A Note on Maximizing Faculty Evaluations

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We model a problem of maximizing faculty evaluations using a Linear Programming approach. This example has been used effectively while teaching LP to our business school students since its problem structure fits in very well as an LP problem. Students enjoy it because it brings a certain connection with the faculty while discussing our performance evaluation. The traditional (Evening) MBA students appreciate it more because they are already aware of employee evaluations at their workplaces.

Our annual salary increase is based on three components: Teaching-T, Research-R, and Service–S. For several years, the weights T = 60%, R = 20%, and S = 20% had been used. Our faculty asked for flexibility in these weights. For example, faculty with good publications in a certain year may wish to be evaluated with a greater weight for research than for service. *We are now allowed to choose our own weights as long as the following criteria are met*: 50 ≤ T ≤ 60; 10 ≤ R ≤ 30; 10 ≤ S ≤ 30; T+R+S = 100 and T, R, S must be multiples of 5. The Dean uses a scale of 0 – 3 to grade us on each of the components (G_T, G_R, G_S). Thus, a faculty with G_T = 2.5, G_R = 2.5, and G_S = 2 will have an overall score of (2.5)(.6)+(2.5)(.2)+(2)(.2) = *2.4* using the old weights for T, R, S. We present the LP model for the above problem as follows:

Maximize $Z = T{*}G_T + R{*}G_R + S{*}G_S$
subject to (the following constraints):
$50 \leq T \leq 60$
$10 \leq R \leq 30$
$10 \leq S \leq 30$
$T + R + S = 100$
T, R, S ≥ 0 (non-negativity constraints)

We make two assumptions in this model: (a) *the guidelines for the annual faculty evaluations are structured in some sense.* For example, a faculty who chairs a service committee will get a specific number of points or a faculty who has one or more refereed journal articles will get 3 points for research; and (b) *the human (Dean) error in evaluations is negligible.* For example, a faculty whose student evaluations are in the top quartile for two consecutive years will get 3 points for each of these years.

For this model, the grades G_T, G_R, G_S must be estimated by faculty to solve for the decision variables *T, S, R.* For example, if a faculty member's estimates of the Dean's grades are G_T = 3, G_R = 2, G_S = 1.5, the weights T = 60%, R = 25%, S = 15% seem reasonable. However, the LP model suggests weights of T = 60%, R = 30%, S = 10% since it results in an optimum Z value of 255 implying a higher overall evaluation (2.55 out of 3).

Once modeled on a spreadsheet to be solved using the Simplex method, it is easy to try different estimates for G_T, G_R, G_S and select the optimum set of weights. The key is to come up with good estimates. The problem reduces to an art if the Dean's evaluation process is not consistent or if the set of evaluation guidelines are not structured. We do realize that it is not possible to accurately quantify each activity. However, we believe that this problem of choosing weights is decision making under risk (probability) rather than decision making under uncertainty.

Note: *Despite trying various estimates of G_T, G_R, G_S on an Excel spreadsheet, the LP solution never recommended weights that are not multiples of 5. In any case, we could add such constraints when we discuss Integer Programming problems.*