Brogden-Cronbach-Glaser (BCG) Model

The purpose of this "white paper" is to provide a quick overview of the most comprehensive and flexible method of modeling the effect of ANY organizational intervention on the dollar value added to the organization. Importantly, this demonstration describes how Russell, Colella, and Bobko (1993) extended this model to incorporate organizations' strategic considerations when applied to a personnel selection "intervention."

The model was originally developed on the basis of the following equation:

$$y = \boldsymbol{b} \cdot Z_x + \boldsymbol{m}_y + e$$

where . . .

- ♦ y = job performance measured in dollars
- ♦ $\boldsymbol{b}$ = the linear regression weight on the predictor for forecasting job performance
- ♦ Z_x = performance on the predictor in standard score form in the applicant group
- ♦ $\boldsymbol{m}_y$ = mean job performance in dollars of randomly selected employees
- ♦ e = error of prediction

Then:

$$E(y) = E(\boldsymbol{b} \cdot Z_{x/s}) + E(\boldsymbol{m}) + E(e)$$

or

$$\overline{y} = \boldsymbol{b} \cdot \overline{Z}_{x/s} + \boldsymbol{m}_y$$

. . . where $\overline{Z}_{x/s}$ equals the average performance on the predictor of just those applicants who were selected. Given that $\boldsymbol{b} = r_{xy}(SD_y/SD_x)$, and $SD_x = 1$ because the predictor was standardized,

$$\overline{y}_s = r_{xy} \cdot SD_y \cdot \overline{Z}_{x/s} + \boldsymbol{m}_y$$

$$\overline{y}_s - \boldsymbol{m}_y = r_{xy} \cdot SD_y \cdot \overline{Z}_{x/s}$$

or

$$\Delta U = r_{xy} \cdot SD_y \cdot \overline{Z}_{x/s}$$

This is the marginal utility of a selection system. One small modification yields the total utility gained, or:

$$\Delta U_{total} = N_s \cdot r_{xy} \cdot SD_y \cdot \overline{Z}_{x/s} - N_a c$$

where:

- **N_s = number selected;**
- **N_a = number of applicants; and**
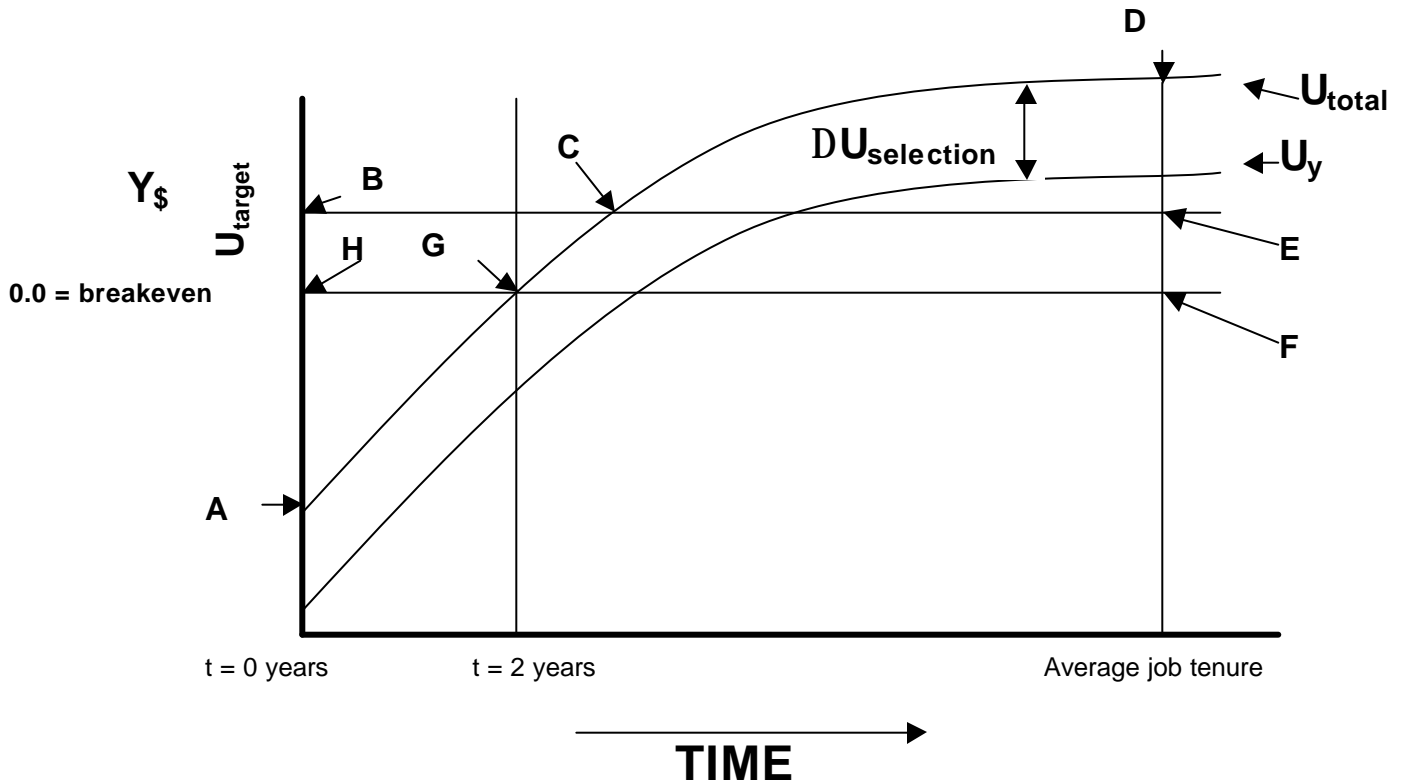- **C = cost of testing**

Strategic Utility

   The figure below graphically portrays both *total* utility (U_{total}) and *incremental* utility ($\mathbb{D}U_{selection}$) over time. Assume for a moment that this portrays the expected trend in profitability for a fast food franchise when the franchisee has and has not been selected via some new selection system. $\mathbb{D}U_{selection}$ will always be positive and equal to the difference between the two curved lines (U_y and U_{total}) at any point in time. Traditional "tactical" applications of the Brogdon-Cronbach-Glaser model by human resource executives would suggest the selection system demonstrates a net gain in expected dollar utility[1] and should be implemented.

   Importantly, a "strategic" view of utility suggests the franchiser should not consider selling franchises unless U_{total} is expected to reach some breakeven and/or target level within some specified time period. Note that multiple circumstances besides the selection system might impact U_{total}. For example, targeted recruiting efforts that increase applicant quality should increase U_y and U_{total}.[2] Alternatively, decreasing franchise cost or fees would permit franchisees to retain a larger pool of initial working capital, hence extending the amount of time they can survive between start-up and the breakeven or target profit levels.

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[1] See Boudreau (1990, *Handbook of I/O Psychology*) for a description of various modifications of the BCG model to incorporate factors such as depreciation, taxes, etc.

[2] Note that if some performance ceiling exists, increasing applicant quality has the effect of reducing performance variance (SD_y) *and* r_{xy} (due to range restriction in y).

Y$ U_target

0.0 = breakeven

D

U_total

$\mathbf{DU}_{selection}$

U_y

B

C

E

H G

F

A

t = 0 years   t = 2 years   Average job tenure

TIME

U_{target} = the level of utility (value) dictated by the firm's strategic goals
G = "break even" point, where cost of labor = total utility derived
C = point at which total utility derived from labor = strategic target
If area AHG < area GDF, then positive economic return is realized
If area CDE £ area ABC, then strategic goal is met or exceeded

Figure taken from:

Russell, C.J., Colella, A., & Bobko, P. (1993). Expanding the context of utility: The strategic impact of personnel selection. *Personnel Psychology, 46*, 781-801.