more than purely operational decisions about individual employees (such as which employee to hire, train, promote or reward). Each of these decisions occurs within the framework of human resource programs. For example, deciding which employee(s) to hire or promote requires a framework of programs generating a pool of job candidates (such as college recruitment or job posting) and programs that provide staffing information (such as selection tests or skill inventories).

What Makes a Human Resource Program Useful? Quantity, Quality and Cost

Decisions about human resource programs have wide-ranging effects, subject to the scrutiny of many constituents. No decision system

encompasses all of these effects, but utility analysis focuses on three important factors: quantity, quality and cost. HR programs have value when they affect many employee work behaviors over time, when they produce large improvements (or avoid large reductions) in the quality (or value) of those work behaviors, and when they minimize the costs required to develop, implement and maintain the programs.

These three factors are similar to those typically used in other management functions, and this similarity is not accidental. Marketing, Finance and Manufacturing Operations' programs also produce value to the extent that they produce large quantities of productivity (such as sales or units produced), large improvements in productive quality (such as reduced costs or increased quality), and minimize the necessary cost or investment. The utility analysis models presented in this chapter reflect the similarities between investing resources in human resource management programs and investing resources in programs from other management areas.

In considering quantity, quality and cost, it is important to recognize that different constituents may be concerned with different aspects of these three factors. For example, operating managers may be concerned with the program's effects on unit revenues and operating costs in the short run (perhaps because they expect to be promoted shortly), while the financial and accounting staff may be concerned with the programs' impact on the unit's financial statements, and top management may be more concerned with enhancing the long-term flexibility and productivity of the work force. Utility analysis can reflect these different perspectives, but each one implies a different way of measuring program payoff.

Utility analysis must also identify the mechanisms through which HR programs affect the organization. For example, organizations facing

increasing product demand use enhanced employee productivity to increase output, while organizations facing cost pressures apply productivity improvements to reduce head count and compensation costs. Again, utility analysis can encompass each of these effects, but the analyst must carefully define and measure the payoff to reflect the appropriate effect. A common mistake in utility analyses is to measure whatever outcomes are convenient (e.g., sales or absenteeism) even when such outcomes have little relevance to organizational goals.

Utility analysis models clearly omit some decision factors. They emphasize productivity-related outcomes, and ignore other potentially important factors such as employee attitudes, union relationships, government or public relations, and political considerations. They represent one valuable decision support tool in the arsenal of HR decision makers. They do not provide the answers to all human resource decisions any more than a financial analysis alone fully addresses the decision about whether or not to build a nuclear power plant. Utility analysis models are useful because they summarize a great deal of productivity-related information so that it can be compared to these other important factors.

What if We Can't Measure It? Precision in Utility Analysis

Though utility analysis models are all based on three simple concepts of quantity, quality and cost, they are nonetheless complex. This complexity can give the incorrect impression that utility analysis is impractical. Some of the variables cannot be measured precisely (or cannot be measured at all). Those that can be measured are often uncertain and prone to change over time or in different situations. Finally, some variables that could be measured precisely are simply very expensive to measure.

These considerations are legitimate and important, but measurement limitations and uncertainty should not prevent systematic analysis of human resource programs any more than uncertainty about stock prices or the inability to precisely measure consumer preferences prevents systematic analysis of financial investments or marketing strategies. The limitations and costs of information are quite well recognized in management, and there are ways to address these problems (cf. Bierman, Bonnini & Hausman, 1981, Chapters 4-10). Simply put, information is useful when it: (1) is likely to correct decisions that would have been incorrect without it; (2) when the corrections are important and produce large benefits; and (3) when the cost of the information does not outweigh the expected benefit of the corrected decisions.

In other words, information gathering is itself an investment decision. Uncertainty about human resource program effects should lead decision makers not to abandon systematic analysis, but to use methods that identify the sources of uncertainty, how (or whether) it affects decisions, and when to invest in better information. This approach differs from common practices that focus only on the most measurable information, such as costs, or base decisions on inexplicit beliefs or opinions. Subsequent sections will illustrate how utility analysis models make human resource decisions more systematic even in the face of uncertainty.

Two Categories of Human Resource Management Programs and Effects

The concepts noted above (costs and benefits; human resource programs; quantity, quality and cost) can be applied to all human resource program decisions, but the analysis differs depending on whether the program affects employee stocks or flows.

Employee stocks. Programs affecting employee stocks (such as training,

compensation, performance feedback and employee involvement) aim to increase valuable characteristics (such as skills, abilities or motivation) among existing employee to improve their current job performance. In terms of quantity, quality and cost, decisions affecting employee stocks enhance productivity more when they: (1) Affect large stocks of employees and time periods; (2) Cause large average increases in the value of employee job behaviors; and (3) Achieve 1 and 2 at minimum cost. Thus, decisions affecting employee stocks "work" by improving employee behaviors in their existing assignments.

Employee flows. Employee flows occur when employees move into, through and out of an organization through selection, separation, promotion, demotion and transfer. In terms of quantity, quality and cost, decisions affecting employee flows enhance productivity more when they: (1) Affect large numbers of employee flows and time periods, (2) Achieve large increases in the value of job behaviors by making better person-job matches, and (3) Achieve 1 and 2 at minimum cost. Most research has focused on utility analysis for selection decisions, but the approach applies as well to other programs affecting employee flows (such as improved recruitment, job posting, or incentives that encourage employees to apply for jobs or promotions). Programs affecting employee flows "work" by improving the pattern of movements into, through and out of the organization so that more valuable employees are placed in jobs or work roles.

Utility Analysis for Decisions Affecting Employee Stocks

Utility models have been applied to performance feedback (Florin-Thuma and Boudreau, in press; Landy, Farr & Jacobs, 1982) and training (Mathieu & Leonard, 1987; Schmidt, Hunter & Pearlman, 1982). As noted, such models could also be applied to other programs affecting employee stocks (such

as compensation and employee involvement). To illustrate utility analysis for such programs, let us examine the case of a large manufacturing organization faced with a choice between two training programs. Though disguised, this example is based on an actual utility analysis application conducted in 1986.

The Decision Situation

The decision involved a choice between delivering training for engineers through a traditional classroom system, or through a sophisticated audio-video network. While some training staff believed the audio-video system was a good investment, cost pressures had convinced others that it was simply too expensive. Table 1 describes the example in terms of quantity, quality and cost.

Insert Table 1 Here

Cost. The classroom program would cost $451,035 over five years, while building and staffing the audio-video network would cost $1,031,147 over five years (with the largest portion occurring in up-front costs). To be conservative and ensure no unfair advantage to the Audio-Video system, the entire cost of the system was borne by this one program, though if implemented many programs would share it.

Quantity. The target population for training was the 200 currently-employed engineers, plus 20 new engineers added every year for the next four years. Due to training capacity constraints, Classroom training could train only 40 employees per year, or 200 over the 5-year target period. Audio-Video training could accommodate up to 200 persons per year, thus

it could fully train the incumbent work force in the first year, and then easily accommodate the additional 20 new hires in each future year, for a total of 280 trainees over five years.

Cost per trainee. Following its typical practice, the organization computed the accounting cost per trainee by dividing total costs by the number trained. Classroom training cost $2,255 per trainee (i.e., $451,035/200) and Audio-Video training cost $3,683 per trainee (i.e., $1,031,147/280). These figures suggested that Audio-Video training must demonstrate much higher per-trainee effectiveness than Classroom training to be cost effective. Discussions concerning whether this was likely had reached no definite conclusions. Some believed that spending over one million dollars on a training delivery system for 280 engineers could not possibly be cost-effective. Moreover, some believed that cost-benefit analysis required a costly and complex experimental study to discover the program's effects on performance.

Leverage Computation. Evaluating training programs solely based on cost-per-trainee is like evaluating a manufacturing plant based on the amount of raw materials it consumes, rather than on its production of finished goods. How much productivity would be affected by the two training programs? The number of trained engineers the programs would place into the work force over the five-year period is shown in the middle portion of Table 1 (because engineer tenure averaged more than 5 years, we assumed no turnover.) Because Audio-Video delivery trains more people earlier (e.g., the first 200 trainees are productive for the entire 5-year period), it affects 1,200 total person-years of productivity (i.e., 200 plus 220, etc.). Classroom training trains a total of 200 employees, but only 40 at a time, so the work force doesn't reach 200 trainees until Year 5.

Still, even Classroom training affects 600 person-years of productivity (i.e., 40 plus 80, etc.). This is the leverage of the two programs, and this leverage computation demonstrates how faster training can substantially increase the program's effect. Leverage occurs because human resource programs affect many employees who affect productivity for a long time.

Quality. Typical of many organizations, little information was available to help us estimate the effects of the two training programs on employee quality, and certainly none that could forecast the dollar value of improved performance. To explicitly symbolize this uncertainty, the unknown average productivity increase per-trainee, per-year was simply symbolized P_1 for Option 1 (Classroom Training) and P_2 for Option 2 (Audio-Video Training).

Payoff formulas. Even without knowing the effects of either program on employee quality, the cost and leverage information proved quite useful in constructing the payoff formulas shown in Table 1. The utility (usefulness) of Classroom training (i.e., U_1) goes up by $600 with every one-dollar increase in average employee quality per person-year, offsetting the $451,035 cost. Similarly, the utility of Audio-Video training (i.e., U_2) goes up by $1,200 for every one-dollar increase in average employee quality per person-year, offsetting its $1,031,147 cost. These payoff functions suggested that quite modest program effects might be sufficient to make training worthwhile and that large training effects on employee value would produce quite sizable returns to the training investment. For example, an average productivity increase of $1,500 per person-year would produce total utility of $148,965 from Classroom training and $168,853 from Audio-Video training. This represents a 33% return on investment for the Classroom training, and a 16% return on investment from the Audio-

Video training. At higher average productivity increases, the relative advantage of the Audio-Video training is enhanced.

Break-Even analysis. Of course, the $1,500 figure used above was only a guess. As noted, little information was available to precisely estimate the dollar increase in employee value per person-year from either training program. However, rather than embark on potentially costly studies attempting to measure this variable, we divided the costs by the leverage to obtain the values for P_1 and P_2 that would cause each program's total payoff to equal (or "break-even" with) its costs. These values are shown in Table 1. The Classroom training costs would be covered if it produced at least $752 per person-year (i.e., $451,035/600), while the break-even value for the Audio-Video training program was $860 per person-year (i.e., $1,031,147/1,200). Notice that these values are much lower than the costs-per-trainee computed earlier. Relatively modest training effects could justify what had originally appeared to be a very large necessary training investment.

Program comparisons. While the break-even analysis was enlightening, it treated each training option independently, and therefore did not address the question of whether to substitute the more expensive Audio-Video training for the less expensive Classroom training. However, the same break-even logic could be applied to this question. What are the values of the unknown Classroom training effect (i.e., P_1) and Audio-Video training effect (i.e., P_2) that would make the total utility of Audio-Video training equal to Classroom training? The formula for these relative effects is found by subtracting the Classroom payoff formula from the Audio-Video payoff formula, producing a payoff formula reflecting the difference between the two programs as shown in Table 1. By setting the difference (U_2 -

U_1) to zero, we obtained a formula for the value of P_2 that would be necessary to make the Audio-Video program payoff exactly equal to the Classroom program payoff, given a certain value for P_1 [i.e., P_2 = (.5 X P_1) + \$484]. The decision rules implied by this break-even analysis are shown at the bottom of Table 1. For example, if the payoff per person-year from Option 1 (P_1) is equal to \$2,000, then the payoff per person-year from Option 2 (P_2) must exceed only \$1,484 [i.e., (.5 X 2,000) + 484] to justify the more expensive Audio-Video training. If Classroom training produces large productivity increases (i.e., greater than \$968 per person-year), it can be cost-effective to invest in the faster Audio-Video training system even if it has a smaller average productivity effect per person-year than Classroom training. The break-even formula provides a simple equation that shows when each program is the better investment. Moreover, the computations can be further simplified using personal computers (Boudreau & Milkovich, 1988, Chapter 8).

Decision Results. Even without measuring training effectiveness, the break-even analysis focused the decision process and helped to better define the critical issues. Instead of arguing about whether one or another estimate of training effects was right or wrong, the decision focused on whether the Audio-Video training effect was enough to justify switching to it. In light of the important work done by these engineers, and the undisputed value of this training for engineering performance, the Audio-Video expenditure could be justified. Moreover, because other training programs could also use the Audio-Video network, the fact that it could be justified for this program alone made it a worthwhile investment. The break-even analysis demonstrated that a costly and complex effectiveness study (earlier thought to be essential for applying cost-benefit analysis)

was not necessary to improve decisions.

This example demonstrated how the utility analysis concepts of quantity, quality and cost can be applied to training programs. Similar applications are possible for other programs affecting employee stocks, such as compensation and employee involvement. Moreover, it demonstrated how an explicit cost-benefit analysis can address uncertainty about program effects. Uncertainty is a fact of decision making. Break-even analysis is one method of addressing uncertainty explicitly, and reducing its detrimental effects on decision quality. Rich and Boudreau (1987) demonstrated several other methods of addressing uncertainty when cost-benefit analyses are applied to HRM decisions. We now discuss how to apply these cost-benefit principles to decisions affecting employee flows.

Utility Analysis for Decisions Affecting Employee Flows

Analyzing the costs and benefits of programs that affect employee stocks is useful, but what about employee flows? How can we determine whether resources devoted to improve selection tests, college recruiting, turnover/layoff management, and internal staffing offer sufficient returns to justify their expense?

As noted earlier, employee flows occur when people into, through and out of organizational positions/jobs (e.g., selection, turnover, promotions, demotions and transfers). HRM decisions affect such flows as well as affecting the existing stock of employees. However, decisions that affect employee flows operate differently. Whereas decisions affecting employee stocks work by enhancing the value of employees in their current positions, decisions affecting employee flows work by affecting which individuals will occupy those positions.

We can consider three general processes through which individuals

flow through the work force (Boudreau & Berger, 1985b; Milkovich & Boudreau, 1988, Ch. 10-13): (1) External recruitment/selection, which involves attracting a pool of job applicants and choosing which of them will be hired into the organization; (2) External separation/retention, which involves managing the quantity and pattern of employee separations that affect which employees are retained by the organization; and (3) Internal staffing, which involves managing the quantity and pattern of employee movements between positions within the organization. Though these processes are typically managed, evaluated and planned as if they were independent, they are obviously quite closely related. Effectively managing each of them depends on the quantity, quality and cost effects of HRM programs that identify candidates for employment opportunities, that choose which candidates will fill employment vacancies, and that affect who stays and leaves the job.

Insert Table 2 Here

The following section develops utility models for decisions affecting employee flows. The models proceed from simpler to more complex. The first models focus solely on external selection, with subsequent models adding enhancements to reflect and integrate the other employee flow processes. Table 2 provides a summary of the decision models, the features added by each one, and the decision addressed by each model. Model #1 focuses on choosing whom to hire from among one group of external job applicants. Model #2 incorporates factors useful in making HRM decisions compatible with the financial considerations typically applied to other investments. Model #3 extends the model to reflect the effects of re-

applying selection programs over time. Model #4 incorporates the effects of recruitment into the external staffing utility analysis. Model #5 incorporates the effects of employee separations (e.g., turnover, layoffs, resignations) into the recruitment-selection utility analysis. Finally, Model #6 incorporates the effects of internal employee movements (e.g., promotions, demotions and transfers) into the analysis, providing an integrated analysis framework for the staffing process. Thus, Table 2 provides an outline and summary for the discussion that follows.

The Case Study Decision Situation

We will explore utility models for employee flows using a case study. Though hypothetical, this case study uses information based on published studies and realistic assumptions. However, readers may find it useful to substitute values from their own experience to produce illustrations that are more familiar to them. The important point is not the numbers themselves, but the decision systems they illustrate. Throughout the analysis, break-even analysis will be used to illustrate how uncertainty can be explicitly and systematically addressed. Readers should also keep in mind that though the computations behind the models can become complex, computer analysis methods (e.g., Boudreau, 1985, 1987a) greatly reduce the computational burden.

Insert Table 3 Here

Consider a large organization employing 4,404 entry-level computer programmers, and 1,000 data system managers one level above them. Table 3 contains a description of the characteristics of the two jobs (adapted from Schmidt, Hunter, McKenzie and Muldrow, 1979 and Boudreau, 1987b).