Goal Programming Application to Assignment Problem in Marketing

Anal J. Mehta, Ph.D. and Ahmed K. Rifai, Ph.D.
Purdue University and Northern Illinois University

The assignment technique of linear programming is an effective method for many administrative problems in manufacturing, new product decision, marketing research, sales effort allocation, and many other areas. Major contributions to the assignment problems have been made by P. S. Dwyer, M. M. Flood, D. F. Votaw and A. Arden, and H. W. Kuhn. The general method for the assignment problem is explained in detail in (2, 379–387).

The primary deficiency of the assignment technique or any other linear programming models is its inability to deal with multiple conflicting objectives. However, this problem is recently tackled by a newer extension of linear programming termed goal programming. Goal programming allows a simultaneous solution of a system of complex conflicting objectives rather than a single, simple objective as required in linear programming models. Ijiri in 1965 made the first attempt to apply goal programming to management control problems. He suggested that multiple goals be treated according to their importance. More recently, extension and application of goal programming have largely been the work of S. M. Lee and his associates.

The purpose of this paper is to present a further extension in analysis of assignment problems by introducing the goal programming approach.

The following problem illustrates how goal programming can be used in analysis of an assignment problem with multiple conflicting goals.
relatively simple, hypothetical problem shows the versatility of goal pro-
gramming in handling a conflicting multiple goal assignment problem
obscured by problem details and complexity.

Illustration of Goal Programming Approach to
Assignment Problem

A small marketing company, Alpha Marketing International (AMI), is
located in Chicago and employs ten full-time marketing analysts. Assume
that the company has just received requests for marketing research work
from five clients in the Chicago area. Currently, only four marketing ana-
lysts are free and available for the assignments. The basic problem of the
company is how best to assign the marketing analysts.

Management realizes that the time and cost to complete the studies will
depend upon the skill, experience, and attitude of each of the marketing
analysts. Management has evaluated these factors through survey and past
experience. The project commission for each analyst-client combinations is
shown in Table 1.

<table>
<thead>
<tr>
<th>TABLE 1</th>
<th>Combination Cost for Each Analyst-Client Combinations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Clients 1 2 3 4 5</td>
</tr>
<tr>
<td>Analysts</td>
<td>Y11 ($3200) Y12 ($1800) Y13 ($1900) Y14 ($2400) Y15 ($1700)</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Y21 ($1800) Y22 ($1900) Y23 ($3000) Y24 ($1900) Y25 ($1800)</td>
</tr>
<tr>
<td>3</td>
<td>Y31 ($2500) Y32 ($3100) Y33 ($2900) Y34 ($3000) Y35 ($2000)</td>
</tr>
<tr>
<td>4</td>
<td>Y41 ($3000) Y42 ($2900) Y43 ($2800) Y44 ($2900) Y45 ($2100)</td>
</tr>
</tbody>
</table>

The marketing analysts are on a fixed salary plus a 10% commission
based on the cost of the project. For example, if marketing analyst num-
ber 1 is assigned to client Number 3, his commission will be $3200, and
the total cost for the project will be $32,000.

Two common approaches are used in solving assignment problems.
These approaches are: 1) the intuitive approach, and 2) the assignment
model of linear programming. The intuitive approach has enjoyed the
greatest application due to its ease. The major limitations of this approach are: