

Utility Analysis Models for Personnel Decision Making

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March 1996



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United States Army
Research Institute for the Behavioral and Social Sciences

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U.S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES

**A Field Operating Agency Under the Jurisdiction
of the Deputy Chief of Staff for Personnel**

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Director

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for the Department of the Army

Cornell University

Technical review by

Michael Drillings

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UTILITY ANALYSIS MODELS FOR PERSONNEL DECISION MAKING

EXECUTIVE SUMMARY

Research Requirement:

This report summarizes the results of research conducted with support from the U.S. Army Research Institute office of Basic Research, Contract MDA 903-87-K-0001. This research was undertaken to develop and explore the effects of cost-benefit or "utility" models for evaluating the consequences of personnel decisions, apply such models to personnel programs, and examine the effects of such models on the decisions and decision processes of personnel managers.

Procedure:

The original procedures for the research were: (1) identify the characteristics of human resource decisions where cost-benefit analysis is most appropriate; (2) identify organizational and individual characteristics influencing personnel management decisions; (3) gather data to compute costs, benefits, and break-even payoff levels for personnel management programs; (4) examine the effect of cost-benefit information on personnel management decisions; (5) integrate utility analysis models with decision theory; and (6) apply the finding to develop improved decision support systems.

Findings:

A key finding of the research was that the domain of decision making regarding human resource management programs was inadequately represented by the mathematical models frequently studies in traditional utility analysis research. The results of the research program include increased understanding of how managers actually use information in making human resource management decision; empirical evidence of the factors affecting such decisions, not only from the perspective of managers, but also from the perspective of other key stakeholders (such as employees and job applicants); and development of prototype models and tools that may be used by managers to better make future human resource management decisions.

Utilization of Findings:

The frameworks, findings, and decision tools developed here can be used by U.S. Army policymakers and personnel planners to

evaluate and report the costs and benefits of personnel management strategies and programs. They can be used to suggest fruitful areas for exploration beyond those traditionally examined by utility analysis models. They can also be used as prototypes for the development of more customized cost-benefit estimation and planning tools by Army decision makers.

UTILITY ANALYSIS MODELS FOR PERSONNEL DECISION MAKING

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UTILITY ANALYSIS MODELS FOR PERSONNEL DECISION MAKING

Introduction

This report summarizes the results of research conducted with support from the U.S. Army Research Institute Office of Basic Research, Contract MDA 903-87-K-0001. This research was undertaken to develop and explore the effects of cost-benefit or "utility" models for evaluating the consequences of personnel decisions, apply such models to personnel programs, and examine the effects of such models on the decisions and decision processes of personnel managers. The original goals for the research were: (1) Identify the characteristics of human resource decisions where cost-benefit analysis is most appropriate; (2) Identify organizational and individual characteristics influencing personnel management decisions; (3) Gather data to compute costs, benefits and break-even payoff levels for personnel management programs; (4) Examine the effect of cost-benefit information on personnel management decisions; (5) Integrate utility analysis models with decision theory; and (6) Apply the findings to develop improved decision support systems.

Existing literature at the commencement of this research project focused primarily on very simple mathematical models to express the utility of human resource management decisions. Our

initial proposal was based on the premise that the models that people use were convertible to simple mathematical form. Results from the first stage of the research revealed the need to adopt a broader definition of "utility", that encompassed not only the perspective of the organization, but the perspectives of employees, applicants and other stakeholders. Moreover, this perspective was not adequately represented in the simple mathematical models in existence at the time. Thus, planned activities designed to apply the mathematical models, compute break-even levels of the parameters, and evaluate the reliability and accuracy of utility parameters (encompassed in Task #3 and #4 above) was reduced in favor of investigations that better captured the richness and complexity of the utility concept. This report will therefore emphasize results from Tasks #1, #2, #5 and #6, though some activity relevant to Tasks #3 and #4 will also be described.

This report will summarize the articles, chapters, and other reports supported by this research contract. It will organize the results of these reports according to the objectives noted above, highlighting how each publication supported those objectives. Specific scientific findings and relevant literature can be found in the publications themselves, listed in Appendix

A: List of Contract-Related Publications and Papers. Readers interested in specific studies or findings are referred to the attached papers. This report is intended as an overview and summary for use by the Office of Basic Research and others interested in the activities and outcomes of this research contract. We conducted qualitative research to describe managerial decision processes in areas such as human resource planning, recruitment, communication, and rewards. The research described in this report thus involves not only application of traditional utility analysis models, and observation of managerial reactions to such models, but also research that helps us better understand the broad domain of personnel management decisions and its effects on multiple stakeholders. It's key accomplishments include expanding the domain of utility-analysis research, identifying factors affecting the decision processes of managers, employees and job applicants related to human resource management programs, and integrating utility analysis with other related research domains.

Cost-Benefit Analysis Defined

The first task of this research project was to integrate existing definitions of utility analysis within a broader decision-making framework. Boudreau (1991d, p. 622) defined

utility analysis as "the process that describes, predicts and/or explains what determines the usefulness or desirability of decision options and examines how that information affects decisions". He proposed that utility analysis models in industrial psychology should be considered special cases of a broader class of "multi-attribute utility" (MAU) models. This perspective suggests that the components of the traditional utility analysis models are composed of three general attributes: Quantity, Quality and Cost. It also shows that utility analysis models may be applied to virtually any human resource program, but the form of the model differs depending on whether the application involves programs aimed at changing the flow of individuals through the work force (such as recruitment, selection, promotions, downsizing, or dismissal) versus changing the characteristics of individuals in their current positions in the work force (such as training, compensation, and communication).

Boudreau (1988, 1989, 1991d) also suggested that traditional utility analysis models were likely to be deficient because they focused only on productivity improvements from human resource programs, as judged by the managers who decide to pay for or implement the programs. Research on multi-attribute utility

models applied to other research domains (such as locating medical facilities, or nuclear power plants) has shown that a wide variety of non-productivity-related factors may affect important decisions. Applying this perspective to utility analysis suggested that the traditional utility model's managerial perspective on productivity probably omitted potentially important perspectives (such as those of employees or applicants), and potentially important decision attributes (such as fairness, "fit" with organizational strategy, and administrative or regulatory mandates).

Our research took this broader perspective in addressing the objectives noted above. This required that we depart from an approach that would simply apply utility analysis models to organizations, and calculate utility values. Instead, we sought to focus on examining the decision processes used by managers and others in organizations as they identify human resource programs, choose among them, and respond to them.

Task #1:

Identifying Decision Situations

Appropriate for Utility Analysis

Under what conditions are utility analysis models likely to be applicable, and what is the nature of the utility models that

will apply in different situations? Published reports of utility analysis applications tend to fall primarily in the areas of employee selection and training (Boudreau, 1991d). Boudreau suggested that opportunities existed to study such models in other areas. Our experience working with corporations to develop utility analysis research also suggests that such models are most readily accepted when managers' performance evaluations and rewards are linked to the ability to show tangible results. Boudreau (1988, 1989, 1990) presented specific simulation examples of selection and training utility analyses based on actual information from companies. Yet many companies resisted our efforts to carry out actual utility analysis applications. Though little data exists on this issue, it appears that organizations were more reluctant to use utility analysis when they feared the results might reflect badly on the organization, when they believed it would reduce their ability to acquire necessary resources, or when they believed that they would be held accountable for achieving the dollar-valued results predicted from the utility analysis models. Some of our research attempted to develop frameworks to explain how personnel management programs are evaluated and the conditions under which utility models with various attributes will be appropriate.

Dyer & Holder (1988) showed how decisions about human resource programs and activities reside within the process of "human resource strategic planning". They suggested that planning itself is a human resource activity, and that it's prevalence is determined in part by perceptions among managers about its likely value in achieving organizational objectives. They also establish a broad framework of goals for human resource management programs, including employee Contribution, Composition, Competence, and Commitment, hypothesizing that these goals are accomplished by an integrated combination of Staffing, Development, Rewards, Work Systems, Supervision and Performance Management, Employee Relations, Labor Relations and Government Relations. This suggests that utility analysis models should attend to how human resource programs are combined, not just their individual payoff. Dyer and Holder suggested that the pattern of these combinations might be categorized into three strategic "types": Inducement, Investment and Involvement, whose value depends not only on the payoffs from individual programs, but on the "fit" between the strategy and the organization or environment in which it occurs. This notion of program integration was also developed by Boudreau, and partially implemented in computer-based simulation models designed to

reflect the effects of recruitment, selection and employee turnover within a single framework (Boudreau, 1991b, 1991c).

Dyer, Bamberger & Bacharach (1990) suggested several non-productivity-related factors that characterize the perceived value and time devoted to human resource planning in high-technology entrepreneurial startup organizations in Israel. They concluded that these smaller firms devote less activity to planning than more-frequently studied large firms, that succession planning for managerial promotions was positively related to firm size and age, that turnover among R&D professionals was associated with perceived needs for more time on succession planning and linking human resource plans to the business, and that faster-than-anticipated growth was associated with increased perceived needs to spend more effort on human resource planning. Such managerial attitudes were more closely related to perceived needs for planning than exogenous variables such as firm size, age, number of employees, and revenue. If managerial attitudes about human resource planning behave similarly to utility analysis, then we might suspect that organizations experiencing higher turnover and growth levels will be more amenable to utility analysis applications.

Rynes (1991) developed an integrated model for research on

employee recruitment, noting that recruitment affects outcomes both before and after the hiring decision. This demonstrates that the utility concept applied to recruitment must encompass a broader set of variables than simple employee productivity, and illustrates the value of considering not only managerial perceptions of the value of human resource activities, but the reactions of applicants and employees to those practices as well. Rynes showed that a full understanding of such program effects requires research from several perspectives. Research assessing these broader recruitment outcomes (Rynes & Barber, 1990; Rynes, Bretz & Gerhart, 1991; Rynes & Gerhart, 1990) will be discussed in more detail below. In a somewhat similar vein, Marron & Dyer (1991) suggest that a cost-benefit model for programs designed to provide due process for employee grievances must incorporate the concept of "justice". Rynes, Weber and Milkovich (1989) and Weber and Rynes (1991) suggested that decisions about compensation programs hinge not only on simple projections about productivity-related effects, but on information about the labor market, the organization's goals, and even the gender composition of jobs. Thus, utility analysis applied to compensation appears most feasible when the model can incorporate variables reflecting the administrative, labor market, and strategic factors

influencing decisions among alternatives.

In summary, our research seems to suggest that traditional utility models may not be readily accepted by managers when they are deficient in key aspects of the decision process. Moreover, these aspects may not directly affect the "rational" outcomes of productivity directly, but may be related to more intangible factors like justice, equity, strategic direction, and administrative emphasis. Also, it seems likely that utility analysis applications will be better received when they acknowledge the ability to integrate human resource programs, rather than focusing on one program at a time.

Task #2:

Individual and Organizational Characteristics

Influencing Human Resource Decisions

Several research studies supported by this contract examined the variables affecting managers' decisions to undertake various human resource management programs, and employees' reactions or responses to human resource management programs.

In the area of organizational pay and reward programs, Rynes, Weber, and Milkovich (1989) studied managerial decisions regarding the level of pay to assign to jobs. They specifically varied the gender composition, market pay level, and job

evaluation points assigned to a set of job descriptions, as well as examining whether the gender of the job rater affected these decisions. Their results suggest that neither the gender of the rater nor gender dominance of the job had a significant effect on set pay levels. Market rates and job evaluation points did have significant effects. This suggests that internally-assigned job evaluation points are only one factor affecting job pay, and that existing market wages or current pay levels have a strong impact. It also suggests that pay-setting decisions may be less influenced by the gender makeup of the job than previously believed. Weber and Rynes (1991) observed that different firms seem to set pay at different levels even for similar jobs in similar labor markets. They sought to explain this phenomenon by examining the effects of current job pay rates, market rates, job evaluation points, the organization's policy regarding whether it generally pays more or less than the market, and the organization's relative emphasis on internal versus external equity. Their study controlled for organizational demographic variables such as size and industry. Results suggested that managers set pay based on current pay levels, market pay levels, and job evaluation points, and that the pay-setting strategy of the organization affected these decisions. Moreover, market pay

information appeared to play a more important role than internal job evaluations. These studies combined to suggest that managerial pay-setting policies may be more "objectively-oriented" than previously believed, but also suggest that using more "subjective" information (such as job evaluation points) as a means of correcting possible market pay inequities may not influence actual pay levels as much as some might believe.

In the area of staffing, Olian and Rynes (1991) examined the employment practices of plan, branch or local service operation managers, to determine the extent of their activity in attracting, developing or retaining non-exempt employees. In view of widespread statements in the press and elsewhere that labor shortages are likely in the future, this research found that managers were engaged in surprisingly few activities to attract and retain their employees. Their primary strategy seemed to be to invest in managerial and supervisory training, rather than nonexempt employee training.

With regard to recruitment, Rynes and Barber (1990) and Rynes (1991, in press) provided frameworks that suggest a number of organizational factors likely to affect choices of recruitment programs and their effectiveness. Rynes & Barber (1990) suggested that recruitment research could be enhanced by an

organization-focused, rather than applicant-focused approach, and developed a model suggesting strategies for applicant attraction, factors affecting organizational choices of those strategies, and links between recruitment strategies and other organizational outcomes. Rynes (1991, in press) summarized existing literature on both the applicant and organizational perspectives on the recruitment process, suggesting specific choices organizations can make to create "ideal" recruitment processes from an applicant's point of view, as well as the deviations between pursuit of this "ideal" and organizational reality. This demonstrated that, contrary to previous research, the utility model for recruitment must encompass not only factors related to recruitment success as defined by the organization (such as yields or costs) but also factors defined by the applicants themselves to distinguish good from poor recruitment practices. Considering the applicant as a "customer" for recruitment extends the domain of recruitment utility, and suggests new individual and organizational factors affecting choices of recruitment activities.

A second research stream related to recruitment focused on the concept of the "fit" between applicants and organizations, as perceived by both the organization and the applicant. Rynes &

Gerhart (1990) examined the concept of "fit" as perceived by applicants who are considering alternative jobs, and by recruiters considering alternative applicants. While previous research had attempted to examine the effects of job and applicant characteristics, and some models reflecting the costs and benefits of recruitment choices and activities had emerged, this stream of research sought to determine how specific individual and organizational characteristics combine to form the impression that a job "fits" the individual or that the individual "fits" the organization. Results from interviewer's assessments, suggested that assessments of general employability differed from assessments of firm-specific employability. Interviewers do use a firm-specific component when evaluating job applicants, and the "utility" of job applicants (beyond general employability) depends on interpersonal skills, goal orientation, and physical attractiveness, with objective qualifications such as GPA and years of experience less important. Rynes, Bretz and Gerhart (1990) noted that existing research often suggested that applicant job choices are relatively unaffected by recruitment practices. If this was true, the benefits of investments in different recruitment alternatives would be less likely to produce benefits for organizations. The authors adopted a new

research method involving multi-stage interviews with job seekers to develop "critical incidents". Job seekers explained, in their own words, how they made critical decisions throughout the recruitment process. The results suggested that applicants' decisions to pursue and accept job offers were significantly affected by recruitment practices, and suggested areas in which organizational investments in recruiters and recruitment procedures are most likely to make a difference in applicant decisions, and thus to create improved returns.

Rudin and Boudreau (1989, 1991) also examined managers' decisions about staffing, but focused on whether managers behaved differently when asked to rate an entire set of internal job candidates than when they were asked simply to pick the best candidate from the group. Actual managers were presented with hypothetical job candidates varying on two different attributes. Results suggested that managers' ultimate preferences for the best candidates were not affected by the task. However, managers doing the rating task gathered much more information about the non-preferred candidates. This suggests that the rating task may cause managers to engage in more information gathering in areas that may not be relevant when the ultimate goal is to choose one candidate from the group, rather than to rate candidates'

relative value. Also, it appeared that for the job of accounting supervisor, interpersonal skills were weighted more heavily than computer competence. Finally, Boudreau (1991a) found that the level of experience among decision makers had a significant effect on their propensity to choose a risky option with a chance for a high payoff over a more certain but lower payoff. Students differed significantly from experienced human resource managers in a simulated decision regarding work force reduction.

Broderick and Boudreau (1990, in press) examined the individual and organizational characteristics related to managerial decisions to invest in automated human resource information systems (HRIS). Their interviews with the executives in charge of HRIS in ten leading U.S. companies suggested that the value of decision information provides a valuable framework for understanding the patterns of such investments. They identified three profiles of information-system investments, defined by four system-development dimensions (database coverage, data availability, sophistication of decision support, and cross-unit integration) and four organization development dimensions (link to the organization's information systems, investment in influencing expectations of users, investments in improving knowledge of users, and linkage to the organization's existing

information-system technology). The results suggested that more centralized and comprehensive information systems evolve when the benefits of decisions about human resources are primarily derived through a centralized set of key decision makers, while more decentralized and targeted information systems evolve when the key strategic decisions are in the hands of many individual profit-center or unit-level managers.

With regard to employee benefits, Barringer and Milkovich (1990) examined the relationship between employee characteristics and choices of different health-care plans. Their results suggest that such choices can be better predicted using models that incorporate individual characteristics, and that the price (premium) of benefits alternatives may differ in importance depending on individual and plan characteristics. We will continue to pursue this question after termination of the contract. We have gathered survey data on over 2,000 managerial employees of a large service organization. The survey focuses on flexible employee benefits, and measures employees' knowledge, attitudes, and comparison standards regarding their benefits. Data-gathering activities were supported by this contract, though the data were still being analyzed at the time of this report, so no paper is available on this research at this time. It is hoped

that this research will help managers better understand how different aspects of benefit systems affect employee benefit attitudes, knowledge and choices, and thus shed light on the likely payoff from investments in benefit programs and communication. It may also reveal how individual differences affect the effectiveness of benefit programs.

Task #3:

Computing Actual Cost-Benefit and Break-Even Levels

Research results from the first two tasks, and our own efforts to secure cooperation from organizations, suggested that managers were not receptive to studies that simply applied simple utility models, calculated utility values, and computed break-even values. They repeatedly noted that the decision models they actually used were more complex, and they preferred to become involved in studies that would help to explore the domain of these models, rather than estimate traditional utility model parameters. Thus, our efforts were directed toward these domain-defining studies, as described in the other sections of this report.

However, several reports from the project (Boudreau, 1990, 1991b, 1991c, 1991d) provide frameworks for conducting break-

even analysis. These reports also show how the traditional models focusing on only one human resource activity (such as selection) can be expanded to encompass integration between different activities, and how break-even analysis simplifies the decision task and mathematical demands. Boudreau (1991b, 1991c) provides an example of using personal computer analysis to implement calculations of utility that integrate selection, recruitment and separations among employees. Finally, Boudreau and Berman (1992) reported on a specific application of utility analysis to an investment in a profit-sharing program. The calculations, break-even values and managerial reactions to the information were reported. This provides a model for applying utility analysis to decisions about compensation, a human resource activity that has long remained ignored by utility analysis researchers (Boudreau, 1991d).

Task #4:

Evaluating The Effects of Cost-Benefit Information

On Management Decisions

Do managers really respond to cost-benefit information? How do differences in the information provided to managers and employees about the outcomes of human resource programs affect their perceptions and decisions? We had originally hoped to

address this issue by calculating utility values according to the simple models in existence at the outset of the study, and then systematically feeding this information back to managers. With the realization that the existing models were often too simplistic to generate subjects' commitment to the study, we curtailed much of this activity in favor of focusing on developing the broad utility concept as noted above.

Nonetheless, several studies completed under this contract explored the differences in managerial decisions associated with the information that is provided. Rudin & Boudreau (1989) examined the information-gathering and decision-making behavior of actual managers faced with a hypothetical internal staffing decision. The results suggested that managers will respond very differently depending on the type of selection task they are given, and the outcomes they are asked to achieve. Managers asked simply to choose the best candidate tended to spend less time gathering information about clearly less-qualified candidates, compared to those asked to rate all candidates for their desirability on the job. Evidence in other decision areas had suggested that managers will reverse their preferences for alternatives depending on whether they are asked to make judgments or to make choices among alternatives. However, Rudin

& Boudreau (1992) noted that there was no such effect when managers were presented with information about the technical and interpersonal qualifications job candidates. Therefore, the processes that managers use to accomplish the task seemed to depend on the task, while the outcomes were relatively stable. It appears that information about the costs and benefits of acquiring different candidates does affect decisions, but that the approach managers take may differ with their selection task.

Boudreau (1991a) explored whether the way cost-benefit information is "framed" would induce different behaviors in decision makers, depending on their decision-making experience. Previous research has provided individuals with choices between risky alternatives (with the potential for either a high payoff or a large loss) and certain alternatives (with a guaranteed outcome equal to the expected value of the risky alternative). The two alternatives are presented either in terms of the gain (e.g., lives saved) or loss (e.g., lives lost) associated with both alternatives. Previous research has shown that when a choice with the same objective outcome is described in terms of losses, individuals are more likely to choose the risky alternative, rather than accept what appears to be a more certain loss. When the alternatives are described in terms of the gains,

individuals are more likely to choose the certain alternative to "lock-in" what appears to be a certain gain. Boudreau (1991a) presented both students and experienced managers with a framing task with a decision affecting a reduction in the workforce. The "frame" was manipulated by describing the outcomes either in terms of the number of jobs lost (negatively framed) or the number of jobs saved (positive frame). Results suggested that the framing manipulation did significantly affect the choices of students, but it did not significantly affect the choices of managers. The difference in response patterns between students and managers was significant. This suggests that naive decision makers may be sensitive to the manner in which cost-benefit information is presented even when the objective outcomes are the same. Moreover, it suggests that individual characteristics such as experience may be important in predicting and explaining the effects of cost-benefit information.

Task #5:

Integrating Utility Analysis

With Decision Theory

Boudreau (1991d) provided a framework for linking utility analysis models from industrial-organizational psychology with the principles of decision theory. Decision theory focuses on

predicting, explaining and improving decisions, and utility estimation has long been a part of decision theory research. Yet, little research had examined the relationships between decisions about human resource activities typically addressed by utility analysis models from industrial-organizational psychology and principles derived from more traditional decision-theoretic utility analysis research. Boudreau (1991d) suggested that industrial psychology utility models could be considered a subset of more general multi-attribute-utility (MAU) models that had been applied to a diverse set of decisions. This observation led to the conclusion that existing utility models might be deficient by not including the perspectives of decision makers other than organizational managers, and that even from the perspective of managers there were many attributes not reflected in the models. This conclusion was supported through our experience with managers who called for studies to expand the domain of utility analysis attributes, as well as through the empirical research demonstrating the value of observing the effects of human resource management decisions not only on the perceptions of managers, but of applicants and employees as well. Rynes (1991) also demonstrated the value of decision theory in guiding research on recruitment decisions by employers and applicants,

and Dyer and Holder (1988) applied decision-theoretic principles to suggest a framework of human resource planning activity.

Several studies directly applied findings from decision theory to the question of manager's use of cost-benefit information in human resource decisions. Boudreau (1991a) used the concept of "framing" to determine whether the method in which the costs and benefits of alternatives are presented affects decisions. The findings suggest that the effects of framing decisions as gains or losses may indeed affect human resource management decisions, but may be moderated by individual differences such as experience. In most previous research on decisions other than human resource management decisions, the framing effect has been consistent and significant. Though Boudreau's (1991a) findings must be regarded as exploratory at this time, if replicated they would suggest that framing effects are more complex phenomena than previously observed.

Rudin and Boudreau (1989, 1992) also directly applied research designs and concepts from decision theory to determine their value in describing managerial reactions to the costs and benefits of human resource management decisions. As discussed above, these data were collected in a study of actual managers' use of information about hypothetical job candidates for an

internal staffing decision. Their results suggested that managers will use information differently depending on whether they are asked to make judgments (ratings) of all candidates, or whether they are asked to make a summary choice of the best candidate for the job. While previous research in decision theory had successfully caused subjects to reverse their preferences for certain alternatives depending on whether they were asked to make judgments or choices, the results from Rudin and Boudreau (1992) suggest that the danger of such preference reversals in human resource management decisions may be low.

Decision-theory methods were applied to decisions about how pay levels are established for jobs by Rynes, Weber and Milkovich (1989) and Weber and Rynes (1991). Policy-capturing methods were used, in which compensation managers were presented with descriptions of jobs and asked to assign pay levels to them. The pay-level assignments were then analyzed to determine which differences between jobs had the largest effects. Results from the Rynes, Weber and Milkovich (1989) study suggest that in deciding how to invest salary dollars in different jobs, managers were significantly influenced by "objective" factors such as the going pay for jobs and the number of points assigned to jobs by the internal evaluation system. However, they were not

significantly influenced by the percentage of female employees in a given job. Results from the Weber and Rynes (1991) study suggested that investments of pay across different jobs are also affected by whether the managers believe the organization's pay strategy involves leading or lagging the pay levels in the labor market. Moreover, the organization's pay strategy was found to affect the relative importance assigned to market pay information versus internal evaluations of the importance of jobs.

Virtually all of the research reports resulting from this project in some way draw decision theory and utility analysis together. Taken together, the research demonstrates the value of extending the utility analysis models to better reflect the decision-theoretic idea of multi-attribute utility, with the attributes defined by multiple stakeholders, and across multiple outcomes. By focusing not only on managers, but also on employees and job applicants, the research established several new dimensions to be considered as future research on utility models develops. Moreover, decision-theory principles provided the basis for research that shows how individual differences and decision biases may affect how utility analysis information is used in actual organizations.

Task #6:

Applying Research Findings

To Develop Improved Decision Support Systems

Though the project was conceived as basic research, we have tried throughout the research program to consider how our results were likely to affect actual managerial decisions. Virtually every research report contains suggestions for improving human resource decisions either by improving the methods used to assess and evaluate human resource programs, or by better identifying relevant factors to be considered in making human resource decisions. Those interested in learning more about the managerial implications of the research should consult particular research reports on topics of interest.

Many of these implications have already been discussed, but it is useful to briefly review specific examples, including: (1) Extending the domain of utility analysis by incorporating a multi-attribute-utility concept when designing and considering the costs and benefits of human resource programs (Boudreau, 1988, 1989, 1991d); (2) Considering the integration of different human resource programs into distinct strategies, and the effect of these strategies on the relative value of specific programs (Bamberger, et al., 1990; Dyer & Holder, 1988; Rynes & Barber

(1990); (3) Extending the domain of recruitment decision making to include organizational perspectives and the concept of "fit" as perceived by applicants and organization members (Rynes, in press, 1991; Rynes, et al., 1991; Rynes & Gerhart, 1990); (4) Demonstrating how managerial decisions regarding pay systems incorporate objective and subjective factors (Rynes, et al., 1989; Weber & Rynes, 1991); (5) Determining how patterns of employee choice can help managers to better plan investments in employee benefit systems such as health care (Barringer & Milkovich, 1990); and (6) Developing a framework of dimensions that relate to successful investments in human resource information technology, to enable managers to consider the sorts of investments that best fit their organizational conditions (Broderick & Boudreau, 1990, in press).

Several reports completed under this project were directly designed to provide tools that managers might use to enhance their decision-making ability. Hannon, Milkovich & Sturman (1990) discuss how managers can build expert systems that support human resource management decisions. They also provide a demonstration showing how one such tool was developed to assist employees in choosing among health-care options in an employee benefits system. Boudreau (1988, 1991d) discussed how the use of

break-even analysis can simplify the task of calculating and analyzing cost-benefit information, even for strategies that involve combinations of programs affecting the flow of employees through the work force. Boudreau (1990) provided a step-by-step guide and case-study illustration of these methods, using decisions typical of those faced by managers. Boudreau (1991b, 1991c) developed a menu-driven spreadsheet tool that can be used by managers to simulate the costs and benefits of programs designed to reflect changes in recruitment, selection and employee separations. The spreadsheet program (Boudreau, 1991b) presents the information in accessible form, so that users can set the utility parameters to reflect their own organizational conditions, and then alter different managerial decision parameters to determine the effects on investment values for human resource programs. The case study using this computer program (Boudreau, 1991c) shows how these concepts can be presented to encourage managerial curiosity and learning.

Conclusion

At the outset of this contract, research on utility analysis in industrial-organizational psychology was dominated by applications of relatively simple mathematical models to hypothetical or actual decisions about employee selection and

training programs. This research program was designed to learn more about the actual decision models used by managers and planners, to provide frameworks to guide future research toward findings likely to enhance our ability to predict, explain and improve such decisions, and to suggest directions for future research into decision tools for managers that could better encompass the actual factors used in human resource management decisions.

The research summarized here suggests that the actual models used by managers include such factors as organizational strategic intent, the reactions and opinions of employees and job applicants, the stated policies of organizations, and common decision behaviors and biases described by decision theory. The research also demonstrates that the utility concept must be broadly defined to encompass these factors, because simple correlation-based mathematical models may be severely deficient in many realistic situations. Conceiving of utility as a multi-attribute concept that is judged by multiple stakeholders seems to provide a valuable framework for expanding the domain and relevance of research in this area.

Moreover, the research program has endeavored to apply utility analysis models to new areas of human resource

management, including planning, recruitment, compensation, and employee benefits. Clearly, the broad utility concept can be applied in these areas, and provides a valuable framework for discovering the behaviors and outcomes leading to such decisions. Future research can build upon these findings by further developing the decision domain, and by using the methods developed here to discover additional human resource decision areas in which these principles apply.

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Appendix

List of Contract-Related Reports

1. Bamberger, P., Dyer, L. Bacharach, S. B. (1990). Human Resource Planning in High Technology Entrepreneurial Startups. Human Resource Planning, 13 (1) 37-44.
2. Barringer, M. & Milkovich G. T. (1990). Predicting Employee Health Care Decisions in a Flexible Benefits Environment. A Preliminary Report. Ithaca, New York: Center for Advanced Human Resources Working Paper #90-23.
3. Boudreau, J. W. (1991a). Effect of Framing on Layoff Decisions: Are More Experienced Managers More Rational? Does Computerized Data Make Any Difference? Ithaca, New York: Center for Advanced Human Resource Studies Working Paper #91-15.
4. Boudreau, J. W. (1991b). EXTMOV: A Computer Spreadsheet Program for Analyzing Staffing Costs and Benefits. Ithaca, New York: Center for Advanced Human Resource Studies Working Paper #91-13.
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6. Boudreau, J. W. (1991d). Utility analysis for decisions in human resource management. In M. D. Dunnette & L. M. Hough (Eds.) *Handbook of Industrial and Organizational Psychology*, (2nd ed.), Vol. 2. Palo Alto: Consulting Psychologists Press, pp. 621-745.
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16. Oljan, J. D. & Rynes, S. L. (1991). Addressing Nonexempt Employment Needs: The Operating Unit Role. Ithaca, New York: Report to the Center for Advanced Human Resource Studies.
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