**Decision Models**

**Union Airways: Personnel Scheduling**

Union Airways is adding more flights to and from its hub airport and so needs to hire additional customer service agents. However, it is not clear just how many more should be hired. Management recognizes the need for cost control while also consistently providing a satisfactory level of service to the company’s customers, so a desirable trade-off between these two factors is being sought. Therefore, a management science team is studying how to schedule the agents to provide satisfactory service with the smallest personnel cost.

Based on the new schedule of flights, an analysis has been made of the minimum number of customer service agents that need to be on duty at different times of the day to provide a satisfactory level of service. These numbers are shown in the last column of Table 1 for the time periods given in the first column. The other entries in this table reflect one of the provisions in the company’s current contract with the union that represents the customer service agents. The provision is that each agent works an eight-hour shift. The authorized shifts are

Shift 1: 6 AM to 2 PM Shift 2: 8 AM to 4 PM Shift 3: Noon to 8 PM Shift 4: 4 PM to midnight Shift 5: 10 PM to 6 AM

Table 1

**Time Periods Covered by Shift**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | **Minimum**  **Number of** |
| **Time Period** | **1** | **2** | **3** | **4** | **5** | **Agents Needed** |
| 6 AM to 8 AM | √ |  |  |  |  | 48 |
| 8 AM to 10 AM | √ | √ |  |  |  | 79 |
| 10 AM to noon | √ | √ |  |  |  | 65 |
| Noon to 2 PM | √ | √ | √ |  |  | 87 |
| 2 PM to 4 PM |  | √ | √ |  |  | 64 |
| 4 PM to 6 PM |  |  | √ | √ |  | 73 |
| 6 PM to 8 PM |  |  | √ | √ |  | 82 |
| 8 PM to 10 PM |  |  |  | √ |  | 43 |
| 10 PM to midnight |  |  |  | √ | √ | 52 |
| Midnight to 6 AM |  |  |  |  | √ | 15 |
| Daily cost per agent | $170 | $160 | $175 | $180 | $195 |  |

Check marks in the main body of Table 1 show the time periods covered by the respective shifts. Because some shifts are less desirable than others, the wages specified in the contract differ by shift. For each shift, the daily compensation (including benefits) for each agent is shown in the bottom row. The problem is to determine how many agents should be assigned to the respective shifts each day to minimize the total personnel cost for agents, based on this bottom row, while meeting (or surpassing) the service requirements given in the last column.