EXTMOV: A Computer Spreadsheet Program For Analyzing Staffing Costs and Benefits

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Abstract

[Excerpt] EXTMOV is a LOTUS 1-2-3 spreadsheet program specially designed to assist those managing their human resources. The program allows you to construct a simulation of your workforce that can depict the dollar-valued implications of various selection, recruitment and turnover management strategies. The relationships in the computer program are based on the external employee movement utility model described in Boudreau and Berger's Monograph, "Decision- Theoretic Utility Analysis Applied to Employee Separations and Acquisitions" (Boudreau & Berger, 1985). A case study illustrating how this program can be used to suppon managerial decisions about investments in recruitment, selection and turnover management is contained in another Center working paper #91-12 (Boudreau, 1991).

Keywords

CAHRS, ILR, center, human resource, job, worker, advanced, labor market, job, satisfaction, employee, work, manage, management, training, HRM, employ, model, industrial relations, computer, spreadsheet program, employee, model, recruitment

Comments

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For Analyzing Staffing Costs and Benefits

by

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Working Paper 91-13

Introduction

EXTMOV is a LOTUS 1-2-3 spreadsheet program specially designed to assist those managing their human resources. The program allows you to construct a simulation of your workforce that can depict the dollar-valued implications of various selection, recruitment and turnover management strategies. The relationships in the computer program are based on the external employee movement utility model described in Boudreau and Berger's Monograph, "Decision-Theoretic Utility Analysis Applied to Employee Separations and Acquisitions" (Boudreau & Berger, 1985). A case study illustrating how this program can be used to support managerial decisions about investments in recruitment, selection and turnover management is contained in another Center working paper #91-12 (Boudreau, 1991).

This spreadsheet program is the same one used in that Monograph to conduct the sensitivity analysis reported. In this computer program, you can alter not only the parameters varied in the Monograph (i.e., the separation pattern and the validity), but many other utility parameters as well. In addition, you can "customize" the program so that it reflects the characteristics of the particular workforce you wish to model. To ease data entry, some of the utility parameters have been programmed in already. A complete list of fixed parameters and parameters you can alter is provided below.

You need not have any previous familiarity with LOTUS 1-2-3 to use this computer program. All of the date entry and computational commands have been conveniently programmed into menus. All you do is point to the function you wish to use, enter the parameter you wish to investigate, and the spreadsheet does the calculations and presents you with the results. Thus, you can quickly and easily conduct "what if..." analyses that show the utility implications of possible decisions, given your assumptions about the characteristics of those decisions.

Of course, utility analysis is only one input to human resource decisions. Other non-quantifiable factors may be important to particular decisions. Also, utility analysis makes certain statistical and mathematical assumptions. If these are violated, the results may not precisely represent what you can expect in reality. Thus, this computer program is designed to provide a quicker and easier method of computing the utility implications of staffing decisions, as one input to improved human resource management decision making.

The Underlying Movement Pattern Assumed in the Simulation

The diagram shown in Figure 1 (on the next page) depicts the decision situation modelled by this simulation program. Each box describes a component of the utility model for separations and acquisitions. Figure 1 presents two periods of employee acquisitions and separations, with the workforce utility at the end of the first period (Box C) serving as the starting point for the next period (Box E), as indicated by the lines connecting the two boxes. Box A represents

the workforce utility at the beginning of the analysis (i.e., in the period prior to implementing programs to change the quantity or quality of employee movement). In each time period, two processes may occur to change the utility of the workforce. First, employees may be added. The utility of acquisitions in the first time period (t = 1) is represented by Box B. The utility of the acquisitions becomes part of the utility of the workforce following acquisitions, as indicated by the arrow form Box B to Box C, and by the description within Box C. Second, some quantity of employees may separate. In the first period, this is shown in Box D. These separations will affect the quantity and/pr quality of those retained from the beginning work force. This effect is indicated by the arrow between Boxes A and C and by the description within Box C. In the second period (shown in Boxes E through H), the same processed occur, except that the beginning workforce utility is taken from the workforce at the end of the first time period and the quantity, quality and cost of acquisitions and retentions may differ from the first period. FInally, as indicated at the bottom of the Figure, the process is assumed to continue for the duration of the analysis (time periods 3 through F).

Figure 1
Diagram of the Employee Movement Utility Concept
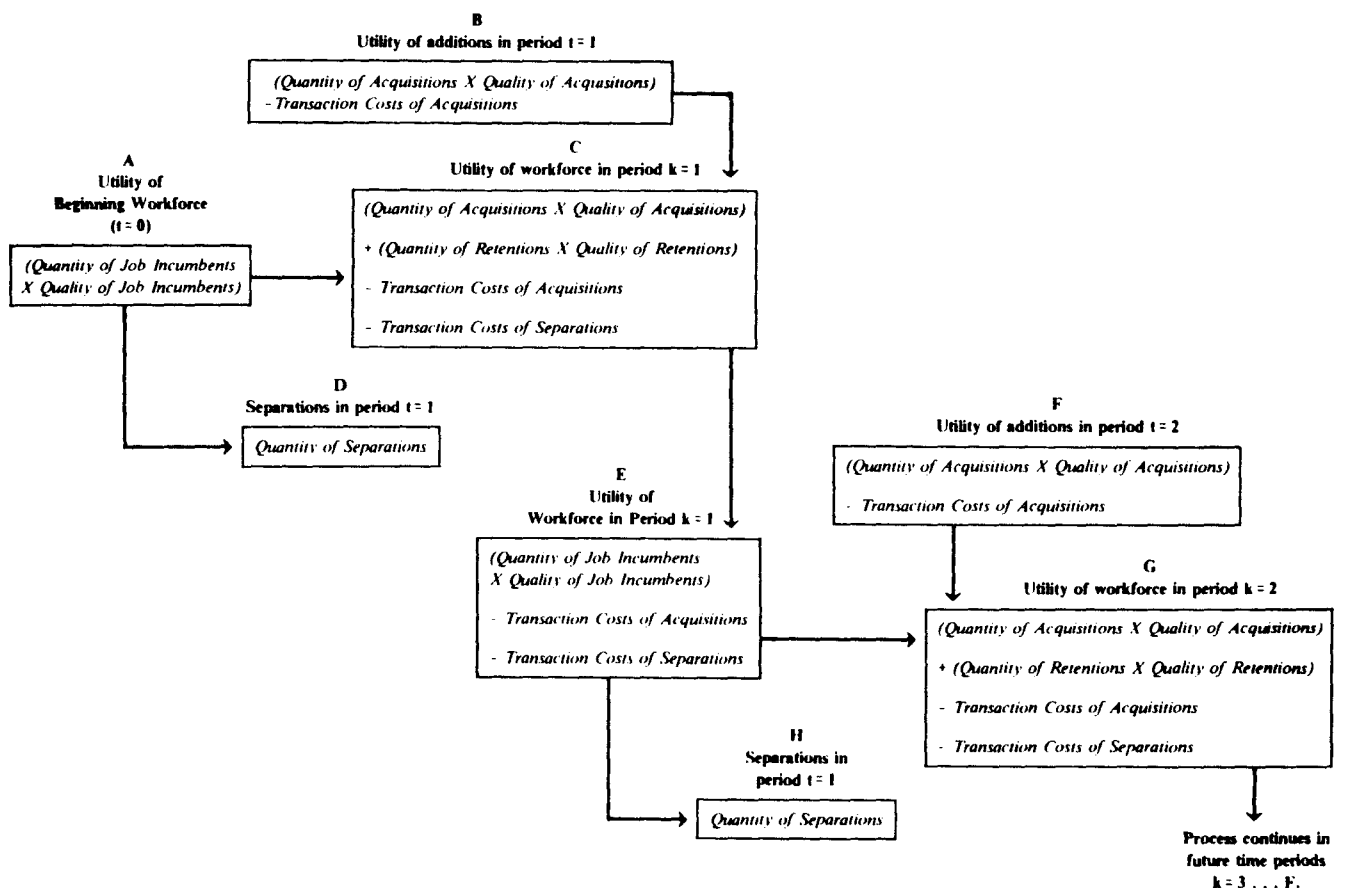
The utility values reported by this program reflect the sum of the total workforce values (i.e., value produced less costs) over each of 10 future periods. The simulation assumes that the staffing and retention management programs specified are carried out in each of the future 10 years. The program effects cumulate in the workforce as new employees are added and previous employees are retained. The workforce value in each period is multiplied by the appropriate discount factor to reflect the fact that benefits received in the future are less valuable because the money from such benefits could be invested to earn a return (the discount rate).

Final utility values are reported based on after-tax, discounted utility values, reflecting both increases in the value of goods and services produced by the workforce (i.e., "service value") as well as increases in costs to maintain and support that workforce (i.e., "service costs").

Parameters of the Program that are Fixed

Using LOTUS 1-2-3, it is possible to alter any and all of the model's parameters to reflect a particular decision situation. However, the program is constructed so the users can alter only a subset of important utility parameters. This reduces the complexity of the user's task, while still allowing a large variety of simulated alternatives to be depicted by the model. This means that certain model parameters are fixed by the program and not available for alteration by the user. These parameters and their fixed values are listed below.

1. The analysis period is fixed at 10 years.
2. The discount rate is fixed at 10%.
3. The proportion of variable costs is fixed at 5%, and rises with increased value.
4. The tax rate is fixed at 45%.
5. All vacancies are assumed to be filled.
6. All separations and acquisitions are assumed to occur at the beginning of each time period.

It is assumed that all vacancies will be filled through acquisitions, thus keeping the size of the workforce constant.

Parameters of the Program Reflecting Initial Workforce Characteristics

The first set of parameters that can be altered by the user are the "Initial" workforce parameters. These are: (1) the average level of "service value" produced per-year by each employee in the workforce; (2) the average level of "service costs" produced per-year by each employee in the workforce; (3) and the quantity of employees in the workforce. These parameters are set by the user to reflect his/her particular decision situation. They can be altered in those situations where the user wants to explore implications of changing them.

Parameters of the Program Reflecting Selection Parameters

The second set of parameters that can be altered by the user are the "Selection" parameters. These are: (1) the per-applicant cost of the systematic selection program; (2) the per-hire cost of accommodating an acquisition, excluding any additional costs of systematic selection; (3) the validity coefficient f(or correlation coefficient) between scores on the systematic selection device and dollar-valued job performance; (4) the dollar-valued standard deviation of job performance among the applicant population; (5) the selection ratio; and (6) the average standardized test score (i.e., Zx) of the selected group (note that this is a function of the selection ratio). These parameters can be altered by the user to reflect differences in selection program alternative costs and outcomes. They correspond to the parameters of the traditional one-period or one-cohort utility analysis models.

Parameters of the Program Reflecting Retention Parameters

The third set of parameters that can be altered by the user are the "Retention" parameters. In this program, we focus on the quality and quantity of employees retained when separations take place. Thus, the effects of separations are reflected by the characteristics of those retained after the separations take place. The retention parameters the user can alter are: (1) the per-incumbent cost of systematic retention (i.e., the cost per job incumbent of a program designed to change the quantity or quality of retentions); (2) the per-separation cost of accommodating a separation, excluding the cost of a program to systematically alter the retention quantity or quality: (3) the average, per-employee, per-year difference in dollar-valued performance between the group of retained employees and the pre-separation group of job incumbents (the more positive this value, the more the organization retains its best performers, and vice versa); and (4) the turnover rate (ratio of separations to previous job incumbents) per year, which in turn determines the number of separations and retentions per year.

These parameters reflect the quantity and quality of retentions in each period. They can be altered to examine the costs and benefits of different retention programs that occur in combination with different selection programs.

How the EXTMOV Program Looks and Works

The best way to learn the concepts in this section is to execute them while actually using the EXTMOV program. If you don't have access to the program, you can gain an adequate understanding of the concepts, but if possible you should try to work through the example by actually executing the commands described here and viewing the results.

Starting LOTUS 1-2-3 and Accessing the EXTMOV Program

Follow the instructions for starting DOS and Lotus 1-2-3 on your computer. Once you have reached the 1-2-3 spreadsheet screen, place the disk enclosed with this paper into your floppy disk drive (A or B). Retrieve the EXTMOV spreadsheet by typing /FRd:extmov (where d is the letter of your floppy disk drive), and press the Enter key.

The next thing you will see is the customized menu. The highlighted choice will be INITIAL, followed by the words SELECTN, RETENTN, COMPUTE, VIEW, TBL_CLR, PRINT, AND EXIT. The word MENU should appear in the upper right-hand corner of the screen, depending on the version of Lotus 1-2-3 you are using.

The First Program Screen and "Main Menu"

The computer screen now resembles the illustration shown on the next page. This screen consists of three main parts that you need to keep in mind.

First, the top three lines (above the blue border with letters in it) are the "control panel." This area shows you the choices you have available and can briefly describe what they do. By moving the blue box (called a "cursor") over each word in the control panel, you can see a brief description of what that word stands for on the line below it. For example, if the blue box is over the word INITIAL, the line above the blue border says "Alter the value of the INITIAL workforce parameters" as shown below. This means that if you "choose" that option by pressing the enter key, you will be able to alter the initial workforce parameters. You choose an option by positioning the cursor over the word and pressing the enter key. In LOTUS 1-2-3, the set of choices is called a "Menu" so we will refer to this area of the screen as the Menu from now on.

Illustration of the First Screen with the Cursor Over the INITIAL Choice

```
AR1:
INITIAL  SELECTN  RETENTN  COMPUTE  VIEW  TBL_CLR  PRINT  EXIT
Alter the value of the INITIAL workforce parameters
          AR       AS       AT      AU       AV      AW       AX
1                 COPYRIGHT 1991 BY JOHN W. BOUDREAU
2
3
4
5
6     --------------------------------------------------------
7
8     Current Yearly Values of INITIAL Workforce Parameters
9
10                                          per
11                                       employee    yearly
12                                       affected     total
13
14    number of beginning job incumbents     ---      1,565
15    service value among job incumbents   $32,550   $50.94 million
16    service cost among job incumbents    $24,350   $38.11 million
17    net benefits (value minus cost)       $8,200   $12.83 million
18
19
20
16-Apr-91  08:00 AM                           CMD
```

To get a brief summary of the choices available to you, move the cursor over each word in this first Menu. You will see that the choices are as follows:

INITIAL: Alter the value of the INITIAL workforce parameters
SELECTN: Alter the value of SELECTION utility parameters
RETENTN: Alter the value of the RETENTION utility parameters
COMPUTE: Write the results into a table and return to the main menu
VIEW: View results table showing results of changes
TBL_CLR: CLear results from sensitivity table
PRINT: Print table of results
EXIT: Leave spreadsheet program, finished

Each of these choices will be discussed in the example that follows. For now, it is important that you understand how to move the cursor, and that you feel comfortable with the concept of "choosing" from among the menu options. When you make a choice, you will often move to a new menu screen, with a different set of choices.

The second important part of the screen is in the upper right-hand corner. This blue box now contains the word MENU or CMD MENU (this may appear in the lower part of the screen as well). When these words appear in it, that means it is waiting for you to make a choice form the displayed menu. When the program is computing results, this box will flash and turn red, and have the work WAIT displayed in it. If something happens that it doesn't recognize, it may display the work ERROR, and the computer will beep. When this happens, try pressing the Esc key (located in the upper left part of the keyboard, next to the number one). Sometimes this will return you to the   MENU words and you can go on. Sometimes pressing the Esc key will cause the blue box to display the word READY. If this happens, you are out of the menu system. To get back into the menu system when the blue box displays the word READY, simply hold down the ALT key (lower left of the keyboard and press the "m" key.

The third important part of the screen is the values display. This is the area located in the middle of the screen inside the blue border. When the main menu is displayed, this part of the screen displays the values of the initial workforce parameters, as shown on the previous page. When you change to new menu screens, different value displays may appear.

The Initial Workforce Values Menu Screen

Now that you understand the main menu, let's see what happens if we choose an option. Place the cursor over the word INITIAL in the menu and press the Enter key. This tells the program that you are choosing to alter the initial workforce parameters. You will see the menu part of the screen change, displaying a new set of choices:

QUANTITY: Alter the beginning quantity of employees in the job
VALUE: Alter the beginning average level of service value per employee per
           year
SVCCOST: Alter the beginning average level of service cost per employee per
           year
COMPUTE: Write the results of changes into a table and return to the main
           menu
RETURN: Return to the main menu

The screen should look like the one shown on the next page. By moving the cursor over the different menu options, you can get a brief description of what they do. The first three options are used to alter one of the three initial workforce parameters shown in the values display (i.e., the quantity, average service value, or average service cost of the initial workforce). The COMPUTE choice computes the results (this will be discussed in a moment), and the RETURN choice sends you back to the main menu.

Illustration of the Initial Workforce Values Menu Screen

```
AR1:
QUANTITY  VALUE  SVCCOST  COMPUTE  RETURN
Alter the beginning quantity of employees in the job
         AR        AS       AT       AU       AV       AW        AX
1               COPYRIGHT 1991 BY JOHN W. BOUDREAU
2
3
4
5
6    ---------------------------------------------------------
7
8    Current Yearly Values of INITIAL Workforce Parameters
9
10                                          per
11                                       employee     yearly
12                                       affected      total
13
14   number of beginning job incumbents     ---        1,565
15   service value among job incumbents   $32,550   $50.94 million
16   service cost among job incumbents    $24,350   $38.11 million
17   net benefits (value minus cost)       $8,200   $12.83 million
18
19
20
16-Apr-91   08:00 AM                                CMD
```

Try "choosing" the return option by placing the cursor over the word RETURN and pressing the Enter Key. See the menu line change back to the main menu of choices? Now choose the INITIAL option from the main menu, to return to the menu of choices for the initial workforce parameters, and the screen should return to look like the one shown above. In order to change parameters form any of the three different categories of utility parameters (i.e., INITIAL, SELECTION or RETENTION), you go from the main menu to the menu for that category, make your changes, return to the main menu and then move to the next category of interest.

Selection Utility Parameter Menu Screen

Return to the main menu screen by choosing RETURN from the Initial Values menu screen. Your screen should now have the options INITIAL, SELECTN, RETENTN, COMPUTE, VIEW, TBL_CLR, PRINT and EXIT displayed.

We have seen the menu screen for the Initial workforce parameters, now let's see the menu screen for the selection utility parameters. To do this, simply

choose the SELECTN choice form the main menu. The screen changes to look like the screen displayed below. (If this did not happen, simply choose RETURN to go back to the main menu and then choose SELECTN).

Illustration of the selection Utility Parameter Menu Screen

```
AJ1:                                                                    MENU
SELCOSTS  MOVECOST  VALIDITY  APP_SDsv  SEL_RATIO  Zx  COMPUTE  RETURN
Incremental costs of systematic selection
           AJ       AK       AL       AM       AN       AO       AP       AQ
 1                        COPYRIGHT 1991 BY JOHN BOUDREAU
 2
 3
 4   program, finished
 5
 6           ------------------------------------------------------
 7           Current Yearly Value of SELECTION Utility Parameters:
 8
 9                                                  Per
10                                                Person     Yearly
11                                               Affected    Total
12
13           Costs of Systematic Selection:         $0     $0.000 Million
14           Cost of regular acquisition:       $3,250     $1.017 million
15           Correlation Coefficient:              --           0
16           SDsv among future applicants:      $5,550     $5,550
17           Selection Ratio                       --          0.5
18           Avg. standard test score (Zx):        --          0.8
19
20
```

As you can see, the menu for selection parameters allow the following options:

SELCOSTS:	Incremental costs of systematic selection
MOVECOST:	Costs of acquisition, excluding incremental costs
VALIDITY:	The correlation between the predictor and SV in the applicant population
APP_SDsv:	Standard deviation of SDsv in the applicant population
SEL_RATIO:	Ratio of number selected to number of applicants
Zx:	Average standard test score of selectees
COMPUTE:	Compute results of changes into a table and return to main menu
RETURN:	Return to the main menu

The first six of these options allow you to change one of the six utility parameters shown in the value display. The other two options let you compute the results of your changes or return to the main menu. Note that the first two values in the display refer to program costs. These values are displayed on a per-person basis (i.e., the selection program costs are per-selectee, and the regular acquisition cost are per-hire), as well as in total (depending on the number of hires and applicants).

The Retention Utility Parameter Menu Screen

Choose RETURN form the Selection utility parameter menu to return to the main menu. Now, choose RETENTN from the main menu, to move to the Retention Utility Parameter Menu Screen. Your screen should look this the screen shown below.

Illustration of the Retention Utility Parameter Menu Screen

```
AY1:
SEPCOST  MOVECOST  PERFDIFF  TURNOVER  COMPUTE  RETURN
Per-employee cost of program tO alter the retention pattern
        AY        AZ        BA        BB        BC        BD        BE        BF
1                          COPYRIGHT 1991 BY JOHN BOUDREAU
2
3
4
5
6          ---------------------------------------------------------
7          Current Yearly Values of RETENTION Utility Parameters:
8
9                                                    per
10                                              employee      yearly
11                                              affected       total
12
13         Costs of systematic retention              $0    $0.000 million
14         Regular separation costs:              $3,000    $0.939 million
15         Diff btwn stayers and prior wkfrce:  ($1,000)  ($1.252)million
16         turnover rate and no. of separations     20%        313 sepratns
17
18
19
20
16-Apr-91  08:01 AM                                CMD
```

As you can see, the retention menu offers the following options:

SEPCOST: Per-employee cost of program to alter the retention pattern
MOVECOST: Per-separation cost, excluding cost of retention management
                programs
PERFDIFF: Average per-year service value difference between stayers and
                the pre-separation workforce.
TURNOVER: Turnover level in the workforce
COMPUTE: Write results of changes into a table and return to the main
                menu
RETURN: Return to the main menu

The SEPCOST option allows you to alter the per-employee cost of a retention management program. It is assumed that this cost applies to all pre-separation job incumbents, so the per-employee cost is multiplied by the number of job incumbents to get the yearly total shown in the values display. The MOVECOST option allows you to alter the regular costs of processing and accommodating a separation (i.e., exit interviews, severance pay, etc.). These costs are presumed to apply to each separation, so the per-separation cost is multiplied by the number of separations to get the yearly total shown in the values display. The PERFDIFF option allows you to alter the implications of the retention pattern. Specifically, this options lets you input a value representing the average per-employee, per-year difference in dollar-valued performance between those who stay and the pre-separation workforce. If this value is zero, it means that separation are random, and the average workforce value is the same before and after separations. Larger positive values indicate retention of more valued employees. The TURNOVER option allows you to alter the turnover rate, which is multiplied by the initial number of job incumbents to determine the number of separations and acquisitions. The COMPUTE and RETURN options work the same way as they did in previous screens.

An Example Illustrating How to Use the EXTMOV Program

In this example, you will work through an entire sequence of commands and conduct a complete "what if ..." analysis on a hypothetical workforce. The workforce is assumed to have the characteristics indicated in the INitial values display of the main menu. That is, we assume the workforce has 1,565 employees, producing an average yearly service value of $32,550 and requiring an average service cost of $24,350 to support that performance level. We are interested in examining various staffing policies applied to this workforce, se we will not alter these initial parameters in this example analysis.

Viewing the Results Table to Determine Program Effects

First, we may wish to determine the effect of the initial parameter estimates, over the 10-year period of analysis, in terms of discounted costs and benefits. The program has already computed the initial effects and inserted them

into the results table. To see this table, go to the main menu and choose the VIEW option. You will then see a screen similar to the one shown below.

Illustration of the Results Table
Showing the effects of Initial Parameter Settings

```
C84: [W35]
RETURN
Return to the main menu
```

			C	D	E	F	G
83			Results of Different Utility Parameter Combinations				
84				Trial 1	Trial 2	Trial 3	Trial 4
85	I	Size of the initial workforce		1,565	0	0	0
86	I	Initial avg. Service Value		$32,550	$0	$0	$0
87	I	Initial avg. Service Cost		$24,350	$0	$0	$0
88	S	Regular Acq. cost/yr. (Million)		$1.017	$0.000	$0.000	$0.000
89	S	Selection pgm. cost/yr. (Million)		$0.000	$0.000	$0.000	$0.000
90	S	Validity of selection program		0	0	0	0
91	S	Selection Ratio		50%	0%	0%	0%
92	R	Regular Sep. cost/yr. (Million)		$0.939	$0.000	$0.000	$0.000
93	R	Retention pgm. cost/yr. (Million)		$0.000	$0.000	$0.000	$0.000
94	R	Avg perf. diff (Stayers-Previous)		($1,000)	$0	$0	$0
95	R	Turnover Rate/year		20%	0%	0%	0%
96	U	Utility if no turnover occurs		$43.37	$0.00	$0.00	$0.00
97	U	Effect of random acquisitions		$37.21	$0.00	$0.00	$0.00
98	U	Effect of systematic selection		$0.00	$0.00	$0.00	$0.00
99	U	Effect of random separations		($37.22)	$0.00	$0.00	$0.00
100	U	Effect of systematic separations		($18.99)	$0.00	$0.00	$0.00
101	U	Total Utility for 10 years		$24.36	$0.00	$0.00	$0.00
102	B	Total prgm. budget/yr. (Million)		$1.956	$0.000	$0.000	$0.000

```
16-Apr-91  08:15 AM                          CMD
```

Notice that the menu above this table has only one option, RETURN. Thus, you use the VIEW choice to see the table, and the RETURN choice to go back to the main menu. The results table summarizes the parameter settings used to compute utility values, and presents the utility values that result. In consists of four columns, one for each of four "Trials". Thus, you can make four utility computations and see the results in this table (in a moment you will learn how to clear the table so you can do more calculations). The first column (Trial 1) shows the results of the current parameter settings. The first three rows (beginning with the letter I) indicate the current values for the initial parameters. The next four rows (beginning with the letter S) indicate the values for the selection utility parameters. NOte that the regular acquisition costs and the selection program costs are expressed as yearly totals, on a pre-tax, un-discounted basis. The next four rows show the retention parameters. Again notice that the costs are expressed on a per-year, pre-tax, un-discounted basis.

The six rows beginning with the letter U show the utility effects of employee movement. These rows are designed to show the separate effects of random acquisitions, systematic acquisitions, random separations, and systematic separations, as well as the total after-tax, discounted utility over the 10 years of the programs. The total utility shown in the second-from-bottom row is simply the sum of the other rows. All utility values are expressed in millions of dollars.

The table shows that for this workforce, if we could reduce turnover to zero (at no cost), the 10-year utility would be $43.37. However, turnover does occur. The effect of random acquisitions (i.e., the additional workforce value that would be added if no separations occurred and we simply added 313 random acquisitions per year) is $37.21. This reflects the assumed average value of an applicant (assumed to be equal to the initial workforce values) less the costs of regular acquisition. Because there is no systematic selections program, no systematic selection costs are incurred, and no benefits form systematic selection accrue, producing a zero value for systematic selection. Because separations occur, the value of the workforce is reduced. The row labelled "Effect of random separations" reflects the loss of services from losing average performers (offset by the reduced service costs incurred to maintain their services) plus the costs of regular separations. Notice that because we have assumed an equal number of random acquisitions and random separations, the effects roughly cancel each other out. The next row shows the effects of systematic retention. Recall from the Retention Utility Parameter value display that we assumed we were losing our best performers, so that the average value of those retained was $1,000 less than the average value of the pre-separation workforce. The negative value of $18.19 million shown in this row shows the added effect on the workforce of this pattern of retentions. Finally, the row labelled "Total Utility for 10 years is the sum of the previous five rows, and shows the discounted, after-tax utility produced by the workforce for the 10-year period. As shown, the 10-year value is $24.36 million.

Finally, the bottom row in the table shows the current level of yearly staffing budget implied by these assumptions. It is the sum of the first two rows beginning with an S, and the first two rows beginning with an R. This bottom row is handy for keeping track of how much your policy decisions are costing the organization.

Making Changes in the Staffing Utility Parameters

Let's assume you wanted to see if you could do better (i.e., produce a greater workforce value) by improved staffing management. Specifically, let's assume you could reduce the turnover rat by 2% per year by introducing a program costing $200 per employee per year.

Return to the main menu by pressing the Enter key. Now, you must choose to alter the retention parameters, so choose the RETENTN option for the main manu. Now you are in the Retention Utility Parameter Manu Screen. We

want to alter tow of the parameters: The cost of the program to alter the
retention pattern (SEPCOST) and the turnover level (TURNOVER). Choose
SEPCOST from the menu NOtice how the cursor is now positioned over the
per-employee cost. Also, the Control panel now carries the message, "Enter the
cost per job incumbent:". To enter the cost of 200, simply type 200 and press
the Enter key. (NOTE: when entering numbers in this program, do not enter
dollar signs or other punctuation. Only decimal points are sometimes required.)
Notice how the values in the top row change to $200 and $0.313 million. Also,
the control panel now contains the Retention Utility Parameter menu and the
upper right-hand corner displays CMD MENU. Now change the turnover rate
assumption. Choose TURNOVER, and the control panel displays the message,
"Enter the turnover rate (e.g., 5 = 5.00%). The cursor has moved down to the
turnover value in the table. To enter the new turnover rate of 18%, type in 10
and press the Enter key. The program now calculates the new number of
separations (i.e., 281), and recalculates the regular separation costs and acquisition
costs to reflect it. During calculations, the upper right corner displays the WAIT
message in a flashing red box. When calculations are finished, the Retention
Utility Parameter Menu Screen should look like the screen shown below.

Illustration of the Retention Utility Parameter Menu Screen After Changes

```
BD16:  (P0)  @ROUND($E$33/$D$34,2)
SEPCOST  MOVECOST  PERFDIFF  TURNOVER  COMPUTE  RETURN
Per-employee cost of program tO alter the retention pattern
        AY         AZ         BA         BB         BC         BD          BE          BF
 1                        COPYRIGHT 1991 BY JOHN BOUDREAU
 2
 3
 4
 5
 6              ---------------------------------------------------------
 7          Current Yearly Values of RETENTION Utility Parameters:
 8
 9                                                   per
10                                                employee    yearly
11                                                affected     total
12
13          Costs of systematic retention           $200     $0.313 million
14          Regular separation costs:             $3,000     $0.843 million
15          Diff btwn stayers and prior wkfrce:  ($1,000)    ($1.284)million
16          turnover rate and no. of separations      18%        281 sepratns
17
18
19
20
16-Apr-91   08:02 AM                              CMD
```

Now that you have made your changes, you will want to see what effect they have on the utility values. To tell the program you are finished making changes and have it compute new values and enter them into the results table, choose COMPUTE from the menu. The results table will be displayed and the upper right corner will display the WAIT message. After a few moments, the second column of the table will fill with values and the cursor will move down that column. When it reaches the bottom, the WAIT message will stop, the RETURN choice will appear in the control panel, and the upper right corner will display CMD MENU. Thus, the results table should look like the table displayed below.

Illustration of the Results Table After Changes

```
C84:  [W35]
RETURN
Return to the main menu
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		C	D	E	F	G
83		Results of Different Utility Parameter Combinations				
84			Trial 1	Trial 2	Trial 3	Trial 4
85	I	Size of the initial workforce	1,565	1,565	0	0
86	I	Initial avg. Service Value	$32,550	$32,550	$0	$0
87	I	Initial avg. Service Cost	$24,350	$24,350	$0	$0
88	S	Regular Acq. cost/yr. (Million)	$1.017	$0.913	$0.000	$0.000
89	S	Selection pgm. cost/yr. (Million)	$0.000	$0.000	$0.000	$0.000
90	S	Validity of selection program	0	0	0	0
91	S	Selection Ratio	50%	50%	0%	0%
92	R	Regular Sep. cost/yr. (Million)	$0.939	$0.843	$0.000	$0.000
93	R	Retention pgm. cost/yr. (Million)	$0.000	$0.313	$0.000	$0.000
94	R	Avg perf. diff (Stayers-Previous)	($1,000)	($1,000)	$0	$0
95	R	Turnover Rate/year	20%	18%	0%	0%
96	U	Utility if no turnover occurs	$43.37	$43.37	$0.00	$0.00
97	U	Effect of random acquisitions	$37.21	$33.40	$0.00	$0.00
98	U	Effect of systematic selection	$0.00	$0.00	$0.00	$0.00
99	U	Effect of random separations	($37.22)	($33.03)	$0.00	$0.00
100	U	Effect of systematic separations	($18.99)	($20.64)	$0.00	$0.00
101	U	Total Utility for 10 years	$24.36	$23.10	$0.00	$0.00
102	B	Total prgm. budget/yr. (Million)	$1.956	$2.069	$0.000	$0.000

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Let's see what happened. The first three parameter values are unchanged because we didn't alter the initial workforce parameters. Regular acquisition costs are now lower (i.e., $0.913 million) because we have fewer separations and thus fewer new hires. The next three selection values remain the same because we didn't alter the selection program. Regular separation costs also go down because we have fewer separations to accommodate. The retention program costs rose, to reflect out turnover reduction program, but the average performance difference remains unchanged. The turnover rate reflects our change from 20% to 18%.

Was this a useful decision? Look at the bottom two rows. In the bottom row, we see that this decision raised our total yearly budget by about $.09 million, to $2.069 million. In the next-to-bottom row, we see that the effects of this turnover reduction program actually decreased our 10-year discounted after-tax workforce value by about $1.26 million, to $23.10 million. Why did this happen? Looking down the utility rows, we see that the utility if no turnover occurs is still $43.37 (only a change in initial workforce parameters can alter this value). Our program reduced the positive effects of random acquisitions (because we acquire fewer people, the value of those added is less), but it also reduced the offsetting effects of random separations. However, the effect of systematic separations is more negative (it is now $20.64 million) because of the extra costs incurred to reduce the turnover rate. The combined effect of all this is to reduce overall utility by about $1.26 million. From a utility perspective, this was not a wise decision.

Making Changes in the Retention Utility Parameters

Let's try again. This time, let's assume that we felt the problem with turnover reduction was that we didn't have a program of acquiring good employees in the first place. So, we wish to see what would happen if we implemented a selection program costing $300 per applicant that would produce a validity of .15. To evaluate the changes of adding this program to the existing retention program, we must leave the retention parameters unchanged and change the selection parameters.

Return to the main menu by choosing RETURN. Now choose SELECTN to alter the selection utility parameters. Change the costs of systematic selection by choosing SELCOSTS for the menu, typing 300 and pressing the Enter key. Notice the changes in the first-row values when the computations are finished. Next, change the correlation coefficient by choosing VALIDITY from the main menu, typing .15, and pressing the Enter key. Again, notice that the value in the display changes. Finally, to compute the new values and enter them in you results table, choose COMPUTE from the menu. The results table will now be displayed, and when the computations are finished the new values will appear in the third column. The table should look like the one shown on the next page.

Illustration of Utility Results After Selection Program Changes

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C84: [W35]
RETURN
Return to the main menu
```

		C	D	E	F	G
83		Results of Different Utility Parameter Combinations				
84			Trial 1	Trial 2	Trial 3	Trial 4
85	I	Size of the initial workforce	1,565	1,565	1,565	0
86	I	Initial avg. Service Value	$32,550	$32,550	$32,550	$0
87	I	Initial avg. Service Cost	$24,350	$24,350	$24,350	$0
88	S	Regular Acq. cost/yr. (Million)	$1.017	$0.913	$0.913	$0.000
89	S	Selection pgm. cost/yr. (Million)	$0.000	$0.000	$0.169	$0.000
90	S	Validity of selection program	0	0	0.15	0
91	S	Selection Ratio	50%	50%	50%	0%
92	R	Regular Sep. cost/yr. (Million)	$0.939	$0.843	$0.843	$0.000
93	R	Retention pgm. cost/yr. (Million)	$0.000	$0.313	$0.313	$0.000
94	R	Avg perf. diff (Stayers-Previous)	($1,000)	($1,000)	($1,000)	$0
95	R	Turnover Rate/year	20%	18%	18%	0%
96	U	Utility if no turnover occurs	$43.37	$43.37	$43.37	$0.00
97	U	Effect of random acquisitions	$37.21	$33.40	$33.40	$0.00
98	U	Effect of systematic selection	$0.00	$0.00	$2.21	$0.00
99	U	Effect of random separations	($37.22)	($33.03)	($34.03)	$0.00
100	U	Effect of systematic separations	($18.99)	($20.64)	($20.64)	$0.00
101	U	Total Utility for 10 years	$24.36	$23.10	$24.31	$0.00
102	B	Total prgm. budget/yr. (Million)	$1.956	$2.069	$2.238	$0.000

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Notice that the selection program cost per year is now higher (i.e., it is now $0.169 million) due to the systematic selection program, and the validity is also now equal to .15. Because our selection ratio and turnover rate and pattern were not altered, the values in the next seven rows are the same as in Trial 2. The effect of systematic selection is now highly positive (i.e., it is $2.21 million), reflecting that the increased value of higher-quality selectees is greater than the costs of the selection program. The negative effect of random separations is higher (i.e., it has risen for $33.03 million in Trial 2 to $34.03 million now) because when you acquire or retain higher-quality employees, the workforce becomes more valuable and even random losses remove higher-valued employees. The effects of systematic separations remains unchanged because we did not alter the retention parameters.

Did we do better? Well, the total utility value for this trial is higher than in Trial 2, but it is still not quite as high as in the original situation. We are spending $0.282 million per year more than Trial 1, and achieving slightly less total workforce utility.

Making Changes in the Selection Ratio

Let's give it one more try. Suppose we combined our reduced turnover rate and improved selection program with a program to become more choosy about who we hire. Specifically, right now we are hiring about 50% of those applicants we consider. What if we expanded our applicant pool so that we hired only 40% of those we consider? This would mean greater applicant processing, but it might also lead to greater workforce value because we would get more of the "cream of the crop". Let's assume that we could reduce our selection ratio to 40%.

To change the assumed selection ration to 40%, you must return to the main menu by choosing RETURN. Then, choose the selection menu by choosing SELECTN. Once you are in the Selection Utility Parameter Menu Screen, choose SEL_RATIO. The cursor moves down to the selection ratio position, and you are asked to enter a number between 0 and 1.0. Type .40 to reflect the new selection ratio and press the Enter key. Notice that the value for the selection ratio will change and so will the value for the costs of systematic selection (i.e., it changes to $0.2111 million). Now, you know that the value for Z_x and the selection ratio are related. Therefore, you know that lowering the selection ratio implies a higher standard test score for those hired because you are being more choosy. If you go to the Cascio book (Cascio, 1991, pp. 301-313) you find that the Z_x level corresponding to a selection ratio of .40 is about .96. Enter this value for Z_x by choosing Z_x from the menu and typing in .96.

Now that you have added the change in the selection ratio to the existing assumptions, you are ready to compute the new values. To do this, choose COMPUTE from the menu. You will see a new table of results with the fourth column reflecting the new parameter assumptions. The new results table should look like the one on the next page.

Illustration of Results Table After Selection Ratio Change

```
C84: [W35]
RETURN
Return to the main menu
```

		C	D	E	F	G
83		Results of Different Utility Parameter Combinations				
84			Trial 1	Trial 2	Trial 3	Trial 4
85	I	Size of the initial workforce	1,565	1,565	1,565	1,565
86	I	Initial avg. Service Value	$32,550	$32,550	$32,550	$32,550
87	I	Initial avg. Service Cost	$24,350	$24,350	$24,350	$24,350
88	S	Regular Acq. cost/yr. (Million)	$1.017	$0.913	$0.913	$0.913
89	S	Selection pgm. cost/yr. (Million)	$0.000	$0.000	$0.169	$0.211
90	S	Validity of selection program	0	0	0.15	0.15
91	S	Selection Ratio	50%	50%	50%	40%
92	R	Regular Sep. cost/yr. (Million)	$0.939	$0.843	$0.843	$0.843
93	R	Retention pgm. cost/yr. (Million)	$0.000	$0.313	$0.313	$0.313
94	R	Avg perf. diff (Stayers-Previous)	($1,000)	($1,000)	($1,000)	($1,000)
95	R	Turnover Rate/year	20%	18%	18%	18%
96	U	Utility if no turnover occurs	$43.37	$43.37	$43.37	$43.37
97	U	Effect of random acquisitions	$37.21	$33.40	$33.40	$33.40
98	U	Effect of systematic selection	$0.00	$0.00	$2.21	$2.62
99	U	Effect of random separations	($37.22)	($33.03)	($34.03)	($34.24)
100	U	Effect of systematic separations	($18.99)	($20.64)	($20.64)	($20.64)
101	U	Total Utility for 10 years	$24.36	$23.10	$24.31	$24.52
102	B	Total prgm. budget/yr. (Million)	$1.956	$2.069	$2.238	$2.280

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In Trial 4, the selection program cost per year is higher because we must give the test to more applicants to lower the selection ratio, as shown in the fifth row. The seventh row shows the lower selection ratio. The next six values are unchanged. However, we can see that this increases choosiness has raised the value of systematic selection from $2.21 million to $2.62 million. Because the workforce is more valuable, the effects of random separations also rises somewhat. The added effect of systematic separations remains unchanged, so the total 10-year utility value is now $24.52. This is the highest total utility value yet. Compared to the original value of $24.36, it appears that we have finally hit upon a combination of options that increases workforce value over the original situation. We also see in the bottom row that we are spending $2.28 million per year to do this.

Printing and Clearing the Results Table

Suppose we wished to make additional assumptions to determine if we could improve on this situation, The results table in now full, so there is no room to write additional results. If we tried to do another computation, we

would get a message instructing us to "return to the main menu to clear or print the results table." Let's find out how we would do this.

The results we have so far are pretty interesting. It would be good to have a printout of them to refer to later. Printing the results table is as simple as choosing a menu option. First, make sure you are working at a computer that is next to a printer in room 111. If you are not, then you cannot do the printing portion of this case. Make sure the printer is turned on and that the Online and Power lights are lit. If not, turn on the printer by moving the switch at the back right to the forward position. The power and Online buttons should light up.

Return to the main menu and choose the PRINT option. The printer will now begin printing your table of results. WHen it has finished printing, you can remove the printout record of your results.

Now that you have printed your results, you are ready to clear the results table so that it is ready to accept new values reflecting new assumptions. To do this, choose TBL_CLR from the main menu. You will see the results table, and watch the program clear out the old values and enter zeros into the columns. You may now do for more trials before printing and/or clearing the table. Make as many analyses as you wish and print out whatever results you find interesting.

Exiting the Program When Finished

When you decide you have finished with this program, choose EXIT from the main menu. This will clear the screen and return you to the Lotus 1-2-3 Access System.

References

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Boudreau, J. W. & Berger, C. J. (1985) Decision-theoretic utility analysis applied to employee separations and acquisitions. *Journal of Applied Psychology* [Monograph], *70*, 581-612.

Cascio, W. F. (1991). *Costing human resources: The financial impact of behavior in organizations*. Boston: PWS-Kent.